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# COMPUTATION OF THE PERCENTAGE POINTS OF THE CHI-SQUARE DISTRIBUTION

by

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Warfare Analysis Department

APRIL 1977

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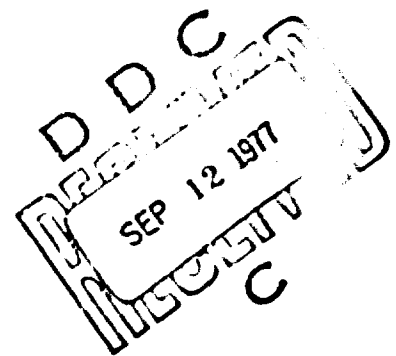
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A. R. DiDonato

R. K. Hageman



11-1473

## FOREWORD

This technical report was written in the Applied Mathematics Section, Science and Mathematics Research Group, Warfare Analysis Department.

The authors are indebted to Dr. Marlin Thomas and members of his Statistical Analysis Branch for helping to choose the input values for the table of percentage points given in Appendix A.

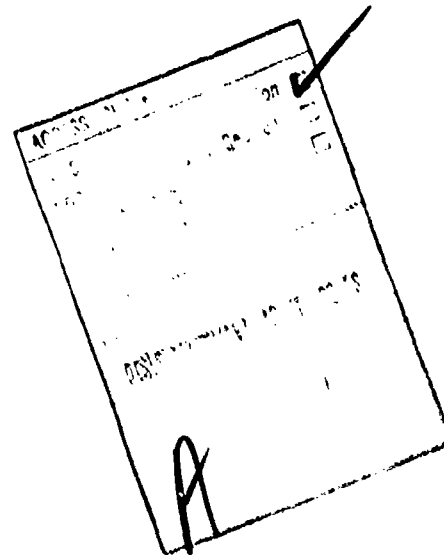
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## ABSTRACT

A Fortran IV program is developed for computing the percentage points of the Chi-square distribution. The Newton-Raphson procedure is used with good initial approximations. The maximum number of iterations is four and in most cases only one or two are needed. An extensive table is given of the percentage points  $\chi^2$  in terms of  $\nu$ , a positive number, and  $Q(\nu|\chi^2)$ , the probability integral of the Chi-square distribution.

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# 1. INTRODUCTION

The primary objective of this paper is to describe the effective use of the Newton-Raphson procedure (N-R) for finding the percentage points of the Chi-square distribution. For a given value of  $Q(\nu|\chi^2)$  and one of  $\nu > 0$ , the value of  $\chi^2$  is found, where

$$Q(\nu|\chi^2) = [2^{\nu/2}\Gamma(\nu/2)]^{-1} \int_{\chi^2}^{\infty} e^{-t/2} t^{\nu/2-1} dt, \quad \nu > 0 \quad (1)$$

$$0 \leq Q(\nu|\chi^2) \leq 1, \quad P(\nu|\chi^2) \equiv 1 - Q(\nu|\chi^2), \quad Q(\nu|0) = 1. \quad (2)$$

Here  $\Gamma(\cdot)$  denotes the complete gamma function.

The final results of this study are a Fortran IV program which is listed in Appendix C, and an extensive table of percentage points with six correct significant digits. The program was used on the CDC 6700 to construct the table which contains 72,000 entries. The entire calculation took only 7.5 minutes with an average of  $2(N-R)$  iterations per entry. The table is given in Appendix A. A very condensed version is also given in Appendix B primarily to exhibit a corrected copy of the table in [1, pp. 984-985]. The program was also employed to check a table of 5290 entries by Harter, [4, pp. 137-161]. No errors larger than one unit in the last place were found. They are listed in Section 5.

Because the notation is more convenient, we shall work with the incomplete gamma function ratios,  $P(a, x)$  and  $Q(a, x)$ , [2] instead of the corresponding  $P(\nu|\chi^2)$  and  $Q(\nu|\chi^2)$ , where

$$P(a, x) = \frac{1}{\Gamma(a)} \int_0^x e^{-t} t^{a-1} dt = P(\nu/2|\chi^2/2) \quad (3)$$

$$Q(a, x) = \frac{1}{\Gamma(a)} \int_x^{\infty} e^{-t} t^{a-1} dt = Q(\nu/2|\chi^2/2), \quad (4)$$

$$0 \leq \nu = 2a, \quad 0 \leq \chi^2 = 2x. \quad (5)$$

The relationships between (1), (2) and (3), (4) are well-known and easy to show using (5).

For easy reference, we note that the (N-R) refers to an iterative procedure for computing a root  $r$  of a function  $f(t) \in C^1$ . The  $(n+1)$ st iterate is given by

$$t_{n+1} = t_n - f(t_n)/f'(t_n), \quad n = 0, 1, \dots \quad (6)$$

If convergence occurs so that

$$\lim_{n \rightarrow \infty} t_n = y, \quad f(y) = 0, \quad (7)$$

and moreover if  $f'(y) \neq 0$ , then

$$\lim_{n \rightarrow \infty} [t_{n+1} - y] = \frac{1}{2} [f''(y)/f'(y)] [t_n - y]^2, \quad [6, \text{pp. 329-330}]. \quad (8)$$

A glance at (8) shows that for  $t_{n+1}$  sufficiently close to  $y$  the error in  $t_{n+1}$  is approximately proportional to the square of the error in  $t_n$ . This is the attractive feature of the (N - R), and it applies in our case since  $f' = dP/dx$ , or  $dQ/dx$ , is always positive, or negative, respectively for  $x > 0$ , i.e., never zero.

In order to successfully use the (N - R) to find  $x$  from  $P(a, x)$  or  $Q(a, x)$ , the following questions required affirmative answers:

- 1) Can  $P(a, x)$  and  $Q(a, x)$  be computed efficiently to high relative accuracy?
- 2) Can a "good" initial approximation to  $x$ , denoted hereafter by  $x_0$ , always be found?
- 3) Will the (N - R) always converge for such  $x_0$ ?

Treating the third question first, it is easy to show from (3) that for fixed  $a \leq 1$ ,  $P(a, x)$  is concave for all  $x \geq 0$ , and that for  $a > 1$ ,  $P(a, x)$  has an inflection point at  $x = a - 1$  with  $P$  convex for  $0 \leq x < a - 1$  and concave for  $x > a - 1$ . Similar properties hold for  $Q(a, x)$ . Typical curves are shown in Figure 1.

It can be shown analytically or from a geometric interpretation of the (N - R) that convergence will occur when  $a \leq 1$  provided  $x_0 \leq x$ , and also when  $a > 1$  if  $x_0 = a - 1$ . Thus global convergence can always be achieved without much difficulty.

Nevertheless, experimentation shows that if  $x_0$  is chosen simply to assure convergence in the ways just described, the rate of convergence in most cases will be slow. Therefore for better efficiency, efforts were made to determine an  $x_0$  "close" to  $x$  even though the sufficient conditions noted above might not be

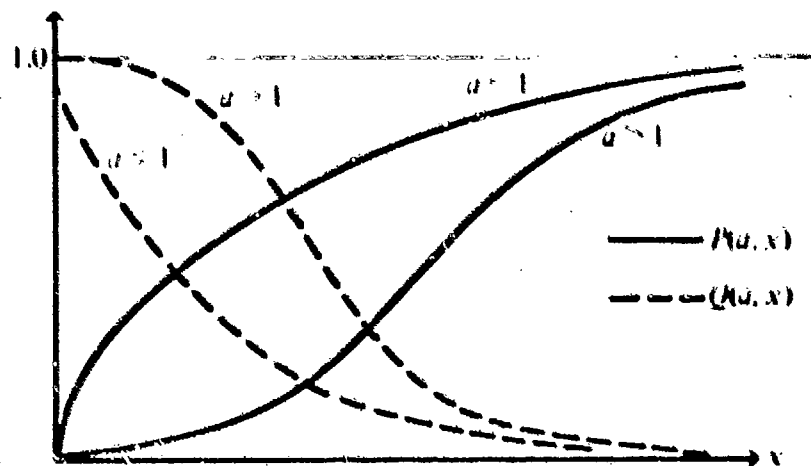


Figure 1. Typical curves of  $P(a, x)$  and  $Q(a, x)$  for fixed  $a$ .

satisfied. Convergence then would be established from computer results. This approach lead to a set of initial approximations depending on  $P$ ,  $Q$ , and  $a$ , such that for  $\epsilon < P < 1 - \epsilon$  ( $\epsilon = 5 \times 10^{-13}$ ), no more than four iterations of the  $(N - R)$  were needed to obtain  $x$  correctly to about 8 significant digits in every case tried including the 72,000 entries of the table in Appendix A.

For the  $(N - R)$  to work so well not only are "good" starting values  $x_0$  required, but also  $P$ ,  $Q$  and their first derivatives must be available to high precision. This presented no problem because of a previous study of ours, [2], from which a computer program was developed giving  $P$  and  $Q$  to 12 significant digits for all  $a > 0$ ,  $x > 0$ . The high precision requirements are necessary, of course, when  $x$  is desired to many digits. In addition, they are also needed when  $P$  is very close to zero or one otherwise the last term on the right hand side of (6) could carry no reliable digits with disastrous effects on the iterations.

Clearly then, the three questions posed above can be answered in the affirmative, and consequently a computer program based on the  $(N - R)$  to find the percentage points of the chi-square distribution can be constructed.

In the next section we obtain the initial approximations for  $x$ . In Section 3, the criteria for terminating the  $(N - R)$  are specified. In Section 4, the computer program is described, and a flow chart is given.

## 2. INITIAL APPROXIMATIONS

Our objective in this section is to give approximations for  $x$  which result in rapid convergence of the  $(N - R)$  to a final estimate for  $x$ , say  $x^*$ . By rapid convergence we mean that no more than 4 iterations are necessary for about 8 correct significant digits in  $x^*$ .

We remark here that some of the analysis below is heuristic with the emphasis on plausibility, and attaining efficiency in the use of the  $(N - R)$ , at expense of rigor. The usefulness of the initial approximations is evaluated primarily by computer experimentation. No effort is made to obtain associated error bounds on  $|x_0 - x|$ , where  $x_0$  denotes the initial approximation.

The input values of  $P(a, x)$  and  $Q(a, x)$  are denoted by  $P$  and  $Q$ , respectively. For the remainder of this section, as well as Sections 3 and 4, the flow chart on page 11 will be helpful.

Two sets of initial approximations for  $x$  are used depending on whether  $a \leq 1$  or  $a \geq 1$ . (If  $a = 1$ , then  $x = -\ln(Q)$ .)

Considering  $a \leq 1$  first, let

$$B = Q/a. \quad (9)$$

Then for  $B \geq .45$ , we have  $x \leq 1$ . For, if it is assumed that  $x > 1$ , then with  $a \leq 1$

$$.45 \leq B = \int_1^x e^{-t} t^{a-1} dt \leq e^{-1},$$

This inequality implies  $x < .7985$  contrary to the assumption  $x > 1$ . Thus with  $x < 1$  an approximation for  $x_0$ , say  $u$ , can be obtained from

$$P(a, x) = \frac{x^a}{\Gamma(a+1)} \left[ 1 - \frac{ax}{(a+1)!} + \frac{ax^2}{(a+2)2!} - \dots \right], \quad [1, \text{p. 262}] \quad (10)$$

by dropping all terms but the first, i.e.,

$$u = [P(a+1)]^{1/a}. \quad (11)$$

This result is improved by using the first two terms of (10) with (11). In this case

$$u \approx x_0 \left( 1 - \frac{au}{a+1} \right)^{1/a} \approx x_0 \left( 1 - \frac{u}{a+1} \right)$$

or

$$\boxed{x_0 \approx u/[1 - u/(a+1)]}, \quad B \geq .45, \quad a < 1. \quad (12)$$

We see that  $1 - u/(a+1) > 0$ . Indeed, from (10),  $u < x$  for  $x < 1$ . Hence  $u/(a+1) < x/a+1 < x$  and  $1 - u/(a+1) > 1 - x > 0$ .

If  $B < .45$  (with  $a < 1$ ), then an approximation for  $x_0$  is found from the asymptotic series

$$Q(a, x) \approx [R(a, x)/x] \left[ 1 + \frac{a-1}{x} + \frac{(a-1)(a-2)}{x^2} + \dots \right], \quad (x \rightarrow \infty), \quad [1, \text{p. 263}], \quad (13)$$

where

$$R(a, x) = e^{-x} x^a / \Gamma(a). \quad (14)$$

We have by carrying only the first term on the right hand side of (13)

$$e^{-x} x^{a-1} \approx Q(a) = B < .45, \quad (15)$$

and taking logarithms

$$-x + (a-1) \ln x \approx \ln B. \quad (16)$$

For  $a < 1$ ,  $x > 1$ , the first term on the left dominates the second, giving as a first approximation to  $x_0$

$$x \approx -\ln B. \quad (17)$$

This estimate for  $x_0$  is then improved by using it in (16) to get

$$x = y + (a-1) \ln y. \quad (18)$$

We improve the result still further by using a rational approximation for  $Q$ , [5].

$$Q \approx [R(a, x)/v] \left( \frac{x+1}{x+2-a} \right), \quad (19)$$

and obtain

$$x \approx -\ln B + (a-1) \ln x - \ln [(x+2-a)/(x+1)] \quad (20)$$

Now using  $v$ , as given by (18), for  $x$  on the right hand side of (20), we have

$$x_0 = y + (1-a) \ln v - \ln [(v+2-a)/(v+1)] \quad B < .45, \quad 0 < a < 1. \quad (21)$$

We digress here briefly to show that the arguments of the logarithms in (21) are always positive for admissible values of  $a, x$ . Indeed, since  $B < .45$ ,

$$v = -\ln B > -\ln .45 = v_m \approx .7985, \quad (22)$$

so that for  $v_m \leq v \leq 1$ , we have from (18), with  $a < 1$ ,

$$x \geq v \geq v_m \approx .7985.$$

For  $y \geq 1$ , we have from (18) that  $dv/dy = 1 + (a-1)/v > 1 - 1/v > 0$ , also  $v = 1$  at  $y = 1$ . Therefore  $x \geq .7985$  for all  $B < .45, a < 1$ . Also  $x+2-a \geq .7985+2-a \geq 1.7985$ .

It is possible when  $x$  is in the neighborhood of the computer determined value 0.62 that (12) is better than (21) as a choice for  $x_0$ , even though  $B < .45$ , or that (21) is better than (12) when  $B \geq .45$ . Denoting  $x_0$  from (12) by  $x_{01}$  and  $x_0$  from (21) by  $x_{02}$ , it was concluded from computer experimentation that when  $B \geq .45$  and  $x_{01} \geq .57$ , or  $B < .45$  and  $x_{02} \leq .67$  that usually the best choice for these situations was to take  $x_0$  as the larger of  $x_{01}$  and  $x_{02}$ .

For  $a > 1$ , we consider the Cornish-Fisher six term approximation for  $v$  and denote it by  $\tilde{v}_6$ . [3] A quantity  $x$  is determined first, where for a given  $Q$

$$Q = \frac{1}{\sqrt{2\pi}} \int_0^x e^{-t^2/2} dt = q(x). \quad (23)$$

The value of  $x$  for a given value of  $Q \in (0, 1/2]$  is obtained from the rational approximation

$$x \approx \psi = \frac{a_0 + a_1\psi + a_2\psi^2 + a_3\psi^3}{1 + b_1\psi + b_2\psi^2 + b_3\psi^3 + b_4\psi^4} \quad \psi = (-2 \ln Q)^{1/2}. \quad (24)$$

where the coefficients are determined by the Chebyshev minimax error criterion. They are given by

$$\begin{aligned} a_0 &= 3.3112 \cdot 59221 \cdot 08741 & b_1 &= 6.6105 \cdot 37656 \cdot 25462 \\ a_1 &= 11.661 \cdot 67202 \cdot 88968 & b_2 &= 6.4069 \cdot 15977 \cdot 60039 \\ a_2 &= 4.2834 \cdot 21589 \cdot 67104 & b_3 &= 1.2746 \cdot 44897 \cdot 82223 \\ a_3 &= .21362 \cdot 34937 \cdot 15853 & b_4 &= 3.6117 \cdot 08101 \cdot 88470(-1) \end{aligned} \quad (25)$$

Computer results indicate that the maximum relative error is no larger than  $10^{-5}$  for  $10^{-30} < Q < 5$ . A similar expression is given in [1, p. 933] with that rational function containing one less term in both the numerator and denominator. For values of  $Q > 1.2$  ( $P > 1.2$ ),  $x$  was found for  $1 < Q$  and then replaced by  $(x-y)$ . Once  $x$  is computed, the Cornish-Fisher expansion [3] yields an approximation  $x_0$  to  $x$ , namely

$$\begin{aligned} x_0 &= a + \sqrt{a} \left[ \frac{1}{6} \sqrt{a} + (s^2 - 1) \left( \frac{1}{3} + s(s^2 - 7) \right) \frac{1}{36 \sqrt{a}} \right. \\ &\quad \left. + \left[ (6s^4 + 14s^2 - 32) \frac{1}{1620 a} + s(9s^3 + 256s^2 + 433) \frac{1}{38880 a^{3/2}} \right] \right] \end{aligned} \quad (26)$$

We remark here that an improved version of the Wilson-Hilferty approximation for  $x$ , [7] in terms of  $s$  and  $a$  also, was not as good as (26). For completeness, we give that approximation

$$x_0 \approx a[1 + 1/9a + (s-h)\sqrt{3a}]^{-3} \quad (27)$$

$$h = [3(s^2 - 3) + 8(s^2 - 1)\sqrt{3a}] / 108a \quad (28)$$

The quantity  $x_0$  given by (26) improves as an estimate for  $x$  as  $a$  increases. Experimentation shows, when  $P > 1.2$ , that if  $a > 19$  or if  $\hat{x}_0 > 0.116z + 1$ , that  $x_0$  is as acceptable as  $x_{01}$ . However, if  $a < 19$  and  $\hat{x}_0 < 0.116z + 1$ , with  $P > 1.2$ , then another choice for  $x_0$  is considered. In particular, from (10)

$$a = [P(1a + 1)]^{1/a} = x \left( 1 + \frac{x}{a + 1} \right) \quad (29)$$

or, replacing  $x$  with  $x$

$$\frac{1}{a + 1} x^2 - x + a = 0 \quad (30)$$

The quadratic has solution

$$x = \frac{a + 1}{2} \left[ 1 \pm \sqrt{1 - 4a(a + 1)} \right] \quad (31)$$

Indicating the solution with the minus sign by  $x = x_2$  or  $x_{02}$ , we have

$$x_2 = \frac{a + 1}{2} \left[ 1 - \sqrt{1 - 4a(a + 1)} \right] \quad (32)$$

The root in (31) with the plus sign,  $x(+)$  should not be used, because it does not yield a good approximation to  $x$  when  $x/(a+1)$  is small. Indeed, the approximation for  $u$  given in (29) is only good if  $x/a+1$  is small. Therefore, we have from (29)  $\tilde{x} \cong u$ . In addition, we also conclude from (30) that in fact  $u < \tilde{x}$ , so that

$$u/(a+1) < \tilde{x}/(a+1) \ll 1. \quad (33)$$

Then expanding the radical of (31) gives the desired result,  $\tilde{x} \cong u$  from  $x(-)$  but not from  $x(+)$  which precludes the use of  $x(+)$ .

The choice between  $\tilde{x}_0$  and  $\bar{x}_0$  ( $x(-)$ ) was made by experimentation. The conclusions were: If  $P \leq 1/2$ ,  $a \leq 19$ ,  $\tilde{x}_0 \leq 0.11(a+1)$  and  $a > 4$ , or instead of  $a > 4$ ,  $a \leq 4$  and  $P \leq n_j$ , where  $j$  equals that  $i = 1, 2, 3, 4$  for which  $|a - i|$  is a minimum and  $n_1 = .15$ ,  $n_2 = .05$ ,  $n_3 = .01$ ,  $n_4 = .001$ , then  $\bar{x}_0$  from (32) is taken as  $x_0$ . On the other hand  $\tilde{x}_0$  of (26) is taken as  $x_0$  under the conditions specified earlier, or when  $P \leq 1/2$ ,  $a \leq 19$ ,  $\tilde{x}_0 \leq 0.11(a+1)$ ,  $a \leq 4$  and  $\bar{P} > n_j$ .

When  $\bar{P} > 1/2$  and  $a \geq 11$ , then again  $\tilde{x}_0$  is a satisfactory choice for  $x_0$ . If however  $\bar{P} > 1/2$  and  $1 < a < 11$ , then experimentation shows a better estimate than  $\tilde{x}_0$  is obtained from

$$x_0 = v - (1-a) \ln \tilde{x}_0 - \ln [(\tilde{x}_0 + 2 - a)/(\tilde{x}_0 + 1)] \quad (34)$$

provided that in addition we also have

$$\tilde{x}_0 > 4a. \quad (35)$$

Equation (34) is obtained in much the same way as (21) so its derivation is not given.

### 3. CRITERIA FOR TERMINATING $(N-R)$

In this section we discuss the ways in which the  $(N-R)$  is terminated. Since we are interested in getting  $x$  correct to about 8 significant digits we required

$$|x_N - x_{N-1}| < \lambda x_N, \quad \lambda = 5 \times 10^{-5}, \quad (36)$$

where  $x_N$  denotes the  $N^{\text{th}}$  iterate of  $(N-R)$ . If the inequality holds, then  $x_N$  and  $x_{N-1}$  agree to at least 4 significant digits. However, this means  $x_N$  has close to 8, since by (8)

$$|x_N - x|/x \cong K |x_{N-1} - x|^2/x^2, \quad K < \frac{1}{2} |a - 1 - x|. \quad (37)$$

which implies the relative error in  $x_N$  is proportional to the square of the relative error in  $x_{N-1}$ . The proportionality factor  $K$  can be large when  $a$  and  $P$  are large, for example,  $K \cong 3525$  when  $a \cong 10^6$ ,  $Q \cong 10^{-12}$ , but it is also true for large  $a$  that  $x_0$  is very close to  $x$ . In fact, for the example above  $x_0$ , from (26), already gives  $x$  to 11 significant digits. Computer results support our conclusion drawn from (37).

Although the primary goal is to insure the accuracy of  $x^*$  to about 8 significant digits (it is recalled  $x^*$  is the final iterate from  $(N-R)$ ). See page 3. A secondary objective is to satisfy (40) or (41) below. In this connection, we required once (36) was satisfied, that

$$|x_N - x_{N-1}|^2 |a - x_N - 1| (a + 1 - x_N) \leq 2 \left( \frac{a+1}{a} \right) \lambda x_N^2 \quad \text{if } a > x_N - 1 \quad (38)$$

or

$$|x_N - x_{N-1}|^2 (x_N + 1 - a)(x_N + 2 - a) \leq 2 \lambda x_N (x_N + 1), \quad \text{if } a \leq x_N - 1. \quad (39)$$

If (36) is satisfied but the appropriate inequality, (38) or (39), is not, then one more iteration of  $(N-R)$  is carried out before stopping the procedure. We note in this case  $x^* = x_{N+1}$ . At  $\lambda = 5 \times 10^{-5}$  no cases were found where the designated inequality, (38) or (39), was not satisfied, however for smaller values of  $\lambda$ , for example  $6 \times 10^{-7}$  some cases did occur and one more iteration was made.

Inequalities (38) and (39) are employed to test whether

$$|P(a, x_N) - P| \leq \lambda P, \quad \text{if } P \leq 1/2, \quad (40)$$

or

$$|Q(a, x_N) - Q| \leq \lambda Q, \quad \text{if } Q < 1/2, \text{ respectively.} \quad (41)$$

Ideally, we would like that (38) always implies (40) and (39) always implies (41). This will not always be the case because of the approximations that are used to get (38) and (39). In general however computer results indicate that (38) and (39) work quite well in establishing (40) and (41).

We derived (38) in the following way. Let  $P_n$  denote  $P(a, x_n)$ . Taking two terms of the Taylor series expansion of  $P$  about  $x_N$ , we have

$$(P - P_N) P_N \approx (x - x_N) P'_N / P_N. \quad (42)$$

Using the expressions

$$P(a, x) = [R(a, x)/a] A(a, x), \quad P'(a, x) = R(a, x)/x, \quad (43)$$

where

$$A(a, x) = 1 + \sum_{k=1}^{\infty} \frac{x^k}{(a+1)^{k+1} (a+k)}, \quad [1, p. 262]$$

$$P'_N / P_N = [R(a, x_N)/x_N] / [R(a, x_N)/a] A(a, x_N) \quad (44)$$

$$\leq \frac{a}{x_N} \left[ 1 + \frac{1}{x_N(a+1)} \right] \approx \frac{a}{x_N} \left( 1 + \frac{x_N}{a+1} \right) = \frac{a}{a+1} (a+1-x_N) x_N$$

Using this result in (42)

$$(P - P_N)/P_N \cong (P'_N/P_N)(x - x_N) \cong \frac{a}{a+1} (a+1 - x_N)(x - x_N)/x_N, \quad (x_N < a+1). \quad (45)$$

Now using an approximation to (37) in (45), namely

$$\begin{aligned} |x - x_N|/x_N &\cong K|x - x_{N-1}|^2/x_N \\ &\cong \frac{1}{2} |a - 1 - x_N||x_N - x_{N-1}|^2/x_N^2, \end{aligned} \quad (46)$$

we have

$$|P - P_N|/P_N \cong \frac{1}{2} \frac{a}{a+1} (a+1 - x_N)|a - 1 - x_N||x_N - x_{N-1}|^2/x_N^2, \quad x_N < a+1. \quad (47)$$

Constraining the right hand side to be no greater than  $\lambda$  yields (38).

Inequality (39) is obtained in much the same way. Again

$$(\bar{Q} - Q_N)/Q_N \cong (Q'_N/Q_N)(x - x_N). \quad (48)$$

Approximating  $Q_N$  by (19), and differentiating (4), we obtain

$$|Q'_N/Q_N| \cong (x_N + 2 - a)/(x_N + 1), \quad x_N > a - 2, \quad (49)$$

which when used in (48) gives

$$|\bar{Q} - Q_N|/Q_N \cong (x_N + 2 - a)/(x_N + 1)|x - x_N|. \quad (50)$$

Thus approximating (37) as above by (46) and using the result in (50) gives

$$\frac{|\bar{Q} - Q_N|}{Q_N} \cong \frac{1}{2} (x_N + 2 - a)|x_N + 1 - a||x_N - x_{N-1}|^2/x_N(x_N + 1), \quad x_N > a - 2. \quad (51)$$

Constraining the right hand side to be no greater than  $\lambda$  gives (39). Since the approximation for  $Q$ , given by (19), improves with increasing  $x$ , we used (39) for  $x_N \geq a+1$  rather than  $x_N > a-2$ .

#### 4. COMPUTER PROGRAM

The flow chart at the end of this section on page 11 shows in some detail the basic organization and flow of the program. The boxes marked (A) and (B) refer to particular forms of the  $(X-R)$  which are used. Thus (A) refers to the algorithm

$$x_{n+1} = x_n [1 - (P(a, x_n) - P)R(a, x_n)], \quad n = 0, 1, \dots, \quad (52)$$

and (B) refers to

$$x_{n+1} = x_n [1 + (Q(a, x_n) - Q)/R(a, x_n)], \quad n = 0, 1, \dots, \quad (53)$$

where it is recalled  $P, Q, a$  are given and  $R(a, x)$  is defined by (14). For  $\bar{P} \leq 1/2$ , (52) is used and when  $\bar{P} > 1/2$  (53) applies. By a single call to the incomplete gamma function ratio routine (PAX 6), [2], the quantities  $P(a, x_n)$ ,  $Q(a, x_n)$  and  $R(a, x_n)$  are computed to an accuracy of one unit in the twelfth significant digit. (There is an option of obtaining 6 or 3 significant digits, instead of 12, if desired.) If  $a < 100$ ,  $R(a, x_n)$  is always available from (PAX 6). In order to obtain  $R(a, x_n)$  when  $a \geq 100$  and  $3a \leq 4x \leq 5a$  however, an appropriate modification of the original version of PAX 6) was made.

The conditions under which  $(N - R)$  is terminated were discussed in the previous section. Essentially, the iterations continue until

$$|x_N - x_{N-1}| \leq \lambda x_N. \quad (54)$$

Then for  $x_N < a + 1$ , (38) is checked, or if  $x_N \geq a + 1$  then (39) is checked. Denoting the final output value for  $x$  by  $x^*$ , if the applicable inequality, (38) or (39), is satisfied then  $x^* = x_N$ , if it is not satisfied then one more  $(N - R)$  iteration is carried out and  $x^* = x_{N+1}$ .

The program is presently set with  $\lambda = 5 \times 10^{-5}$ . By arguments given previously this insures close to 8 correct significant digits for the output value  $x^*$ . In the case of the table in Appendix A,  $\lambda$  was set to  $5 \times 10^{-6}$ .

A reflection of the very good initial approximations ( $x_0$ ) for  $x$  is the fact that no case was found where more than 4 iterations was required, including the 72,000 entries of the table in Appendix A. The methods by which  $x_0$  is obtained were discussed in Section 2.

An estimate of the average computing time per case for the CDC 6700, with  $\lambda = 5 \times 10^{-5}$ , is about 4 milliseconds.

A feature of the program permits the user to specify a starting value,  $\bar{x}_0$ , of his own. Thus if the user desires more significant figures in  $x^*$ , he need only make an additional call to the program specifying  $\bar{x}_0$  as the last value of  $x^*$  obtained. Or, it maybe that the user can, in special circumstances, actually supply better starting values than those given by the program.

As a result of this option for the user, the possibility of a poor choice for  $x_0$  arises. For example  $\bar{x}_0 < 0$  or  $\bar{x}_0$  such that  $x_n < 0$ , or  $\bar{x}_0$  such that many iterations of  $(N - R)$  are needed. With this in mind, an additional output location, call it  $Y$ , is allotted to inform the user of errors in input or poor choices for  $x_0$ . In particular

If  $n \in Y$ ,  $n$ , a positive integer, indicates the number of iterations by  $(N - R)$ .

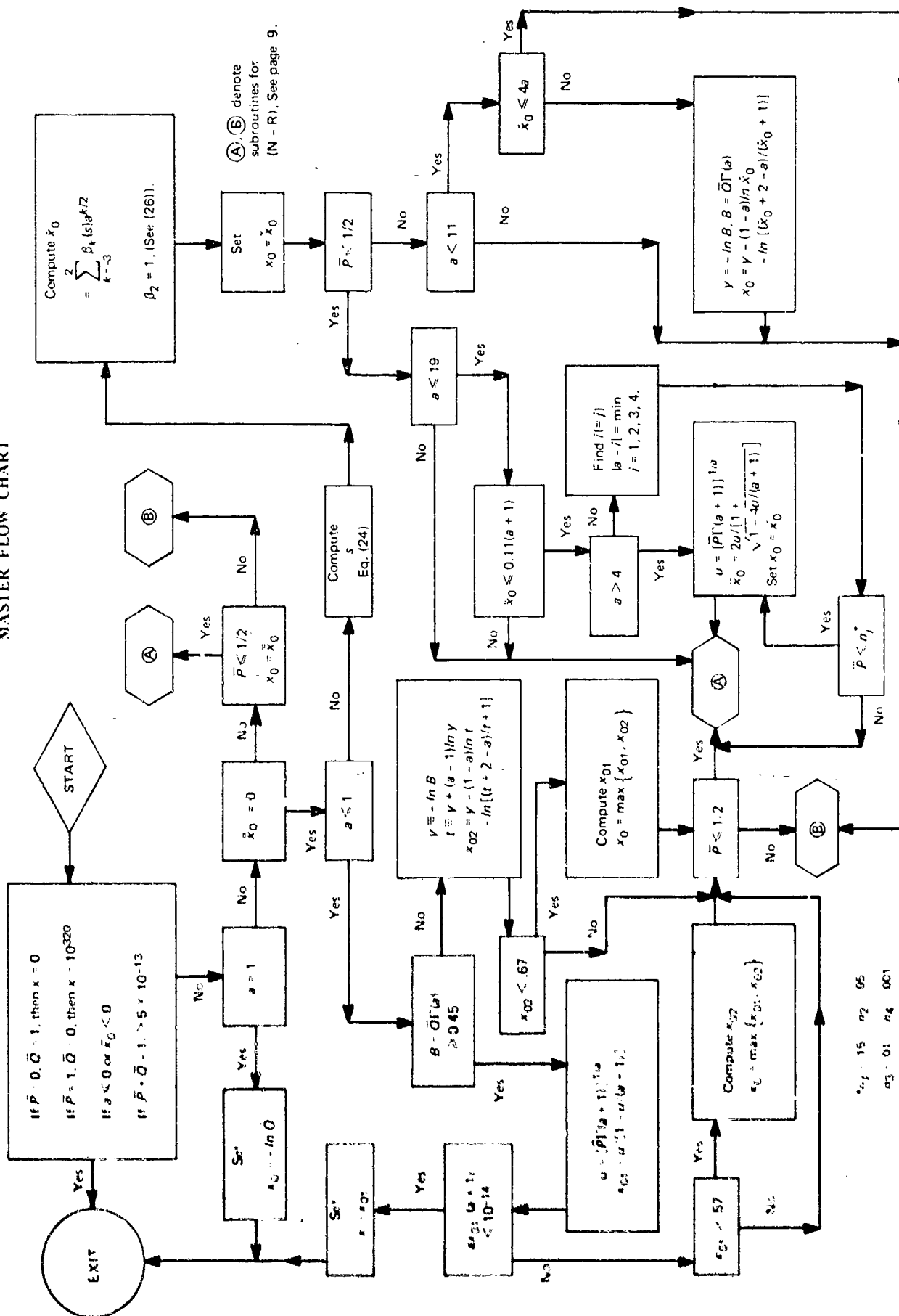
If  $n = 0$ , then either  $a \geq 1$  or  $a < 1$ ,  $B \geq .45$ , (see (9)), and  $ax_0/(a + 1) < 10^{-14}$ , or  $P = 1$ ,  $Q = 0$ , or  $P = 0$ ,  $Q = 1$ . In every case an acceptable value for  $x$  is given.

If  $n = 2 \in Y$ ,  $a \leq 0$  has been specified. No  $x^*$  is found.

If  $n = 4 \in Y$ ,  $|P + Q - 1| > 5 \times 10^{-13}$ , i.e.,  $P$  and  $Q = 1 - P$  are not compatible. No  $x^*$  is found.

If  $n = 5 \in Y$ ,  $x_0$  specified by the user is negative. No  $x^*$  is found.

# MASTER FLOW CHART



If  $-6 \in Y$ , 20 iterations of  $(N - R)$  have occurred. A poor choice of  $\bar{x}_0$  by the user is indicated.  $x^*$  is given but it may not be very accurate.

If  $-7 \in Y$ ,  $x_n$  from  $(N - R)$ , using (52) or (53) is negative no value for  $x^*$  is given.

It is the user's responsibility to check location  $Y$ .

The program has been validated for values of  $\lambda$  ranging from  $10^{-6}$  to  $10^6$  with  $P \in [\epsilon, 1 - \epsilon]$ , ( $\epsilon = 5 \times 10^{-13}$ ). The program experienced no difficulty. Also Harter's table of percentage points [4] were used as a check. A list of the errors found in his table is given in the next section.

Finally, we remark that it is possible to speed up the program by requiring fewer correct significant digits in  $x^*$ . For example for  $\lambda = 5 \times 10^{-2}$ , the average computing time is reduced from 4 to 2 milliseconds with  $x^*$  good to 3 or 4 significant digits. A further decrease in computing time for  $\lambda = 5 \times 10^{-2}$  can be achieved by requiring less accuracy in the computation of  $P, Q$ , say 6 significant digits instead of 12. This is accomplished by setting a parameter in the *PAX6* subroutine, (see [2]). Under these circumstances the average computing time per case would be about 1.5 milliseconds.

## 5. ERRORS IN HARTER'S TABLE

Harter's table is a tabulation with 5290 entries of  $\chi^2$  in terms of  $\nu$  and  $P(\nu|\chi^2)$ . It is contained in [4, pp. 137-161]. The input values of  $\nu$  and  $P(\nu|\chi^2)$  that he used also make up part of the input for the much larger table in Appendix A of this report.

A careful check of Harter's results shows that 139 of his values for  $\chi^2$  are in error by one unit in the 6th significant digit which is also the last recorded digit. Certainly such errors detract very little from his table. We list the necessary corrections below. The page number in [4] is given first as a heading. The first, fourth, and seventh columns refer to values of  $\nu$ , the second, fifth, and eighth columns refer to values of  $P(\nu, \chi^2)$ , and the third, sixth and ninth columns to the associated error. If a plus one (+1) occurs in the error column (denoted by E) this means a one should be added in the last place of Harter's tabulated result for  $\chi^2$ ; in case a minus one (-1) occurs a one should be subtracted. For example, the listing below indicates an error on page 161,  $\nu = 322$ ,  $P(\nu|\chi^2) = .9500$ . It is shown in the error column as a (-1). Therefore Harter's result of  $\chi^2 = 364.848$  should be changed to  $\chi^2 = 364.847$ .

# Corrections To Harter's Table

| $\nu$ | $P(\nu \chi^2)$ | $E$ | $\nu$ | $P(\nu \chi^2)$ | $E$ | $\nu$ | $P(\nu \chi^2)$ | $E$ |
|-------|-----------------|-----|-------|-----------------|-----|-------|-----------------|-----|
|-------|-----------------|-----|-------|-----------------|-----|-------|-----------------|-----|

## Page 138

|   |       |    |   |       |    |   |       |    |
|---|-------|----|---|-------|----|---|-------|----|
| 1 | .2000 | +1 | 5 | .0005 | +1 | 8 | .4000 | +1 |
| 4 | .0250 | +1 | 7 | .4000 | -1 | 9 | .9950 | +1 |

## Page 139

|    |       |    |    |       |    |    |       |    |
|----|-------|----|----|-------|----|----|-------|----|
| 11 | .0001 | +1 | 16 | .3000 | -1 | 18 | .2000 | +1 |
| 11 | .9750 | -1 | 16 | .9750 | +1 | 19 | .5000 | +1 |
| 12 | .0001 | +1 | 17 | .9999 | +1 | 20 | .9995 | +1 |
| 13 | .9999 | +1 | 18 | .0001 | +1 |    |       |    |
| 14 | .0100 | +1 | 18 | .0500 | +1 |    |       |    |

## Page 140

|    |       |    |    |       |    |    |       |    |
|----|-------|----|----|-------|----|----|-------|----|
| 22 | .9950 | +1 | 27 | .9900 | -1 | 29 | .2000 | +1 |
| 23 | .0005 | +1 | 28 | .4000 | +1 | 30 | .9990 | +1 |

## Page 141

|    |       |    |    |       |    |    |       |    |
|----|-------|----|----|-------|----|----|-------|----|
| 32 | .9000 | -1 | 36 | .9990 | +1 | 38 | .6000 | -1 |
| 33 | .9950 | -1 | 38 | .1000 | +1 | 39 | .7000 | -1 |
| 34 | .8000 | -1 | 38 | .5000 | +1 | 40 | .9990 | +1 |

## Page 142

|    |       |    |    |       |    |    |       |    |
|----|-------|----|----|-------|----|----|-------|----|
| 42 | .9750 | +1 | 44 | .9750 | +1 | 47 | .9750 | -1 |
| 43 | .1000 | +1 | 44 | .9950 | +1 | 49 | .9500 | -1 |
| 44 | .2000 | -1 | 45 | .9999 | +1 | 50 | .9999 | -1 |

## Page 143

|    |       |    |    |       |    |    |       |    |
|----|-------|----|----|-------|----|----|-------|----|
| 51 | .9990 | +1 | 55 | .9950 | +1 | 57 | .9950 | +1 |
| 52 | .9500 | +1 | 56 | .9750 | +1 | 58 | .9950 | +1 |
| 52 | .9750 | +1 | 56 | .9950 | +1 | 60 | .9990 | -1 |
| 52 | .9990 | +1 | 57 | .1000 | -1 |    |       |    |
| 53 | .9950 | +1 | 57 | .9500 | -1 |    |       |    |

## Page 144

|    |       |    |    |       |    |    |       |    |
|----|-------|----|----|-------|----|----|-------|----|
| 61 | .2000 | -1 | 64 | .9900 | +1 | 68 | .1000 | +1 |
| 62 | .9950 | +1 | 65 | .9950 | -1 | 68 | .2000 | -1 |
| 64 | .9000 | -1 | 66 | .2000 | -1 | 70 | .8000 | -1 |
| 64 | .9750 | +1 | 67 | .8000 | -1 |    |       |    |

## Page 145

|    |       |    |    |       |    |    |       |    |
|----|-------|----|----|-------|----|----|-------|----|
| 71 | .1000 | +1 | 74 | .9000 | -1 | 76 | .3000 | +1 |
| 72 | .9000 | -1 | 74 | .9750 | -1 | 76 | .9900 | +1 |
| 73 | .9750 | +1 | 76 | .1000 | +1 | 80 | .8000 | -1 |

## Page 146

|    |       |    |    |       |    |    |       |    |
|----|-------|----|----|-------|----|----|-------|----|
| 81 | .9990 | +1 | 82 | .0050 | +1 | 83 | .8000 | -1 |
|----|-------|----|----|-------|----|----|-------|----|

## Page 147

|    |       |    |    |       |    |    |       |    |
|----|-------|----|----|-------|----|----|-------|----|
| 93 | .0250 | -1 | 94 | .1000 | -1 | 97 | .5000 | +1 |
| 94 | .0001 | +1 | 95 | .0010 | +1 | 99 | .1000 | +1 |

Corrections To Harter's Table Continued

| $\nu$ | $P(\nu \chi^2)$ | $E$ | $\nu$ | $P(\nu \chi^2)$ | $E$ | $\nu$ | $P(\nu \chi^2)$ | $E$ |
|-------|-----------------|-----|-------|-----------------|-----|-------|-----------------|-----|
|-------|-----------------|-----|-------|-----------------|-----|-------|-----------------|-----|

Page 148

|     |       |    |     |       |    |  |  |  |
|-----|-------|----|-----|-------|----|--|--|--|
| 102 | .9750 | +1 | 109 | .1000 | +1 |  |  |  |
|-----|-------|----|-----|-------|----|--|--|--|

Page 149

|     |       |    |     |       |    |     |       |    |
|-----|-------|----|-----|-------|----|-----|-------|----|
| 112 | .1000 | +1 | 112 | .6000 | +1 | 119 | .0001 | +1 |
|-----|-------|----|-----|-------|----|-----|-------|----|

Page 150

|     |       |    |     |       |    |  |  |  |
|-----|-------|----|-----|-------|----|--|--|--|
| 122 | .0010 | +1 | 124 | .0500 | -1 |  |  |  |
| 122 | .9950 | +1 | 129 | .9500 | +1 |  |  |  |

Page 151

|     |       |    |     |       |    |     |       |    |
|-----|-------|----|-----|-------|----|-----|-------|----|
| 131 | .9995 | +1 | 132 | .0100 | +1 | 135 | .1000 | +1 |
|-----|-------|----|-----|-------|----|-----|-------|----|

Page 152

|     |       |    |  |  |  |  |  |  |
|-----|-------|----|--|--|--|--|--|--|
| 145 | .9990 | +1 |  |  |  |  |  |  |
|-----|-------|----|--|--|--|--|--|--|

Page 154

|     |       |    |     |       |    |     |       |    |
|-----|-------|----|-----|-------|----|-----|-------|----|
| 174 | .0100 | +1 | 184 | .0500 | -1 | 188 | .9750 | +1 |
| 174 | .3000 | +1 | 184 | .1000 | -1 |     |       |    |

Page 155

|     |       |    |     |       |    |     |       |    |
|-----|-------|----|-----|-------|----|-----|-------|----|
| 192 | .2000 | -1 | 196 | .0500 | +1 | 200 | .0500 | +1 |
| 192 | .9900 | +1 | 196 | .9750 | +1 | 208 | .0000 | +1 |

Page 156

|     |       |    |     |       |    |     |       |    |
|-----|-------|----|-----|-------|----|-----|-------|----|
| 212 | .9950 | +1 | 220 | .1000 | -1 | 226 | .6000 | +1 |
| 216 | .0500 | +1 | 224 | .0500 | +1 | 230 | .1000 | +1 |

Page 157

|     |       |    |     |       |    |  |  |  |
|-----|-------|----|-----|-------|----|--|--|--|
| 236 | .9000 | -1 | 244 | .9990 | +1 |  |  |  |
| 238 | .9995 | +1 | 250 | .3000 | +1 |  |  |  |

Page 158

|     |       |    |     |       |    |     |       |    |
|-----|-------|----|-----|-------|----|-----|-------|----|
| 262 | .4000 | +1 | 258 | .1000 | +1 | 270 | .9995 | +1 |
| 264 | .0005 | +1 | 262 | .9950 | +1 |     |       |    |

Page 159

|     |       |    |     |       |    |  |  |  |
|-----|-------|----|-----|-------|----|--|--|--|
| 274 | .9750 | +1 | 280 | .9750 | +1 |  |  |  |
| 276 | .9500 | +1 | 280 | .9900 | +1 |  |  |  |

Page 160

|     |       |    |     |       |    |     |       |    |
|-----|-------|----|-----|-------|----|-----|-------|----|
| 300 | .9900 | -1 | 304 | .9990 | +1 | 306 | .9750 | -1 |
| 302 | .0250 | -1 | 306 | .0001 | +1 |     |       |    |

Page 161

|     |       |    |     |       |    |     |       |    |
|-----|-------|----|-----|-------|----|-----|-------|----|
| 312 | .0500 | +1 | 318 | .9750 | +1 | 322 | .9990 | +1 |
| 314 | .9750 | +1 | 322 | .9500 | -1 | 328 | .0500 | -1 |

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**APPENDIX A**  
**TABLE A**  
**PERCENTAGE POINTS OF THE CHI-SQUARE DISTRIBUTION**

## PERCENTAGE POINTS OF $Q(\nu|\chi^2)$ -- TABLE A

This appendix contains a table of  $\chi^2$  as a function of  $\nu$  and  $Q(\nu|\chi^2)$ . It is a much larger table than the ones contained in [1, pp. 984-985], [4, pp. 137-161]. There are 72,000 values of  $\chi^2$  tabulated to six correct significant digits with 1200 values of  $\nu$  and 60 values of  $Q(\nu|\chi^2)$  taking the following values:

$\nu$ : 0.1(0.1)1.3(0.2)2.6(0.25)4.2.5(0.5)512

$Q$ : 0.999999, 0.999995, 0.99999, 0.99995, 0.9999, 0.9995, 0.999, 0.9975, 0.995, 0.9925, 0.99, 0.9875, 0.985, 0.98 (0.005) 0.95, 0.925, 0.9 (0.05) 0.5, 0.475, 0.45 (0.05) 0.10, 0.075, 0.05 (0.005) 0.015, 0.0125 (0.0025) 0.0025, 0.001, 0.0005, 0.0001, 0.00005, 0.00001, 0.000005, 0.000001.

The values of  $\chi^2$  are expressed in normalized form. For example for  $Q = .9975$  and  $\nu = 1.9$ , we have  $\chi^2 = .357377 - 02 = .357377 \times 10^{-2}$  or for  $Q = .9925$ ,  $\nu = 9.9$  we have  $\chi^2 = .233478 - 01 = .233478 \times 10^{-1}$ .

An extremely condensed version of this table is given in Appendix B starting on page 164.

### Percentage Points of the $\chi^2$ Distribution Values of $\chi^2$ in Terms of $Q$ and $v$

[illegible]

and put it in the hands of the

|      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      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| 1944 | 1945 | 1946 | 1947 | 1948 | 1949 | 1950 | 1951 | 1952 | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 | 2041 | 2042 | 2043 | 2044 | 2045 | 2046 | 2047 | 2048 | 2049 | 2050 | 2051 | 2052 | 2053 | 2054 | 2055 | 2056 | 2057 | 2058 | 2059 | 2060 | 2061 | 2062 | 2063 | 2064 | 2065 | 2066 | 2067 | 2068 | 2069 | 2070 | 2071 | 2072 | 2073 | 2074 | 2075 | 2076 | 2077 | 2078 | 2079 | 2080 | 2081 | 2082 | 2083 | 2084 | 2085 | 2086 | 2087 | 2088 | 2089 | 2090 | 2091 | 2092 | 2093 | 2094 | 2095 | 2096 | 2097 | 2098 | 2099 | 2100 | 2101 | 2102 | 2103 | 2104 | 2105 | 2106 | 2107 | 2108 | 2109 | 2110 | 2111 | 2112 | 2113 | 2114 | 2115 | 2116 | 2117 | 2118 | 2119 | 2120 | 2121 | 2122 | 2123 | 2124 | 2125 | 2126 | 2127 | 2128 | 2129 | 2130 | 2131 | 2132 | 2133 | 2134 | 2135 | 2136 | 2137 | 2138 | 2139 | 2140 | 2141 | 2142 | 2143 | 2144 | 2145 | 2146 | 2147 | 2148 | 2149 | 2150 | 2151 | 2152 | 2153 | 2154 | 2155 | 2156 | 2157 | 2158 | 2159 | 2160 | 2161 | 2162 | 2163 | 2164 | 2165 | 2166 | 2167 | 2168 | 2169 | 2170 | 2171 | 2172 | 2173 | 2174 | 2175 | 2176 | 2177 | 2178 | 2179 | 2180 | 2181 | 2182 | 2183 | 2184 | 2185 | 2186 | 2187 | 2188 | 2189 | 2190 | 2191 | 2192 | 2193 | 2194 | 2195 | 2196 | 2197 | 2198 | 2199 | 2200 | 2201 | 2202 | 2203 | 2204 | 2205 | 2206 | 2207 | 2208 | 2209 | 2210 | 2211 | 2212 | 2213 | 2214 | 2215 | 2216 | 2217 | 2218 | 2219 | 2220 | 2221 | 2222 | 2223 | 2224 | 2225 | 2226 | 2227 | 2228 | 2229 | 2230 | 2231 | 2232 | 2233 | 2234 | 2235 | 2236 | 2237 | 2238 | 2239 | 2240 | 2241 | 2242 | 2243 | 2244 | 2245 | 2246 | 2247 | 2248 | 2249 | 2250 | 2251 | 2252 | 2253 | 2254 | 2255 | 2256 | 2257 | 2258 | 2259 | 2260 | 2261 | 2262 | 2263 | 2264 | 2265 | 2266 | 2267 | 2268 | 2269 | 2270 | 2271 | 2272 | 2273 | 2274 | 2275 | 2276 | 2277 | 2278 | 2279 | 2280 | 2281 | 2282 | 2283 | 2284 | 2285 | 2286 | 2287 | 2288 | 2289 | 2290 | 2291 | 2292 | 2293 | 2294 | 2295 | 2296 | 2297 | 2298 | 2299 | 2300 | 2301 | 2302 | 2303 | 2304 | 2305 | 2306 | 2307 | 2308 | 2309 | 2310 | 2311 | 2312 | 2313 | 2314 | 2315 | 2316 | 2317 | 2318 | 2319 | 2320 | 2321 | 2322 | 2323 | 2324 | 2325 | 2326 | 2327 | 2328 | 2329 | 2330 | 2331 | 2332 | 2333 | 2334 | 2335 | 2336 | 2337 | 2338 | 2339 | 2340 | 2341 | 2342 | 2343 | 2344 | 2345 | 2346 | 2347 | 2348 | 2349 | 2350 | 2351 | 2352 | 2353 | 2354 | 2355 | 2356 | 2357 | 2358 | 2359 | 2360 | 2361 | 2362 | 2363 | 2364 | 2365 | 2366 | 2367 | 2368 | 2369 | 2370 | 2371 | 2372 | 2373 | 2374 | 2375 | 2376 | 2377 | 2378 | 2379 | 2380 | 2381 | 2382 | 2383 | 2384 | 2385 | 2386 | 2387 | 2388 | 2389 | 2390 | 2391 | 2392 | 2393 | 2394 | 2395 | 2396 | 2397 | 2398 | 2399 | 2400 | 2401 | 2402 | 2403 | 2404 | 2405 | 2406 | 2407 | 2408 | 2409 | 2410 | 2411 | 2412 | 2413 | 2414 | 2415 | 2416 | 2417 | 2418 | 2419 | 2420 | 2421 | 2422 | 2423 | 2424 | 2425 | 2426 | 2427 | 2428 | 2429 | 2430 | 2431 | 2432 | 2433 | 2434 | 2435 | 2436 | 2437 | 2438 | 2439 | 2440 | 2441 | 2442 | 2443 | 2444 | 2445 | 2446 | 2447 | 2448 | 2449 | 2450 | 2451 | 2452 | 2453 | 2454 | 2455 | 2456 | 2457 | 2458 | 2459 | 2460 | 2461 | 2462 | 2463 | 2464 | 2465 | 2466 | 2467 | 2468 | 2469 | 2470 | 2471 | 2472 | 2473 | 2474 | 2475 | 2476 | 2477 | 2478 | 2479 | 2480 | 2481 | 2482 | 2483 | 2484 | 2485 | 2486 | 2487 | 2488 | 2489 | 2490 | 2491 | 2492 | 2493 | 2494 | 2495 | 2496 | 2497 | 2498 | 2499 | 2500 | 2501 | 2502 | 2503 | 2504 | 2505 | 2506 | 2507 | 2508 | 2509 | 2510 | 2511 | 2512 | 2513 | 2514 | 2515 | 2516 | 2517 | 2518 | 2519 | 2520 | 2521 | 2522 | 2523 | 2524 | 2525 | 2526 | 2527 | 2528 | 2529 | 2530 | 2531 | 2532 | 2533 | 2534 | 2535 | 2536 | 2537 | 2538 | 2539 | 2540 | 2541 | 2542 | 2543 | 2544 | 2545 | 2546 | 2547 | 2548 | 2549 | 2550 | 2551 | 2552 | 2553 | 2554 | 2555 | 2556 | 2557 | 2558 | 2559 | 2560 | 2561 | 2562 | 2563 | 2564 | 2565 | 2566 | 2567 | 2568 | 2569 | 2570 | 2571 | 2572 | 2573 | 2574 | 2575 | 2576 | 2577 | 2578 | 2579 | 2580 | 2581 | 2582 | 2583 | 2584 | 2585 | 2586 | 2587 | 2588 | 2589 | 2590 | 2591 | 2592 | 2593 | 2594 | 2595 | 2596 | 2597 | 2598 | 2599 | 2600 | 2601 | 2602 | 2603 | 2604 | 2605 | 2606 | 2607 | 2608 | 2609 | 2610 | 2611 | 2612 | 2613 | 2614 | 2615 | 2616 | 2617 | 2618 | 2619 | 2620 | 2621 | 2622 | 2623 | 2624 | 2625 | 2626 | 2627 | 2628 | 2629 | 2630 | 2631 | 2632 | 2633 | 2634 | 2635 | 2636 | 2637 | 2638 | 2639 | 2640 | 2641 | 2642 | 2643 | 2644 | 2645 | 2646 | 2647 | 2648 | 2649 | 2650 | 2651 | 2652 | 2653 | 2654 | 2655 | 2656 | 2657 | 2658 | 2659 | 2660 | 2661 | 2662 | 2663 | 2664 | 2665 | 2666 | 2667 | 2668 | 2669 | 2670 | 2671 | 2672 | 2673 | 2674 | 2675 | 2676 | 2677 | 2678 | 2679 | 2680 | 2681 | 2682 | 2683 | 2684 | 2685 | 2686 | 2687 | 2688 | 2689 | 2690 | 2691 | 2692 | 2693 | 2694 | 2695 | 2696 | 2697 | 2698 | 2699 | 2700 | 2701 | 2702 | 2703 | 2704 | 2705 | 2706 | 2707 | 2708 | 2709 | 2710 | 2711 | 2712 | 2713 | 2714 | 2715 | 2716 | 2717 | 2718 | 2719 | 2720 | 2721 | 2722 | 2723 | 2724 | 2725 | 2726 | 2727 | 2728 | 2729 | 2730 | 2731 | 2732 | 2733 | 2734 | 2735 | 2736 | 2737 | 2738 | 2739 | 2740 | 2741 | 2742 | 2743 | 2744 | 2745 | 2746 | 2747 | 2748 | 2749 | 2750 | 2751 | 2752 | 2753 | 2754 | 2755 | 2756 | 2757 | 2758 | 2759 | 2760 | 2761 | 2762 | 2763 | 2764 | 2765 | 2766 | 2767 | 2768 | 2769 | 2770 | 2771 | 2772 | 2773 | 2774 | 2775 | 2776 | 2777 | 2778 | 2779 | 2780 | 2781 | 2782 | 2783 | 2784 | 2785 | 2786 | 2787 | 2788 | 2789 | 2790 | 2791 | 2792 | 2793 | 2794 | 2795 | 2796 | 2797 | 2798 | 2799 | 2800 | 2801 | 2802 | 2803 | 2804 | 2805 | 2806 | 2807 | 2808 | 2809 | 2810 | 2811 | 2812 | 2813 | 2814 | 2815 | 2816 | 2817 | 2818 | 2819 | 2820 | 2821 | 2822 | 2823 | 2824 | 2825 | 2826 | 2827 | 2828 | 2829 | 2830 | 2831 | 2832 | 2833 | 2834 | 2835 | 2836 | 2837 | 2838 | 2839 | 2840 | 2841 | 2842 | 2843 | 2844 | 2845 | 2846 | 2847 | 2848 | 2849 | 2850 | 2851 | 2852 | 2853 | 2854 | 2855 | 2856 | 2857 | 2858 | 2859 | 2860 | 2861 | 2862 | 2863 | 2864 | 2865 | 2866 | 2867 | 2868 | 2869 | 2870 | 2871 | 2872 | 2873 | 2874 | 2875 | 2876 | 2877 | 2878 | 2879 | 2880 | 2881 | 2882 | 2883 | 2884 | 2885 | 2886 | 2887 | 2888 | 2889 | 2890 | 2891 | 2892 | 2893 | 2894 | 2895 | 2896 | 2897 | 2898 | 2899 | 2900 | 2901 | 2902 | 2903 | 2904 | 2905 | 2906 | 2907 | 2908 | 2909 | 2910 | 2911 | 2912 | 2913 | 2914 | 2915 | 2916 | 2917 | 2918 | 2919 | 2920 | 2921 | 2922 | 2923 | 2924 | 2925 | 2926 | 2927 | 2928 | 2929 | 2930 | 2931 | 2932 | 2933 | 2934 | 2935 | 2936 | 2937 | 2938 | 2939 | 2940 | 2941 | 2942 | 2943 | 2944 | 2945 | 2946 | 2947 | 2948 | 2949 | 2950 | 2951 | 2952 | 2953 | 2954 | 2955 | 2956 | 2957 | 2958 | 2959 | 2960 | 2961 | 2962 | 2963 | 2964 | 2965 | 2966 | 2967 | 2968 | 2969 | 2970 | 2971 | 2972 | 2973 | 2974 | 2975 | 2976 | 2977 | 2978 | 2979 | 2980 | 2981 | 2982 | 2983 | 2984 | 2985 | 2986 | 2987 | 2988 | 2989 | 2990 | 2991 | 2992 | 2993 | 2994 | 2995 | 2996 | 2997 | 2998 | 2999 | 3000 | 3001 | 3002 | 3003 | 3004 | 3005 | 3006 | 3007 | 3008 | 3009 | 3010 | 3011 | 3012 | 3013 | 3014 | 3015 | 3016 | 3017 | 3018 | 3019 | 3020 | 3021 | 3022 | 3023 | 3024 | 3025 | 3026 | 3027 | 3028 | 3029 | 3030 | 3031 | 3032 | 3033 | 3034 | 3035 | 3036 | 3037 | 3038 | 3039 | 3040 | 3041 | 3042 | 3043 | 3044 | 3045 | 3046 | 3047 | 3048 | 3049 | 3050 | 3051 | 3052 | 3053 | 3054 | 3055 | 3056 | 3057 | 3058 | 3059 | 3060 | 3061 | 3062 | 3063 | 3064 | 3065 | 3066 | 3067 | 3068 | 3069 | 3070 | 3071 | 3072 | 3073 | 3074 | 3075 | 3076 | 3077 | 3078 | 3079 | 3080 | 3081 | 3082 | 3083 | 3084 | 3085 | 3086 | 3087 | 3088 | 3089 | 3090 | 3091 | 3092 | 3093 | 3094 | 3095 | 3096 | 3097 | 3098 | 3099 | 3100 | 3101 | 3102 | 3103 | 3104 | 3105 | 3106 | 3107 | 3108 | 3109 | 3110 | 3111 | 3112 | 3113 | 3114 | 3115 | 3116 | 3117 | 3118 | 3119 | 3120 | 3121 | 3122 | 3123 | 3124 | 3125 | 3126 | 3127 | 3128 | 3129 | 3130 | 3131 | 3132 | 3133 | 3134 | 3135 | 3136 | 3137 | 3138 | 3139 | 3140 | 3141 | 3142 | 3143 | 3144 | 3145 | 3146 | 3147 | 3148 | 3149 | 3150 | 3151 | 3152 | 3153 | 3154 | 3155 | 3156 | 3157 | 3158 | 3159 | 3160 | 3161 | 3162 | 3163 | 3164 | 3165 | 3166 | 3167 | 3168 | 3169 | 3170 | 3171 | 3172 | 3173 | 3174 | 3175 | 3176 | 3177 | 3178 | 3179 | 3180 | 3181 | 3182 | 3183 | 3184 | 3185 | 3186 | 3187 | 3188 | 3189 | 3190 | 3191 | 3192 | 3193 | 3194 | 3195 | 3196 | 3197 | 3198 | 3199 | 3200 | 3201 | 3202 | 3203 | 3204 | 3205 | 3206 | 3207 | 3208 | 3209 | 3210 | 3211 | 3212 | 3213 | 3214 | 3215 | 3216 | 3217 | 3218 | 3219 | 3220 | 3221 | 3222 | 3223 | 3224 | 3225 | 3226 | 3227 | 3228 | 3229 | 3230 | 3231 | 3232 | 3233 | 3234 | 3235 | 3236 | 3237 | 3238 | 3239 | 3240 | 3241 | 3242 | 3243 | 3244 | 3245 | 3246 | 3247 | 3248 | 3249 | 3250 | 3251 | 3252 | 3253 | 3254 | 3255 | 3256 | 3257 | 3258 | 3259 | 3260 | 3261 | 3262 | 3263 | 3264 | 3265 | 3266 | 3267 | 3268 | 3269 | 3270 | 3271 | 3272 | 3273 | 3274 | 3275 | 3276 | 3277 | 3278 | 3279 | 3280 | 3281 | 3282 | 3283 | 3284 | 3285 | 3286 | 3287 | 3288 | 3289 | 3290 | 3291 | 3292 | 3293 | 3294 | 3295 | 3296 | 3297 | 3298 | 3299 | 3300 | 3301 | 3302 | 3303 | 3304 | 3305 | 3306 | 3307 | 3308 | 3309 | 3310 | 3311 | 3312 | 3313 | 3314 | 3315 | 3316 | 3317 | 3318 | 331 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|

# THE UNIVERSITY OF CHICAGO

[illegible]

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu$ | .99999  | .99995  | .99990  | .99950  | .99900  | .99750  | .99500  | .99250  |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|
| 17.0  | .175512 | .215118 | .236748 | .293944 | .323515 | .407087 | .451274 | .508976 |
| 17.1  | .175517 | .215123 | .236753 | .293949 | .323520 | .407092 | .451279 | .508981 |
| 17.2  | .175522 | .215128 | .236758 | .293954 | .323525 | .407097 | .451284 | .508986 |
| 17.3  | .175527 | .215133 | .236763 | .293959 | .323530 | .407102 | .451289 | .508991 |
| 17.4  | .175532 | .215138 | .236768 | .293964 | .323535 | .407107 | .451294 | .508996 |
| 17.5  | .175537 | .215143 | .236773 | .293969 | .323540 | .407112 | .451299 | .509001 |
| 17.6  | .175542 | .215148 | .236778 | .293974 | .323545 | .407117 | .451304 | .509006 |
| 17.7  | .175547 | .215153 | .236783 | .293979 | .323550 | .407122 | .451309 | .509011 |
| 17.8  | .175552 | .215158 | .236788 | .293984 | .323555 | .407127 | .451314 | .509016 |
| 17.9  | .175557 | .215163 | .236793 | .293989 | .323560 | .407132 | .451319 | .509021 |
| 18.0  | .175562 | .215168 | .236798 | .293994 | .323565 | .407137 | .451324 | .509026 |
| 18.1  | .175567 | .215173 | .236803 | .294000 | .323570 | .407142 | .451329 | .509031 |
| 18.2  | .175572 | .215178 | .236808 | .294005 | .323575 | .407147 | .451334 | .509036 |
| 18.3  | .175577 | .215183 | .236813 | .294010 | .323580 | .407152 | .451339 | .509041 |
| 18.4  | .175582 | .215188 | .236818 | .294015 | .323585 | .407157 | .451344 | .509046 |
| 18.5  | .175587 | .215193 | .236823 | .294020 | .323590 | .407162 | .451349 | .509051 |
| 18.6  | .175592 | .215198 | .236828 | .294025 | .323595 | .407167 | .451354 | .509056 |
| 18.7  | .175597 | .215203 | .236833 | .294030 | .323600 | .407172 | .451359 | .509061 |
| 18.8  | .175602 | .215208 | .236838 | .294035 | .323605 | .407177 | .451364 | .509066 |
| 18.9  | .175607 | .215213 | .236843 | .294040 | .323610 | .407182 | .451369 | .509071 |
| 19.0  | .175612 | .215218 | .236848 | .294045 | .323615 | .407187 | .451374 | .509076 |
| 19.1  | .175617 | .215223 | .236853 | .294050 | .323620 | .407192 | .451379 | .509081 |
| 19.2  | .175622 | .215228 | .236858 | .294055 | .323625 | .407197 | .451384 | .509086 |
| 19.3  | .175627 | .215233 | .236863 | .294060 | .323630 | .407202 | .451389 | .509091 |
| 19.4  | .175632 | .215238 | .236868 | .294065 | .323635 | .407207 | .451394 | .509096 |
| 19.5  | .175637 | .215243 | .236873 | .294070 | .323640 | .407212 | .451399 | .509101 |
| 19.6  | .175642 | .215248 | .236878 | .294075 | .323645 | .407217 | .451404 | .509106 |
| 19.7  | .175647 | .215253 | .236883 | .294080 | .323650 | .407222 | .451409 | .509111 |
| 19.8  | .175652 | .215258 | .236888 | .294085 | .323655 | .407227 | .451414 | .509116 |
| 19.9  | .175657 | .215263 | .236893 | .294090 | .323660 | .407232 | .451419 | .509121 |
| 20.0  | .175662 | .215268 | .236898 | .294095 | .323665 | .407237 | .451424 | .509126 |
| 20.1  | .175667 | .215273 | .236903 | .294100 | .323670 | .407242 | .451429 | .509131 |
| 20.2  | .175672 | .215278 | .236908 | .294105 | .323675 | .407247 | .451434 | .509136 |
| 20.3  | .175677 | .215283 | .236913 | .294110 | .323680 | .407252 | .451439 | .509141 |
| 20.4  | .175682 | .215288 | .236918 | .294115 | .323685 | .407257 | .451444 | .509146 |
| 20.5  | .175687 | .215293 | .236923 | .294120 | .323690 | .407262 | .451449 | .509151 |
| 20.6  | .175692 | .215298 | .236928 | .294125 | .323695 | .407267 | .451454 | .509156 |
| 20.7  | .175697 | .215303 | .236933 | .294130 | .323700 | .407272 | .451459 | .509161 |
| 20.8  | .175702 | .215308 | .236938 | .294135 | .323705 | .407277 | .451464 | .509166 |
| 20.9  | .175707 | .215313 | .236943 | .294140 | .323710 | .407282 | .451469 | .509171 |
| 21.0  | .175712 | .215318 | .236948 | .294145 | .323715 | .407287 | .451474 | .509176 |
| 21.1  | .175717 | .215323 | .236953 | .294150 | .323720 | .407292 | .451479 | .509181 |
| 21.2  | .175722 | .215328 | .236958 | .294155 | .323725 | .407297 | .451484 | .509186 |
| 21.3  | .175727 | .215333 | .236963 | .294160 | .323730 | .407302 | .451489 | .509191 |
| 21.4  | .175732 | .215338 | .236968 | .294165 | .323735 | .407307 | .451494 | .509196 |
| 21.5  | .175737 | .215343 | .236973 | .294170 | .323740 | .407312 | .451499 | .509201 |
| 21.6  | .175742 | .215348 | .236978 | .294175 | .323745 | .407317 | .451504 | .509206 |
| 21.7  | .175747 | .215353 | .236983 | .294180 | .323750 | .407322 | .451509 | .509211 |
| 21.8  | .175752 | .215358 | .236988 | .294185 | .323755 | .407327 | .451514 | .509216 |
| 21.9  | .175757 | .215363 | .236993 | .294190 | .323760 | .407332 | .451519 | .509221 |
| 22.0  | .175762 | .215368 | .236998 | .294195 | .323765 | .407337 | .451524 | .509226 |
| 22.1  | .175767 | .215373 | .237003 | .294200 | .323770 | .407342 | .451529 | .509231 |
| 22.2  | .175772 | .215378 | .237008 | .294205 | .323775 | .407347 | .451534 | .509236 |
| 22.3  | .175777 | .215383 | .237013 | .294210 | .323780 | .407352 | .451539 | .509241 |
| 22.4  | .175782 | .215388 | .237018 | .294215 | .323785 | .407357 | .451544 | .509246 |
| 22.5  | .175787 | .215393 | .237023 | .294220 | .323790 | .407362 | .451549 | .509251 |
| 22.6  | .175792 | .215398 | .237028 | .294225 | .323795 | .407367 | .451554 | .509256 |
| 22.7  | .175797 | .215403 | .237033 | .294230 | .323800 | .407372 | .451559 | .509261 |
| 22.8  | .175802 | .215408 | .237038 | .294235 | .323805 | .407377 | .451564 | .509266 |
| 22.9  | .175807 | .215413 | .237043 | .294240 | .323810 | .407382 | .451569 | .509271 |
| 23.0  | .175812 | .215418 | .237048 | .294245 | .323815 | .407387 | .451574 | .509276 |
| 23.1  | .175817 | .215423 | .237053 | .294250 | .323820 | .407392 | .451579 | .509281 |
| 23.2  | .175822 | .215428 | .237058 | .294255 | .323825 | .407397 | .451584 | .509286 |
| 23.3  | .175827 | .215433 | .237063 | .294260 | .323830 | .407402 | .451589 | .509291 |
| 23.4  | .175832 | .215438 | .237068 | .294265 | .323835 | .407407 | .451594 | .509296 |
| 23.5  | .175837 | .215443 | .237073 | .294270 | .323840 | .407412 | .451599 | .509301 |
| 23.6  | .175842 | .215448 | .237078 | .294275 | .323845 | .407417 | .451604 | .509306 |
| 23.7  | .175847 | .215453 | .237083 | .294280 | .323850 | .407422 | .451609 | .509311 |
| 23.8  | .175852 | .215458 | .237088 | .294285 | .323855 | .407427 | .451614 | .509316 |
| 23.9  | .175857 | .215463 | .237093 | .294290 | .323860 | .407432 | .451619 | .509321 |
| 24.0  | .175862 | .215468 | .237098 | .294295 | .323865 | .407437 | .451624 | .509326 |
| 24.1  | .175867 | .215473 | .237103 | .294300 | .323870 | .407442 | .451629 | .509331 |
| 24.2  | .175872 | .215478 | .237108 | .294305 | .323875 | .407447 | .451634 | .509336 |
| 24.3  | .175877 | .215483 | .237113 | .294310 | .323880 | .407452 | .451639 | .509341 |
| 24.4  | .175882 | .215488 | .237118 | .294315 | .323885 | .407457 | .451644 | .509346 |
| 24.5  | .175887 | .215493 | .237123 | .294320 | .323890 | .407462 | .451649 | .509351 |
| 24.6  | .175892 | .215498 | .237128 | .294325 | .323895 | .407467 | .451654 | .509356 |
| 24.7  | .175897 | .215503 | .237133 | .294330 | .323900 | .407472 | .451659 | .509361 |
| 24.8  | .175902 | .215508 | .237138 | .294335 | .323905 | .407477 | .451664 | .509366 |
| 24.9  | .175907 | .215513 | .237143 | .294340 | .323910 | .407482 | .451669 | .509371 |
| 25.0  | .175912 | .215518 | .237148 | .294345 | .323915 | .407487 | .451674 | .509376 |
| 25.1  | .175917 | .215523 | .237153 | .294350 | .323920 | .407492 | .451679 | .509381 |
| 25.2  | .175922 | .215528 | .237158 | .294355 | .323925 | .407497 | .451684 | .509386 |
| 25.3  | .175927 | .215533 | .237163 | .294360 | .323930 | .407502 | .451689 | .509391 |
| 25.4  | .175932 | .215538 | .237168 | .294365 | .323935 | .407507 | .451694 | .509396 |
| 25.5  | .175937 | .215543 | .237173 | .294370 | .323940 | .407512 | .451699 | .509401 |
| 25.6  | .175942 | .215548 | .237178 | .294375 | .323945 | .407517 | .451704 | .509406 |
| 25.7  | .175947 | .215553 | .237183 | .294380 | .323950 | .407522 | .451709 | .509411 |
| 25.8  | .175952 | .215558 | .237188 | .294385 | .323955 | .407527 | .451714 | .509416 |
| 25.9  | .175957 | .215563 | .237193 | .294390 | .323960 | .407532 | .451719 | .509421 |
| 26.0  | .175962 | .215568 | .237198 | .294395 | .323965 | .407537 | .451724 | .509426 |
| 26.1  | .175967 | .215573 | .237203 | .294400 | .323970 | .407542 | .451729 | .509431 |
| 26.2  | .175972 | .215578 | .237208 | .294405 | .323975 | .407547 | .451734 | .509436 |
| 26.3  | .175977 | .215583 | .237213 | .294410 | .323980 | .407552 | .451739 | .509441 |
| 26.4  | .175982 | .215588 | .237218 | .294415 | .323985 | .407557 | .451744 | .509446 |
| 26.5  | .175987 | .215593 | .237223 | .294420 | .323990 | .407562 | .451749 | .509451 |
| 26.6  | .175992 | .215598 | .237228 | .294425 | .323995 | .407567 | .451754 | .509456 |
| 26.7  | .175997 | .215603 | .237233 | .294430 | .324000 | .407572 | .451759 | .509461 |
| 26.8  | .176002 | .215608 | .237238 | .294435 | .324005 | .407577 | .451764 | .509466 |
| 26.9  | .176007 | .215613 | .237243 | .294440 | .324010 | .407582 | .451769 | .509471 |
| 27.0  | .176012 | .215618 | .237248 | .294445 | .324015 | .407587 | .451774 | .509476 |
| 27.1  | .176017 | .215623 | .237253 | .294450 | .324020 | .407592 | .451779 | .509481 |
| 27.2  | .176022 | .215628 | .237258 | .294455 | .324025 | .407597 | .451784 | .509486 |
| 27.3  | .176027 | .215633 | .237263 | .294460 | .324030 | .407602 | .451789 | .509491 |
| 27.4  | .176032 | .215638 | .237268 | .294465 | .324035 | .407607 | .451794 | .509496 |
| 27.5  | .176037 | .215643 | .237273 | .294470 | .324040 | .407612 | .451799 | .509501 |
| 27.6  | .176042 | .215648 | .237278 | .294475 | .324045 | .407617 | .451804 | .509506 |
| 27.7  | .176047 | .215653 | .237283 | .294480 | .324050 | .407622 | .451809 | .509511 |
| 27.8  | .176052 | .215658 | .237288 | .294485 | .324055 | .407627 | .451814 | .509516 |
| 27.9  | .176057 | .215663 | .237293 | .294490 | .324060 | .407632 | .451819 | .509521 |
| 28.0  | .176062 | .215668 | .237298 | .294495 | .324065 | .407637 | .451824 | .509526 |
| 28.1  | .176067 | .215673 | .237303 | .294500 | .324070 | .407642 | .451829 | .509531 |
| 28.2  | .176072 | .215678 | .237308 | .294505 | .324075 | .407647 | .451834 | .509536 |
| 28.3  | .176077 | .215683 | .237313 | .294510 | .324080 | .407652 | .451839 | .509541 |
| 28.4  | .176082 | .215688 | .237318 | .294515 | .324085 | .407657 | .451844 | .509546 |
| 28.5  | .176087 | .215693 | .237323 | .294520 | .324090 | .407662 | .451849 | .509551 |
| 28.6  | .176092 | .215698 | .237328 | .294525 | .324095 | .407667 | .451854 | .509556 |
| 28.7  | .176097 | .215703 | .237333 | .294530 | .324100 | .407672 | .451859 | .509561 |
| 28.8  | .176102 | .215708 | .237338 | .294535 | .324105 | .407677 | .451864 | .509566 |
| 28.9  | .176107 | .215713 | .2373   |         |         |         |         |         |

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $v$

|   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |

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|      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      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|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-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| 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 | 2041 | 2042 | 2043 | 2044 | 2045 | 2046 | 2047 | 2048 | 2049 | 2050 | 2051 | 2052 | 2053 | 2054 | 2055 | 2056 | 2057 | 2058 | 2059 | 2060 | 2061 | 2062 | 2063 | 2064 | 2065 | 2066 | 2067 | 2068 | 2069 | 2070 | 2071 | 2072 | 2073 | 2074 | 2075 | 2076 | 2077 | 2078 | 2079 | 2080 | 2081 | 2082 | 2083 | 2084 | 2085 | 2086 | 2087 | 2088 | 2089 | 2090 | 2091 | 2092 | 2093 | 2094 | 2095 | 2096 | 2097 | 2098 | 2099 | 2100 | 2101 | 2102 | 2103 | 2104 | 2105 | 2106 | 2107 | 2108 | 2109 | 2110 | 2111 | 2112 | 2113 | 2114 | 2115 | 2116 | 2117 | 2118 | 2119 | 2120 | 2121 | 2122 | 2123 | 2124 | 2125 | 2126 | 2127 | 2128 | 2129 | 2130 | 2131 | 2132 | 2133 | 2134 | 2135 | 2136 | 2137 | 2138 | 2139 | 2140 | 2141 | 2142 | 2143 | 2144 | 2145 | 2146 | 2147 | 2148 | 2149 | 2150 | 2151 | 2152 | 2153 | 2154 | 2155 | 2156 | 2157 | 2158 | 2159 | 2160 | 2161 | 2162 | 2163 | 2164 | 2165 | 2166 | 2167 | 2168 | 2169 | 2170 | 2171 | 2172 | 2173 | 2174 | 2175 | 2176 | 2177 | 2178 | 2179 | 2180 | 2181 | 2182 | 2183 | 2184 | 2185 | 2186 | 2187 | 2188 | 2189 | 2190 | 2191 | 2192 | 2193 | 2194 | 2195 | 2196 | 2197 | 2198 | 2199 | 2200 | 2201 | 2202 | 2203 | 2204 | 2205 | 2206 | 2207 | 2208 | 2209 | 2210 | 2211 | 2212 | 2213 | 2214 | 2215 | 2216 | 2217 | 2218 | 2219 | 2220 | 2221 | 2222 | 2223 | 2224 | 2225 | 2226 | 2227 | 2228 | 2229 | 2230 | 2231 | 2232 | 2233 | 2234 | 2235 | 2236 | 2237 | 2238 | 2239 | 2240 | 2241 | 2242 | 2243 | 2244 | 2245 | 2246 | 2247 | 2248 | 2249 | 2250 | 2251 | 2252 | 2253 | 2254 | 2255 | 2256 | 2257 | 2258 | 2259 | 2260 | 2261 | 2262 | 2263 | 2264 | 2265 | 2266 | 2267 | 2268 | 2269 | 2270 | 2271 | 2272 | 2273 | 2274 | 2275 | 2276 | 2277 | 2278 | 2279 | 2280 | 2281 | 2282 | 2283 | 2284 | 2285 | 2286 | 2287 | 2288 | 2289 | 2290 | 2291 | 2292 | 2293 | 2294 | 2295 | 2296 | 2297 | 2298 | 2299 | 2300 | 2301 | 2302 | 2303 | 2304 | 2305 | 2306 | 2307 | 2308 | 2309 | 2310 | 2311 | 2312 | 2313 | 2314 | 2315 | 2316 | 2317 | 2318 | 2319 | 2320 | 2321 | 2322 | 2323 | 2324 | 2325 | 2326 | 2327 | 2328 | 2329 | 2330 | 2331 | 2332 | 2333 | 2334 | 2335 | 2336 | 2337 | 2338 | 2339 | 2340 | 2341 | 2342 | 2343 | 2344 | 2345 | 2346 | 2347 | 2348 | 2349 | 2350 | 2351 | 2352 | 2353 | 2354 | 2355 | 2356 | 2357 | 2358 | 2359 | 2360 | 2361 | 2362 | 2363 | 2364 | 2365 | 2366 | 2367 | 2368 | 2369 | 2370 | 2371 | 2372 | 2373 | 2374 | 2375 | 2376 | 2377 | 2378 | 2379 | 2380 | 2381 | 2382 | 2383 | 2384 | 2385 | 2386 | 2387 | 2388 | 2389 | 2390 | 2391 | 2392 | 2393 | 2394 | 2395 | 2396 | 2397 | 2398 | 2399 | 2400 | 2401 | 2402 | 2403 | 2404 | 2405 | 2406 | 2407 | 2408 | 2409 | 2410 | 2411 | 2412 | 2413 | 2414 | 2415 | 2416 | 2417 | 2418 | 2419 | 2420 | 2421 | 2422 | 2423 | 2424 | 2425 | 2426 | 2427 | 2428 | 2429 | 2430 | 2431 | 2432 | 2433 | 2434 | 2435 | 2436 | 2437 | 2438 | 2439 | 2440 | 2441 | 2442 | 2443 | 2444 | 2445 | 2446 | 2447 | 2448 | 2449 | 2450 | 2451 | 2452 | 2453 | 2454 | 2455 | 2456 | 2457 | 2458 | 2459 | 2460 | 2461 | 2462 | 2463 | 2464 | 2465 | 2466 | 2467 | 2468 | 2469 | 2470 | 2471 | 2472 | 2473 | 2474 | 2475 | 2476 | 2477 | 2478 | 2479 | 2480 | 2481 | 2482 | 2483 | 2484 | 2485 | 2486 | 2487 | 2488 | 2489 | 2490 | 2491 | 2492 | 2493 | 2494 | 2495 | 2496 | 2497 | 2498 | 2499 | 2500 | 2501 | 2502 | 2503 | 2504 | 2505 | 2506 | 2507 | 2508 | 2509 | 2510 | 2511 | 2512 | 2513 | 2514 | 2515 | 2516 | 2517 | 2518 | 2519 | 2520 | 2521 | 2522 | 2523 | 2524 | 2525 | 2526 | 2527 | 2528 | 2529 | 2530 | 2531 | 2532 | 2533 | 2534 | 2535 | 2536 | 2537 | 2538 | 2539 | 2540 | 2541 | 2542 | 2543 | 2544 | 2545 | 2546 | 2547 | 2548 | 2549 | 2550 | 2551 | 2552 | 2553 | 2554 | 2555 | 2556 | 2557 | 2558 | 2559 | 2560 | 2561 | 2562 | 2563 | 2564 | 2565 | 2566 | 2567 | 2568 | 2569 | 2570 | 2571 | 2572 | 2573 | 2574 | 2575 | 2576 | 2577 | 2578 | 2579 | 2580 | 2581 | 2582 | 2583 | 2584 | 2585 | 2586 | 2587 | 2588 | 2589 | 2590 | 2591 | 2592 | 2593 | 2594 | 2595 | 2596 | 2597 | 2598 | 2599 | 2600 | 2601 | 2602 | 2603 | 2604 | 2605 | 2606 | 2607 | 2608 | 2609 | 2610 | 2611 | 2612 | 2613 | 2614 | 2615 | 2616 | 2617 | 2618 | 2619 | 2620 | 2621 | 2622 | 2623 | 2624 | 2625 | 2626 | 2627 | 2628 | 2629 | 2630 | 2631 | 2632 | 2633 | 2634 | 2635 | 2636 | 2637 | 2638 | 2639 | 2640 | 2641 | 2642 | 2643 | 2644 | 2645 | 2646 | 2647 | 2648 | 2649 | 2650 | 2651 | 2652 | 2653 | 2654 | 2655 | 2656 | 2657 | 2658 | 2659 | 2660 | 2661 | 2662 | 2663 | 2664 | 2665 | 2666 | 2667 | 2668 | 2669 | 2670 | 2671 | 2672 | 2673 | 2674 | 2675 | 2676 | 2677 | 2678 | 2679 | 2680 | 2681 | 2682 | 2683 | 2684 | 2685 | 2686 | 2687 | 2688 | 2689 | 2690 | 2691 | 2692 | 2693 | 2694 | 2695 | 2696 | 2697 | 2698 | 2699 | 2700 | 2701 | 2702 | 2703 | 2704 | 2705 | 2706 | 2707 | 2708 | 2709 | 2710 | 2711 | 2712 | 2713 | 2714 | 2715 | 2716 | 2717 | 2718 | 2719 | 2720 | 2721 | 2722 | 2723 | 2724 | 2725 | 2726 | 2727 | 2728 | 2729 | 2730 | 2731 | 2732 | 2733 | 2734 | 2735 | 2736 | 2737 | 2738 | 2739 | 2740 | 2741 | 2742 | 2743 | 2744 | 2745 | 2746 | 2747 | 2748 | 2749 | 2750 | 2751 | 2752 | 2753 | 2754 | 2755 | 2756 | 2757 | 2758 | 2759 | 2760 | 2761 | 2762 | 2763 | 2764 | 2765 | 2766 | 2767 | 2768 | 2769 | 2770 | 2771 | 2772 | 2773 | 2774 | 2775 | 2776 | 2777 | 2778 | 2779 | 2780 | 2781 | 2782 | 2783 | 2784 | 2785 | 2786 | 2787 | 2788 | 2789 | 2790 | 2791 | 2792 | 2793 | 2794 | 2795 | 2796 | 2797 | 2798 | 2799 | 2800 | 2801 | 2802 | 2803 | 2804 | 2805 | 2806 | 2807 | 2808 | 2809 | 2810 | 2811 | 2812 | 2813 | 2814 | 2815 | 2816 | 2817 | 2818 | 2819 | 2820 | 2821 | 2822 | 2823 | 2824 | 2825 | 2826 | 2827 | 2828 | 2829 | 2830 | 2831 | 2832 | 2833 | 2834 | 2835 | 2836 | 2837 | 2838 | 2839 | 2840 | 2841 | 2842 | 2843 | 2844 | 2845 | 2846 | 2847 | 2848 | 2849 | 2850 | 2851 | 2852 | 2853 | 2854 | 2855 | 2856 | 2857 | 2858 | 2859 | 2860 | 2861 | 2862 | 2863 | 2864 | 2865 | 2866 | 2867 | 2868 | 2869 | 2870 | 2871 | 2872 | 2873 | 2874 | 2875 | 2876 | 2877 | 2878 | 2879 | 2880 | 2881 | 2882 | 2883 | 2884 | 2885 | 2886 | 2887 | 2888 | 2889 | 2890 | 2891 | 2892 | 2893 | 2894 | 2895 | 2896 | 2897 | 2898 | 2899 | 2900 | 2901 | 2902 | 2903 | 2904 | 2905 | 2906 | 2907 | 2908 | 2909 | 2910 | 2911 | 2912 | 2913 | 2914 | 2915 | 2916 | 2917 | 2918 | 2919 | 2920 | 2921 | 2922 | 2923 | 2924 | 2925 | 2926 | 2927 | 2928 | 2929 | 2930 | 2931 | 2932 | 2933 | 2934 | 2935 | 2936 | 2937 | 2938 | 2939 | 2940 | 2941 | 2942 | 2943 | 2944 | 2945 | 2946 | 2947 | 2948 | 2949 | 2950 | 2951 | 2952 | 2953 | 2954 | 2955 | 2956 | 2957 | 2958 | 2959 | 2960 | 2961 | 2962 | 2963 | 2964 | 2965 | 2966 | 2967 | 2968 | 2969 | 2970 | 2971 | 2972 | 2973 | 2974 | 2975 | 2976 | 2977 | 2978 | 2979 | 2980 | 2981 | 2982 | 2983 | 2984 | 2985 | 2986 | 2987 | 2988 | 2989 | 2990 | 2991 | 2992 | 2993 | 2994 | 2995 | 2996 | 2997 | 2998 | 2999 | 3000 | 3001 | 3002 | 3003 | 3004 | 3005 | 3006 | 3007 | 3008 | 3009 | 3010 | 3011 | 3012 | 3013 | 3014 | 3015 | 3016 | 3017 | 3018 | 3019 | 3020 | 3021 | 3022 | 3023 | 3024 | 3025 | 3026 | 3027 | 3028 | 3029 | 3030 | 3031 | 3032 | 3033 | 3034 | 3035 | 3036 | 3037 | 3038 | 3039 | 3040 | 3041 | 3042 | 3043 | 3044 | 3045 | 3046 | 3047 | 3048 | 3049 | 3050 | 3051 | 3052 | 3053 | 3054 | 3055 | 3056 | 3057 | 3058 | 3059 | 3060 | 3061 | 3062 | 3063 | 3064 | 3065 | 3066 | 3067 | 3068 | 3069 | 3070 | 3071 | 3072 | 3073 | 3074 | 3075 | 3076 | 3077 | 3078 | 3079 | 3080 | 3081 | 3082 | 3083 | 3084 | 3085 | 3086 | 3087 | 3088 | 3089 | 3090 | 3091 | 3092 | 3093 | 3094 | 3095 | 3096 | 3097 | 3098 | 3099 | 3100 | 3101 | 3102 | 3103 | 3104 | 3105 | 3106 | 3107 | 3108 | 3109 | 3110 | 3111 | 3112 | 3113 | 3114 | 3115 | 3116 | 3117 | 3118 | 3119 | 3120 | 3121 | 3122 | 3123 | 3124 | 3125 | 3126 | 3127 | 3128 | 3129 | 3130 | 3131 | 3132 | 3133 | 3134 | 3135 | 3136 | 3137 | 3138 | 3139 | 3140 | 3141 | 3142 | 3143 | 3144 | 3145 | 3146 | 3147 | 3148 | 3149 | 3150 | 3151 | 3152 | 3153 | 3154 | 3155 | 3156 | 3157 | 3158 | 3159 | 3160 | 3161 | 3162 | 3163 | 3164 | 3165 | 3166 | 3167 | 3168 | 3169 | 3170 | 3171 | 3172 | 3173 | 3174 | 3175 | 3176 | 3177 | 3178 | 3179 | 3180 | 3181 | 3182 | 3183 | 3184 | 3185 | 3186 | 3187 | 3188 | 3189 | 3190 | 3191 | 3192 | 3193 | 3194 | 3195 | 3196 | 3197 | 3198 | 3199 | 3200 | 3201 | 3202 | 3203 | 3204 | 3205 | 3206 | 3207 | 3208 | 3209 | 3210 | 3211 | 3212 | 3213 | 3214 | 3215 | 3216 | 3217 | 3218 | 3219 | 3220 | 3221 | 3222 | 3223 | 3224 | 3225 | 3226 | 3227 | 3228 | 3229 | 3230 | 3231 | 3232 | 3233 | 3234 | 3235 | 3236 | 3237 | 3238 | 3239 | 3240 | 3241 | 3242 | 3243 | 3244 | 3245 | 3246 | 3247 | 3248 | 3249 | 3250 | 3251 | 3252 | 3253 | 3254 | 3255 | 3256 | 3257 | 3258 | 3259 | 3260 | 3261 | 3262 | 3263 | 3264 | 3265 | 3266 | 3267 | 3268 | 3269 | 3270 | 3271 | 3272 | 3273 | 3274 | 3275 | 3276 | 3277 | 3278 | 3279 | 3280 | 3281 | 3282 | 3283 | 3284 | 3285 | 3286 | 3287 | 3288 | 3289 | 3290 | 3291 | 3292 | 3293 | 3294 | 3295 | 3296 | 3297 | 3298 | 3299 | 3300 | 3301 | 3302 | 3303 | 3304 | 3305 | 3306 | 3307 | 3308 | 3309 | 3310 | 3311 | 3312 | 3313 | 3314 | 3315 | 3316 | 3317 | 3318 | 3319 | 3320 | 3321 | 3322 | 3323 | 3324 | 3325 | 3326 | 3327 | 3328 | 3329 | 3330 | 3331 | 3332 | 3333 | 3334 | 3335 | 3336 | 3337 | 3338 | 3339 | 3340 | 3341 | 3342 | 3343 | 3344 | 334 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-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### Percentage Points of the $\chi^2$ Distribution Values of $\chi^2$ in Terms of $Q$ and $r$

|      |        |        |        |        |        |        |        |        |        |        |        |        |        |
|------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 67.5 | 224895 | 267782 | 257041 | 287443 | 231545 | 321013 | 335832 | 356584 | 374531 | 399300 | 937500 | 995300 | 992500 |
| 67.6 | 224896 | 267783 | 257042 | 287444 | 231546 | 321014 | 335833 | 356585 | 374532 | 399301 | 937501 | 995301 | 992501 |
| 67.7 | 224897 | 267784 | 257043 | 287445 | 231547 | 321015 | 335834 | 356586 | 374533 | 399302 | 937502 | 995302 | 992502 |
| 67.8 | 224898 | 267785 | 257044 | 287446 | 231548 | 321016 | 335835 | 356587 | 374534 | 399303 | 937503 | 995303 | 992503 |
| 67.9 | 224899 | 267786 | 257045 | 287447 | 231549 | 321017 | 335836 | 356588 | 374535 | 399304 | 937504 | 995304 | 992504 |
| 68.0 | 224900 | 267787 | 257046 | 287448 | 231550 | 321018 | 335837 | 356589 | 374536 | 399305 | 937505 | 995305 | 992505 |
| 68.1 | 224901 | 267788 | 257047 | 287449 | 231551 | 321019 | 335838 | 356590 | 374537 | 399306 | 937506 | 995306 | 992506 |
| 68.2 | 224902 | 267789 | 257048 | 287450 | 231552 | 321020 | 335839 | 356591 | 374538 | 399307 | 937507 | 995307 | 992507 |
| 68.3 | 224903 | 267790 | 257049 | 287451 | 231553 | 321021 | 335840 | 356592 | 374539 | 399308 | 937508 | 995308 | 992508 |
| 68.4 | 224904 | 267791 | 257050 | 287452 | 231554 | 321022 | 335841 | 356593 | 374540 | 399309 | 937509 | 995309 | 992509 |
| 68.5 | 224905 | 267792 | 257051 | 287453 | 231555 | 321023 | 335842 | 356594 | 374541 | 399310 | 937510 | 995310 | 992510 |
| 68.6 | 224906 | 267793 | 257052 | 287454 | 231556 | 321024 | 335843 | 356595 | 374542 | 399311 | 937511 | 995311 | 992511 |
| 68.7 | 224907 | 267794 | 257053 | 287455 | 231557 | 321025 | 335844 | 356596 | 374543 | 399312 | 937512 | 995312 | 992512 |
| 68.8 | 224908 | 267795 | 257054 | 287456 | 231558 | 321026 | 335845 | 356597 | 374544 | 399313 | 937513 | 995313 | 992513 |
| 68.9 | 224909 | 267796 | 257055 | 287457 | 231559 | 321027 | 335846 | 356598 | 374545 | 399314 | 937514 | 995314 | 992514 |
| 69.0 | 224910 | 267797 | 257056 | 287458 | 231560 | 321028 | 335847 | 356599 | 374546 | 399315 | 937515 | 995315 | 992515 |
| 69.1 | 224911 | 267798 | 257057 | 287459 | 231561 | 321029 | 335848 | 356600 | 374547 | 399316 | 937516 | 995316 | 992516 |
| 69.2 | 224912 | 267799 | 257058 | 287460 | 231562 | 321030 | 335849 | 356601 | 374548 | 399317 | 937517 | 995317 | 992517 |
| 69.3 | 224913 | 267800 | 257059 | 287461 | 231563 | 321031 | 335850 | 356602 | 374549 | 399318 | 937518 | 995318 | 992518 |
| 69.4 | 224914 | 267801 | 257060 | 287462 | 231564 | 321032 | 335851 | 356603 | 374550 | 399319 | 937519 | 995319 | 992519 |
| 69.5 | 224915 | 267802 | 257061 | 287463 | 231565 | 321033 | 335852 | 356604 | 374551 | 399320 | 937520 | 995320 | 992520 |
| 69.6 | 224916 | 267803 | 257062 | 287464 | 231566 | 321034 | 335853 | 356605 | 374552 | 399321 | 937521 | 995321 | 992521 |
| 69.7 | 224917 | 267804 | 257063 | 287465 | 231567 | 321035 | 335854 | 356606 | 374553 | 399322 | 937522 | 995322 | 992522 |
| 69.8 | 224918 | 267805 | 257064 | 287466 | 231568 | 321036 | 335855 | 356607 | 374554 | 399323 | 937523 | 995323 | 992523 |
| 69.9 | 224919 | 267806 | 257065 | 287467 | 231569 | 321037 | 335856 | 356608 | 374555 | 399324 | 937524 | 995324 | 992524 |
| 70.0 | 224920 | 267807 | 257066 | 287468 | 231570 | 321038 | 335857 | 356609 | 374556 | 399325 | 937525 | 995325 | 992525 |

[illegible]

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $r$

[illegible]

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $p$

| $p$   | $Q$    | .99995 | .99990 | .99950 | .99900 | .99500 | .99000 | .97500 | .95000 | .92500 |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 137.5 | 725831 | 751710 | 774721 | 793663 | 808542 | 820444 | 829541 | 836872 | 842858 | 847842 |
| 138.0 | 726070 | 751949 | 774960 | 793901 | 808780 | 820682 | 829779 | 837110 | 843096 | 848080 |
| 138.5 | 726309 | 752188 | 775199 | 794140 | 809020 | 820922 | 829819 | 837150 | 843135 | 848119 |
| 139.0 | 726548 | 752427 | 775438 | 794380 | 809260 | 821162 | 830016 | 837342 | 843370 | 848354 |
| 139.5 | 726787 | 752666 | 775677 | 794620 | 809500 | 821402 | 830256 | 837582 | 843610 | 848589 |
| 140.0 | 727026 | 752905 | 775916 | 794860 | 809740 | 821642 | 830496 | 837822 | 843850 | 848824 |
| 140.5 | 727265 | 753144 | 776155 | 795100 | 810000 | 821882 | 830736 | 838062 | 844090 | 849059 |
| 141.0 | 727504 | 753383 | 776394 | 795340 | 810240 | 822122 | 830976 | 838302 | 844330 | 849294 |
| 141.5 | 727743 | 753622 | 776633 | 795580 | 810480 | 822362 | 831216 | 838542 | 844570 | 849529 |
| 142.0 | 727982 | 753861 | 776872 | 795820 | 810720 | 822602 | 831456 | 838782 | 844810 | 849764 |
| 142.5 | 728221 | 754100 | 777111 | 796060 | 810960 | 822842 | 831696 | 839022 | 845050 | 850000 |
| 143.0 | 728460 | 754339 | 777350 | 796300 | 811200 | 823082 | 831936 | 839262 | 845290 | 850235 |
| 143.5 | 728699 | 754578 | 777589 | 796540 | 811440 | 823322 | 832176 | 839502 | 845530 | 850470 |
| 144.0 | 728938 | 754817 | 777828 | 796780 | 811680 | 823562 | 832416 | 839742 | 845770 | 850705 |
| 144.5 | 729177 | 755056 | 778067 | 797020 | 811920 | 823802 | 832656 | 840002 | 846010 | 850940 |
| 145.0 | 729416 | 755295 | 778306 | 797260 | 812160 | 824042 | 832896 | 840242 | 846250 | 851175 |
| 145.5 | 729655 | 755534 | 778545 | 797500 | 812400 | 824282 | 833136 | 840482 | 846490 | 851410 |
| 146.0 | 729894 | 755773 | 778784 | 797740 | 812640 | 824522 | 833376 | 840722 | 846730 | 851645 |
| 146.5 | 730133 | 756012 | 779023 | 797980 | 812880 | 824762 | 833616 | 840962 | 846970 | 851880 |
| 147.0 | 730372 | 756251 | 779262 | 798220 | 813120 | 825002 | 833856 | 841202 | 847210 | 852115 |
| 147.5 | 730611 | 756490 | 779501 | 798460 | 813360 | 825242 | 834096 | 841442 | 847450 | 852350 |
| 148.0 | 730850 | 756729 | 779740 | 798700 | 813600 | 825482 | 834336 | 841682 | 847690 | 852585 |
| 148.5 | 731089 | 756968 | 779979 | 798940 | 813840 | 825722 | 834576 | 841922 | 847930 | 852820 |
| 149.0 | 731328 | 757207 | 780218 | 799180 | 814080 | 825962 | 834816 | 842162 | 848170 | 853055 |
| 149.5 | 731567 | 757446 | 780457 | 799420 | 814320 | 826202 | 835056 | 842402 | 848410 | 853290 |
| 150.0 | 731806 | 757685 | 780696 | 799660 | 814560 | 826442 | 835296 | 842642 | 848650 | 853525 |
| 150.5 | 732045 | 757924 | 780935 | 799900 | 814800 | 826682 | 835536 | 842882 | 848890 | 853760 |
| 151.0 | 732284 | 758163 | 781174 | 800140 | 815040 | 826922 | 835776 | 843122 | 849130 | 854000 |
| 151.5 | 732523 | 758402 | 781413 | 800380 | 815280 | 827162 | 836016 | 843362 | 849370 | 854235 |
| 152.0 | 732762 | 758641 | 781652 | 800620 | 815520 | 827402 | 836256 | 843602 | 849610 | 854470 |
| 152.5 | 733001 | 758880 | 781891 | 800860 | 815760 | 827642 | 836496 | 843842 | 849850 | 854705 |
| 153.0 | 733240 | 759119 | 782130 | 801100 | 816000 | 827882 | 836736 | 844082 | 850090 | 854940 |
| 153.5 | 733479 | 759358 | 782369 | 801340 | 816240 | 828122 | 836976 | 844322 | 850330 | 855175 |
| 154.0 | 733718 | 759597 | 782608 | 801580 | 816480 | 828362 | 837216 | 844562 | 850570 | 855410 |
| 154.5 | 733957 | 759836 | 782847 | 801820 | 816720 | 828602 | 837456 | 844802 | 850810 | 855645 |
| 155.0 | 734196 | 760075 | 783086 | 802060 | 816960 | 828842 | 837696 | 845042 | 851050 | 855880 |
| 155.5 | 734435 | 760314 | 783325 | 802300 | 817200 | 829082 | 837936 | 845282 | 851290 | 856115 |
| 156.0 | 734674 | 760553 | 783564 | 802540 | 817440 | 829322 | 838176 | 845522 | 851530 | 856350 |
| 156.5 | 734913 | 760792 | 783803 | 802780 | 817680 | 829562 | 838416 | 845762 | 851770 | 856585 |
| 157.0 | 735152 | 761031 | 784042 | 803020 | 817920 | 829802 | 838656 | 846002 | 852010 | 856820 |
| 157.5 | 735391 | 761270 | 784281 | 803260 | 818160 | 830042 | 838896 | 846242 | 852250 | 857055 |
| 158.0 | 735630 | 761509 | 784520 | 803500 | 818400 | 830282 | 839136 | 846482 | 852490 | 857290 |
| 158.5 | 735869 | 761748 | 784759 | 803740 | 818640 | 830522 | 839376 | 846722 | 852730 | 857525 |
| 159.0 | 736108 | 761987 | 784998 | 803980 | 818880 | 830762 | 839616 | 846962 | 852970 | 857760 |
| 159.5 | 736347 | 762226 | 785237 | 804220 | 819120 | 831002 | 839856 | 847202 | 853210 | 858000 |
| 160.0 | 736586 | 762465 | 785476 | 804460 | 819360 | 831242 | 840096 | 847442 | 853450 | 858235 |
| 160.5 | 736825 | 762704 | 785715 | 804700 | 819600 | 831482 | 840336 | 847682 | 853690 | 858470 |
| 161.0 | 737064 | 762943 | 785954 | 804940 | 819840 | 831722 | 840576 | 847922 | 853930 | 858705 |
| 161.5 | 737303 | 763182 | 786193 | 805180 | 820080 | 831962 | 840816 | 848162 | 854170 | 858940 |
| 162.0 | 737542 | 763421 | 786432 | 805420 | 820320 | 832202 | 841056 | 848402 | 854410 | 859175 |
| 162.5 | 737781 | 763660 | 786671 | 805660 | 820560 | 832442 | 841296 | 848642 | 854650 | 859410 |
| 163.0 | 738020 | 763899 | 786910 | 805900 | 820800 | 832682 | 841536 | 848882 | 854890 | 859645 |
| 163.5 | 738259 | 764138 | 787149 | 806140 | 821040 | 832922 | 841776 | 849122 | 855130 | 859880 |
| 164.0 | 738498 | 764377 | 787388 | 806380 | 821280 | 833162 | 842016 | 849362 | 855370 | 860115 |
| 164.5 | 738737 | 764616 | 787627 | 806620 | 821520 | 833402 | 842256 | 849602 | 855610 | 860350 |
| 165.0 | 738976 | 764855 | 787866 | 806860 | 821760 | 833642 | 842496 | 849842 | 855850 | 860585 |
| 165.5 | 739215 | 765094 | 788105 | 807100 | 822000 | 833882 | 842736 | 850082 | 856090 | 860820 |
| 166.0 | 739454 | 765333 | 788344 | 807340 | 822240 | 834122 | 842976 | 850322 | 856330 | 861055 |
| 166.5 | 739693 | 765572 | 788583 | 807580 | 822480 | 834362 | 843216 | 850562 | 856570 | 861290 |
| 167.0 | 739932 | 765811 | 788822 | 807820 | 822720 | 834602 | 843456 | 850802 | 856810 | 861525 |
| 167.5 | 740171 | 766050 | 789061 | 808060 | 822960 | 834842 | 843696 | 851042 | 857050 | 861760 |
| 168.0 | 740410 | 766289 | 789300 | 808300 | 823200 | 835082 | 843936 | 851282 | 857290 | 862000 |
| 168.5 | 740649 | 766528 | 789539 | 808540 | 823440 | 835322 | 844176 | 851522 | 857530 | 862235 |
| 169.0 | 740888 | 766767 | 789778 | 808780 | 823680 | 835562 | 844416 | 851762 | 857770 | 862470 |
| 169.5 | 741127 | 767006 | 790017 | 809020 | 823920 | 835802 | 844656 | 852002 | 858010 | 862705 |
| 170.0 | 741366 | 767245 | 790256 | 809260 | 824160 | 836042 | 844896 | 852242 | 858250 | 862940 |
| 170.5 | 741605 | 767484 | 790495 | 809500 | 824400 | 836282 | 845136 | 852482 | 858490 | 863175 |
| 171.0 | 741844 | 767723 | 790734 | 809740 | 824640 | 836522 | 845376 | 852722 | 858730 | 863410 |
| 171.5 | 742083 | 767962 | 790973 | 810000 | 824880 | 836762 | 845616 | 852962 | 858970 | 863645 |
| 172.0 | 742322 | 768201 | 791212 | 810240 | 825120 | 837002 | 845856 | 853202 | 859210 | 863880 |
| 172.5 | 742561 | 768440 | 791451 | 810480 | 825360 | 837242 | 846096 | 853442 | 859450 | 864115 |
| 173.0 | 742800 | 768679 | 791690 | 810720 | 825600 | 837482 | 846336 | 853682 | 859690 | 864350 |
| 173.5 | 743039 | 768918 | 791929 | 810960 | 825840 | 837722 | 846576 | 853922 | 859930 | 864585 |
| 174.0 | 743278 | 769157 | 792168 | 811200 | 826080 | 837962 | 846816 | 854162 | 860170 | 864820 |
| 174.5 | 743517 | 769396 | 792407 | 811440 | 826320 | 838202 | 847056 | 854402 | 860410 | 865055 |
| 175.0 | 743756 | 769635 | 792646 | 811680 | 826560 | 838442 | 847296 | 854642 | 860650 | 865290 |
| 175.5 | 743995 | 769874 | 792885 | 811920 | 826800 | 838682 | 847536 | 854882 | 860890 | 865525 |
| 176.0 | 744234 | 770113 | 793124 | 812160 | 827040 | 838922 | 847776 | 855122 | 861130 | 865760 |
| 176.5 | 744473 | 770352 | 793363 | 812400 | 827280 | 839162 | 848016 | 855362 | 861370 | 865995 |
| 177.0 | 744712 | 770591 | 793602 | 812640 | 827520 | 839402 | 848256 | 855602 | 861610 | 866230 |
| 177.5 | 744951 | 770830 | 793841 | 812880 | 827760 | 839642 | 848496 | 855842 | 861850 | 866465 |
| 178.0 | 745190 | 771069 | 794080 | 813120 | 828000 | 839882 | 848736 | 856082 | 862090 | 866700 |
| 178.5 | 745429 | 771308 | 794319 | 813360 | 828240 | 840122 | 848976 | 856322 | 862330 | 866935 |
| 179.0 | 745668 | 771547 | 794558 | 813600 | 828480 | 840362 | 849216 | 856562 | 862570 | 867170 |
| 179.5 | 745907 | 771786 | 794797 | 813840 | 828720 | 840602 | 849456 | 856802 | 862810 | 867405 |
| 180.0 | 746146 | 772025 | 795036 | 814080 | 828960 | 840842 | 849696 | 857042 | 863050 | 867640 |
| 180.5 | 746385 | 772264 | 795275 | 814320 | 829200 | 841082 | 849936 | 857282 | 863290 | 867875 |
| 181.0 | 746624 | 772503 | 795514 | 814560 | 829440 | 841322 | 850176 | 857522 | 863530 | 868110 |
| 181.5 | 746863 | 772742 | 795753 | 814800 | 829680 | 841562 | 850416 | 857762 | 863770 | 868345 |
| 182.0 | 747102 | 772981 | 795992 | 815040 | 829920 | 841802 | 850656 | 858002 | 864010 | 868580 |
| 182.5 | 747341 | 773220 | 796231 | 815280 | 830160 | 842042 | 850896 | 858242 | 864250 | 868815 |
| 183.0 | 747580 | 773459 | 796470 | 815520 | 830400 | 842282 | 851136 | 858482 | 864490 | 869050 |
| 183.5 | 747819 | 773698 | 796709 | 815760 | 830640 | 842522 | 851376 | 858722 | 864730 | 869285 |
| 184.0 | 748058 | 773937 | 796948 | 816000 | 830880 | 842762 | 851616 | 858962 | 864970 | 869520 |
| 184.5 | 748297 | 774176 | 797187 | 816240 | 831120 | 843002 | 851856 | 859202 | 865210 | 869755 |
| 185.0 | 748536 | 774415 | 797426 | 816480 | 831360 | 843242 | 852096 | 859442 | 865450 | 870000 |
| 185.5 | 748775 | 774654 | 797665 | 816720 | 831600 | 843482 | 852336 | 859682 | 865690 | 870235 |
| 186.0 | 749014 | 774893 |        |        |        |        |        |        |        |        |

[illegible][illegible]

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| 11176 | 11177 | 11178 | 11179 | 11180 | 11181 | 11182 | 11183 | 11184 | 11185 | 11186 | 11187 | 11188 | 11189 | 11190 | 11191 | 11192 | 11193 | 11194 | 11195 | 11196 | 11197 | 11198 | 11199 | 11200 | 11201 | 11202 | 11203 | 11204 | 11205 | 11206 | 11207 | 11208 | 11209 | 11210 | 11211 | 11212 | 11213 | 11214 | 11215 | 11216 | 11217 | 11218 | 11219 | 11220 | 11221 | 11222 | 11223 | 11224 | 11225 | 11226 | 11227 | 11228 | 11229 | 11230 | 11231 | 11232 | 11233 | 11234 | 11235 | 11236 | 11237 | 11238 | 11239 | 11240 | 11241 | 11242 | 11243 | 11244 | 11245 | 11246 | 11247 | 11248 | 11249 | 11250 | 11251 | 11252 | 11253 | 11254 | 11255 | 11256 | 11257 | 11258 | 11259 | 11260 | 11261 | 11262 | 11263 | 11264 | 11265 | 11266 | 11267 | 11268 | 11269 | 11270 | 11271 | 11272 | 11273 | 11274 | 11275 | 11276 | 11277 | 11278 | 11279 | 11280 | 11281 | 11282 | 11283 | 11284 | 11285 | 11286 | 11287 | 11288 | 11289 | 11290 | 11291 | 11292 | 11293 | 11294 | 11295 | 11296 | 11297 | 11298 | 11299 | 11300 | 11301 | 11302 | 11303 | 11304 | 11305 | 11306 | 11307 | 11308 | 11309 | 11310 | 11311 | 11312 | 11313 | 11314 | 11315 | 11316 | 11317 | 11318 | 11319 | 11320 | 11321 | 11322 | 11323 | 11324 | 11325 | 11326 | 11327 | 11328 | 11329 | 11330 | 11331 | 11332 | 11333 | 11334 | 11335 | 11336 | 11337 | 11338 | 11339 | 11340 | 11341 | 11342 | 11343 | 11344 | 11345 | 11346 | 11347 | 11348 | 11349 | 11350 | 11351 | 11352 | 11353 | 11354 | 11355 | 11356 | 11357 | 11358 | 11359 | 11360 | 11361 | 11362 | 11363 | 11364 | 11365 | 11366 | 11367 | 11368 | 11369 | 11370 | 11371 | 11372 | 11373 | 11374 | 11375 | 11376 | 11377 | 11378 | 11379 | 11380 | 11381 | 11382 | 11383 | 11384 | 11385 | 11386 | 11387 | 11388 | 11389 | 11390 | 11391 | 11392 | 11393 | 11394 | 11395 | 11396 | 11397 | 11398 | 11399 | 11400 | 11401 | 11402 | 11403 | 11404 | 11405 | 11406 | 11407 | 11408 | 11409 | 11410 | 11411 | 11412 | 11413 | 11414 | 11415 | 11416 | 11417 | 11418 | 11419 | 11420 | 11421 | 11422 | 11423 | 11424 | 11425 | 11426 | 11427 | 11428 | 11429 | 11430 | 11431 | 11432 | 11433 | 11434 | 11435 | 11436 | 11437 | 11438 | 11439 | 11440 | 11441 | 11442 | 11443 | 11444 | 11445 | 11446 | 11447 | 11448 | 11449 | 11450 | 11451 | 11452 | 11453 | 11454 | 11455 | 11456 | 11457 | 11458 | 11459 | 11460 | 11461 | 11462 | 11463 | 11464 | 11465 | 11466 | 11467 | 11468 | 11469 | 11470 | 11471 | 11472 | 11473 | 11474 | 11475 | 11476 | 11477 | 11478 | 11479 | 11480 | 11481 | 11482 | 11483 | 11484 | 11485 | 11486 | 11487 | 11488 | 11489 | 11490 | 11491 | 11492 | 11493 | 11494 | 11495 | 11496 | 11497 | 11498 | 11499 | 11500 | 11501 | 11502 | 11503 | 11504 | 11505 | 11506 | 11507 | 11508 | 11509 | 11510 | 11511 | 11512 | 11513 | 11514 | 11515 | 11516 | 11517 | 11518 | 11519 | 11520 | 11521 | 11522 | 11523 | 11524 | 11525 | 11526 | 11527 | 11528 | 11529 | 11530 | 11531 | 11532 | 11533 | 11534 | 11535 | 11536 | 11537 | 11538 | 11539 | 11540 | 11541 | 11542 | 11543 | 11544 | 11545 | 11546 | 11547 | 11548 | 11549 | 11550 | 11551 | 11552 | 11553 | 11554 | 11555 | 11556 | 11557 | 11558 | 11559 | 11560 | 11561 | 11562 | 11563 | 11564 | 11565 | 11566 | 11567 | 11568 | 11569 | 11570 | 11571 | 11572 | 11573 | 11574 | 11575 | 11576 | 11577 | 11578 | 11579 | 11580 | 11581 | 11582 | 11583 | 11584 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|

### Percentage Points of the $\chi^2$ Distribution Values at $\chi^2$ in Terms of $Q$ and $r$

[illegible]

a pur D'io sono I et - V. n. m. d. f. l.

consequente - X. m. d. f. l. m. d. f. l.

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| 15777 | 15778 | 15779 | 15780 | 15781 | 15782 | 15783 | 15784 | 15785 | 15786 | 15787 | 15788 | 15789 | 15790 | 15791 | 15792 | 15793 | 15794 | 15795 | 15796 | 15797 | 15798 | 15799 | 15800 | 15801 | 15802 | 15803 | 15804 | 15805 | 15806 | 15807 | 15808 | 15809 | 15810 | 15811 | 15812 | 15813 | 15814 | 15815 | 15816 | 15817 | 15818 | 15819 | 15820 | 15821 | 15822 | 15823 | 15824 | 15825 | 15826 | 15827 | 15828 | 15829 | 15830 | 15831 | 15832 | 15833 | 15834 | 15835 | 15836 | 15837 | 15838 | 15839 | 15840 | 15841 | 15842 | 15843 | 15844 | 15845 | 15846 | 15847 | 15848 | 15849 | 15850 | 15851 | 15852 | 15853 | 15854 | 15855 | 15856 | 15857 | 15858 | 15859 | 15860 | 15861 | 15862 | 15863 | 15864 | 15865 | 15866 | 15867 | 15868 | 15869 | 15870 | 15871 | 15872 | 15873 | 15874 | 15875 | 15876 | 15877 | 15878 | 15879 | 15880 | 15881 | 15882 | 15883 | 15884 | 15885 | 15886 | 15887 | 15888 | 15889 | 15890 | 15891 | 15892 | 15893 | 15894 | 15895 | 15896 | 15897 | 15898 | 15899 | 15900 | 15901 | 15902 | 15903 | 15904 | 15905 | 15906 | 15907 | 15908 | 15909 | 15910 | 15911 | 15912 | 15913 | 15914 | 15915 | 15916 | 15917 | 15918 | 15919 | 15920 | 15921 | 15922 | 15923 | 15924 | 15925 | 15926 | 15927 | 15928 | 15929 | 15930 | 15931 | 15932 | 15933 | 15934 | 15935 | 15936 | 15937 | 15938 | 15939 | 15940 | 15941 | 15942 | 15943 | 15944 | 15945 | 15946 | 15947 | 15948 | 15949 | 15950 | 15951 | 15952 | 15953 | 15954 | 15955 | 15956 | 15957 | 15958 | 15959 | 15960 | 15961 | 15962 | 15963 | 15964 | 15965 | 15966 | 15967 | 15968 | 15969 | 15970 | 15971 | 15972 | 15973 | 15974 | 15975 | 15976 | 15977 | 15978 | 15979 | 15980 | 15981 | 15982 | 15983 | 15984 | 15985 | 15986 | 15987 | 15988 | 15989 | 15990 | 15991 | 15992 | 15993 | 15994 | 15995 | 15996 | 15997 | 15998 | 15999 | 16000 | 16001 | 16002 | 16003 | 16004 | 16005 | 16006 | 16007 | 16008 | 16009 | 16010 | 16011 | 16012 | 16013 | 16014 | 16015 | 16016 | 16017 | 16018 | 16019 | 16020 | 16021 | 16022 | 16023 | 16024 | 16025 | 16026 | 16027 | 16028 | 16029 | 16030 | 16031 | 16032 | 16033 | 16034 | 16035 | 16036 | 16037 | 16038 | 16039 | 16040 | 16041 | 16042 | 16043 | 16044 | 16045 | 16046 | 16047 | 16048 | 16049 | 16050 | 16051 | 16052 | 16053 | 16054 | 16055 | 16056 | 16057 | 16058 | 16059 | 16060 | 16061 | 16062 | 16063 | 16064 | 16065 | 16066 | 16067 | 16068 | 16069 | 16070 | 16071 | 16072 | 16073 | 16074 | 16075 | 16076 | 16077 | 16078 | 16079 | 16080 | 16081 | 16082 | 16083 | 16084 | 16085 | 16086 | 16087 | 16088 | 16089 | 16090 | 16091 | 16092 | 16093 | 16094 | 16095 | 16096 | 16097 | 16098 | 16099 | 16100 | 16101 | 16102 | 16103 | 16104 | 16105 | 16106 | 16107 | 16108 | 16109 | 16110 | 16111 | 16112 | 16113 | 16114 | 16115 | 16116 | 16117 | 16118 | 16119 | 16120 | 16121 | 16122 | 16123 | 16124 | 16125 | 16126 | 16127 | 16128 | 16129 | 16130 | 16131 | 16132 | 16133 | 16134 | 16135 | 16136 | 16137 | 16138 | 16139 | 16140 | 16141 | 16142 | 16143 | 16144 | 16145 | 16146 | 16147 | 16148 | 16149 | 16150 | 16151 | 16152 | 16153 | 16154 | 16155 | 16156 | 16157 | 16158 | 16159 | 16160 | 16161 | 16162 | 16163 | 16164 | 16165 | 16166 | 16167 | 16168 | 16169 | 16170 | 16171 | 16172 | 16173 | 16174 | 16175 | 16176 | 16177 | 16178 | 16179 | 16180 | 16181 | 16182 | 16183 | 16184 | 16185 |
| 15950 | 15951 | 15952 | 15953 | 15954 | 15955 | 15956 | 15957 | 15958 | 15959 | 15960 | 15961 | 15962 | 15963 | 15964 | 15965 | 15966 | 15967 | 15968 | 15969 | 15970 | 15971 | 15972 | 15973 | 15974 | 15975 | 15976 | 15977 | 15978 | 15979 | 15980 | 15981 | 15982 | 15983 | 15984 | 15985 | 15986 | 15987 | 15988 | 15989 | 15990 | 15991 | 15992 | 15993 | 15994 | 15995 | 15996 | 15997 | 15998 | 15999 | 16000 | 16001 | 16002 | 16003 | 16004 | 16005 | 16006 | 16007 | 16008 | 16009 | 16010 | 16011 | 16012 | 16013 | 16014 | 16015 | 16016 | 16017 | 16018 | 16019 | 16020 | 16021 | 16022 | 16023 | 16024 | 16025 | 16026 | 16027 | 16028 | 16029 | 16030 | 16031 | 16032 | 16033 | 16034 | 16035 | 16036 | 16037 | 16038 | 16039 | 16040 | 16041 | 16042 | 16043 | 16044 | 16045 | 16046 | 16047 | 16048 | 16049 | 16050 | 16051 | 16052 | 16053 | 16054 | 16055 | 16056 | 16057 | 16058 | 16059 | 16060 | 16061 | 16062 | 16063 | 16064 | 16065 | 16066 | 16067 | 16068 | 16069 | 16070 | 16071 | 16072 | 16073 | 16074 | 16075 | 16076 | 16077 | 16078 | 16079 | 16080 | 16081 | 16082 | 16083 | 16084 | 16085 | 16086 | 16087 | 16088 | 16089 | 16090 | 16091 | 16092 | 16093 | 16094 | 16095 | 16096 | 16097 | 16098 | 16099 | 16100 | 16101 | 16102 | 16103 | 16104 | 16105 | 16106 | 16107 | 16108 | 16109 | 16110 | 16111 | 16112 | 16113 | 16114 | 16115 | 16116 | 16117 | 16118 | 16119 | 16120 | 16121 | 16122 | 16123 | 16124 | 16125 | 16126 | 16127 | 16128 | 16129 | 16130 | 16131 | 16132 | 16133 | 16134 | 16135 | 16136 | 16137 | 16138 | 16139 | 16140 | 16141 | 16142 | 16143 | 16144 | 16145 | 16146 | 16147 | 16148 | 16149 | 16150 | 16151 | 16152 | 16153 | 16154 | 16155 | 16156 | 16157 | 16158 | 16159 | 16160 | 16161 | 16162 | 16163 | 16164 | 16165 | 16166 | 16167 | 16168 | 16169 | 16170 | 16171 | 16172 | 16173 | 16174 | 16175 | 16176 | 16177 | 16178 | 16179 | 16180 | 16181 | 16182 | 16183 | 16184 | 16185 |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| 16186 | 16187 | 16188 | 16189 | 16190 | 16191 | 16192 | 16193 | 16194 | 16195 | 16196 | 16197 | 16198 | 16199 | 16200 | 16201 | 16202 | 16203 | 16204 | 16205 | 16206 | 16207 | 16208 | 16209 | 16210 | 16211 | 16212 | 16213 | 16214 | 16215 | 16216 | 16217 | 16218 | 16219 | 16220 | 16221 | 16222 | 16223 | 16224 | 16225 | 16226 | 16227 | 16228 | 16229 | 16230 | 16231 | 16232 | 16233 | 16234 | 16235 | 16236 | 16237 | 16238 | 16239 | 16240 | 16241 | 16242 | 16243 | 16244 | 16245 | 16246 | 16247 | 16248 | 16249 | 16250 | 16251 | 16252 | 16253 | 16254 | 16255 | 16256 | 16257 | 16258 | 16259 | 16260 | 16261 | 16262 | 16263 | 16264 | 16265 | 16266 | 16267 | 16268 | 16269 | 16270 | 16271 | 16272 | 16273 | 16274 | 16275 | 16276 | 16277 | 16278 | 16279 | 16280 | 16281 | 16282 | 16283 | 16284 | 16285 | 16286 | 16287 | 16288 | 16289 | 16290 | 16291 | 16292 | 16293 | 16294 | 16295 | 16296 | 16297 | 16298 | 16299 | 16300 | 16301 | 16302 | 16303 | 16304 | 16305 | 16306 | 16307 | 16308 | 16309 | 16310 | 16311 | 16312 | 16313 | 16314 | 16315 | 16316 | 16317 | 16318 | 16319 | 16320 | 16321 | 16322 | 16323 | 16324 | 16325 | 16326 | 16327 | 16328 | 16329 | 16330 | 16331 | 16332 | 16333 | 16334 | 16335 | 16336 | 16337 | 16338 | 16339 | 16340 | 16341 | 16342 | 16343 | 16344 | 16345 | 16346 | 16347 | 16348 | 16349 | 16350 | 16351 | 16352 | 16353 | 16354 | 16355 | 16356 | 16357 | 16358 | 16359 | 16360 | 16361 | 16362 | 16363 | 16364 | 16365 | 16366 | 16367 | 16368 | 16369 | 16370 | 16371 | 16372 | 16373 | 16374 | 16375 | 16376 | 16377 | 16378 | 16379 | 16380 | 16381 | 16382 | 16383 | 16384 | 16385 | 16386 | 16387 | 16388 | 16389 | 16390 | 16391 | 16392 | 16393 | 16394 | 16395 | 16396 | 16397 | 16398 | 16399 | 16400 | 16401 | 16402 | 16403 | 16404 | 16405 | 16406 | 16407 | 16408 | 16409 | 16410 | 16411 | 16412 | 16413 | 16414 | 16415 | 16416 | 16417 | 16418 | 16419 | 16420 | 16421 | 16422 | 16423 | 16424 | 16425 | 16426 | 16427 | 16428 | 16429 | 16430 | 16431 | 16432 | 16433 | 16434 | 16435 | 16436 | 16437 | 16438 | 16439 | 16440 | 16441 | 16442 | 16443 | 16444 | 16445 | 16446 | 16447 | 16448 | 16449 | 16450 | 16451 | 16452 | 16453 | 16454 | 16455 | 16456 | 16457 | 16458 | 16459 | 16460 | 16461 | 16462 | 16463 | 16464 | 16465 | 16466 | 16467 | 16468 | 16469 | 16470 | 16471 | 16472 | 16473 | 16474 | 16475 | 16476 | 16477 | 16478 | 16479 | 16480 | 16481 | 16482 | 16483 | 16484 | 16485 | 16486 | 16487 | 16488 | 16489 | 16490 | 16491 | 16492 | 16493 | 16494 | 16495 | 16496 | 16497 | 16498 | 16499 | 16500 |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |

a pair of trousers & a coat  
and a pair of shoes & a hat

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| 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 | 2041 | 2042 | 2043 | 2044 | 2045 | 2046 | 2047 | 2048 | 2049 | 2050 | 2051 | 2052 | 2053 | 2054 | 2055 | 2056 | 2057 | 2058 | 2059 | 2060 | 2061 | 2062 | 2063 | 2064 | 2065 | 2066 | 2067 | 2068 | 2069 | 2070 | 2071 | 2072 | 2073 | 2074 | 2075 | 2076 | 2077 | 2078 | 2079 | 2080 | 2081 | 2082 | 2083 | 2084 | 2085 | 2086 | 2087 | 2088 | 2089 | 2090 | 2091 | 2092 | 2093 | 2094 | 2095 | 2096 | 2097 | 2098 | 2099 | 2100 | 2101 | 2102 | 2103 | 2104 | 2105 | 2106 | 2107 | 2108 | 2109 | 2110 | 2111 | 2112 | 2113 | 2114 | 2115 | 2116 | 2117 | 2118 | 2119 | 2120 | 2121 | 2122 | 2123 | 2124 | 2125 | 2126 | 2127 | 2128 | 2129 | 2130 | 2131 | 2132 | 2133 | 2134 | 2135 | 2136 | 2137 | 2138 | 2139 | 2140 | 2141 | 2142 | 2143 | 2144 | 2145 | 2146 | 2147 | 2148 | 2149 | 2150 | 2151 | 2152 | 2153 | 2154 | 2155 | 2156 | 2157 | 2158 | 2159 | 2160 | 2161 | 2162 | 2163 | 2164 | 2165 | 2166 | 2167 | 2168 | 2169 | 2170 | 2171 | 2172 | 2173 | 2174 | 2175 | 2176 | 2177 | 2178 | 2179 | 2180 | 2181 | 2182 | 2183 | 2184 | 2185 | 2186 | 2187 | 2188 | 2189 | 2190 | 2191 | 2192 | 2193 | 2194 | 2195 | 2196 | 2197 | 2198 | 2199 | 2200 | 2201 | 2202 | 2203 | 2204 | 2205 | 2206 | 2207 | 2208 | 2209 | 2210 | 2211 | 2212 | 2213 | 2214 | 2215 | 2216 | 2217 | 2218 | 2219 | 2220 | 2221 | 2222 | 2223 | 2224 | 2225 | 2226 | 2227 | 2228 | 2229 | 2230 | 2231 | 2232 | 2233 | 2234 | 2235 | 2236 | 2237 | 2238 | 2239 | 2240 | 2241 | 2242 | 2243 | 2244 | 2245 | 2246 | 2247 | 2248 | 2249 | 2250 | 2251 | 2252 | 2253 | 2254 | 2255 | 2256 | 2257 | 2258 | 2259 | 2260 | 2261 | 2262 | 2263 | 2264 | 2265 | 2266 | 2267 | 2268 | 2269 | 2270 | 2271 | 2272 | 2273 | 2274 | 2275 | 2276 | 2277 | 2278 | 2279 | 2280 | 2281 | 2282 | 2283 | 2284 | 2285 | 2286 | 2287 | 2288 | 2289 | 2290 | 2291 | 2292 | 2293 | 2294 | 2295 | 2296 | 2297 | 2298 | 2299 | 2300 | 2301 | 2302 | 2303 | 2304 | 2305 | 2306 | 2307 | 2308 | 2309 | 2310 | 2311 | 2312 | 2313 | 2314 | 2315 | 2316 | 2317 | 2318 | 2319 | 2320 | 2321 | 2322 | 2323 | 2324 | 2325 | 2326 | 2327 | 2328 | 2329 | 2330 | 2331 | 2332 | 2333 | 2334 | 2335 | 2336 | 2337 | 2338 | 2339 | 2340 | 2341 | 2342 | 2343 | 2344 | 2345 | 2346 | 2347 | 2348 | 2349 | 2350 | 2351 | 2352 | 2353 | 2354 | 2355 | 2356 | 2357 | 2358 | 2359 | 2360 | 2361 | 2362 | 2363 | 2364 | 2365 | 2366 | 2367 | 2368 | 2369 | 2370 | 2371 | 2372 | 2373 | 2374 | 2375 | 2376 | 2377 | 2378 | 2379 | 2380 | 2381 | 2382 | 2383 | 2384 | 2385 | 2386 | 2387 | 2388 | 2389 | 2390 | 2391 | 2392 | 2393 | 2394 | 2395 | 2396 | 2397 | 2398 | 2399 | 2400 | 2401 | 2402 | 2403 | 2404 | 2405 | 2406 | 2407 | 2408 | 2409 | 2410 | 2411 | 2412 | 2413 | 2414 | 2415 | 2416 | 2417 | 2418 | 2419 | 2420 | 2421 | 2422 | 2423 | 2424 | 2425 | 2426 | 2427 | 2428 | 2429 | 2430 |
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256088 | 256089 | 256090 | 256091 | 256092 | 256093 | 256094 | 256095 | 256096 | 256097 | 256098 | 256099 | 256100 | 256101 | 256102 | 256 |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|----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--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-----|

Percentage Points of the  $\chi^2$ -Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu/Q$ | .999999    | .999995    | .999990    | .999950    | .999900    | .999500    | .997500    | .995000    | .992500    |
|---------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 337.5   | .228056 03 | .234824 03 | .237933 03 | .245697 03 | .249313 03 | .258501 03 | .269143 03 | .274336 03 | .277592 03 |
| 338.0   | .228465 03 | .235239 03 | .238348 03 | .246122 03 | .249741 03 | .258930 03 | .269573 03 | .274767 03 | .278023 03 |
| 338.5   | .228874 03 | .235654 03 | .238763 03 | .246537 03 | .250156 03 | .259345 03 | .270000 03 | .275193 03 | .278449 03 |
| 339.0   | .229283 03 | .236070 03 | .239188 03 | .246973 03 | .250598 03 | .259787 03 | .270482 03 | .275675 03 | .278931 03 |
| 339.5   | .229692 03 | .236485 03 | .239606 03 | .247398 03 | .251027 03 | .260216 03 | .270988 03 | .276181 03 | .279437 03 |
| 340.0   | .230101 03 | .236891 03 | .240025 03 | .247824 03 | .251456 03 | .260645 03 | .271374 03 | .276567 03 | .279823 03 |
| 340.5   | .230510 03 | .237316 03 | .240444 03 | .248249 03 | .251885 03 | .261074 03 | .271880 03 | .277073 03 | .280329 03 |
| 341.0   | .230920 03 | .237732 03 | .240862 03 | .248675 03 | .252313 03 | .261559 03 | .272266 03 | .277459 03 | .280715 03 |
| 341.5   | .231329 03 | .238147 03 | .241280 03 | .249100 03 | .252742 03 | .261996 03 | .272733 03 | .277926 03 | .281182 03 |
| 342.0   | .231738 03 | .238563 03 | .241699 03 | .249526 03 | .253171 03 | .262434 03 | .273159 03 | .278352 03 | .281608 03 |
| 342.5   | .232143 03 | .238979 03 | .242117 03 | .249952 03 | .253600 03 | .262871 03 | .273605 03 | .278798 03 | .282025 03 |
| 343.0   | .232557 03 | .239395 03 | .242536 03 | .250378 03 | .254029 03 | .263308 03 | .274052 03 | .279245 03 | .282479 03 |
| 343.5   | .232967 03 | .239811 03 | .242955 03 | .250804 03 | .254459 03 | .263745 03 | .274498 03 | .279691 03 | .282931 03 |
| 344.0   | .233376 03 | .240227 03 | .243374 03 | .251229 03 | .254888 03 | .264182 03 | .274945 03 | .280138 03 | .283394 03 |
| 344.5   | .233786 03 | .240643 03 | .243793 03 | .251655 03 | .255317 03 | .264620 03 | .275391 03 | .280580 03 | .283846 03 |
| 345.0   | .234196 03 | .241059 03 | .244212 03 | .252081 03 | .255746 03 | .265057 03 | .275838 03 | .281027 03 | .284283 03 |
| 345.5   | .234606 03 | .241475 03 | .244631 03 | .252508 03 | .256176 03 | .265495 03 | .276284 03 | .281478 03 | .284735 03 |
| 346.0   | .235016 03 | .241891 03 | .245050 03 | .252934 03 | .256605 03 | .265932 03 | .276731 03 | .281929 03 | .285186 03 |
| 346.5   | .235425 03 | .242307 03 | .245469 03 | .253360 03 | .257034 03 | .266370 03 | .277178 03 | .282380 03 | .285637 03 |
| 347.0   | .235836 03 | .242724 03 | .245886 03 | .253786 03 | .257464 03 | .266807 03 | .277624 03 | .282831 03 | .286088 03 |
| 347.5   | .236246 03 | .243140 03 | .246307 03 | .254212 03 | .257893 03 | .267245 03 | .278071 03 | .283282 03 | .286539 03 |
| 348.0   | .236656 03 | .243556 03 | .246727 03 | .254639 03 | .258323 03 | .267683 03 | .278498 03 | .283693 03 | .286946 03 |
| 348.5   | .237066 03 | .243973 03 | .247146 03 | .255065 03 | .258753 03 | .268120 03 | .278965 03 | .284104 03 | .287357 03 |
| 349.0   | .237476 03 | .244390 03 | .247565 03 | .255492 03 | .259182 03 | .268496 03 | .279342 03 | .284515 03 | .287768 03 |
| 349.5   | .237887 03 | .244806 03 | .247985 03 | .255918 03 | .259612 03 | .268906 03 | .279759 03 | .284926 03 | .288179 03 |
| 350.0   | .238297 03 | .245223 03 | .248404 03 | .256345 03 | .260042 03 | .269343 03 | .280198 03 | .285309 03 | .288562 03 |
| 350.5   | .238707 03 | .245640 03 | .248824 03 | .256771 03 | .260472 03 | .269771 03 | .280625 03 | .285736 03 | .288989 03 |
| 351.0   | .239118 03 | .246056 03 | .249244 03 | .257198 03 | .260902 03 | .270209 03 | .281059 03 | .286170 03 | .289423 03 |
| 351.5   | .239528 03 | .246473 03 | .249663 03 | .257625 03 | .261331 03 | .270647 03 | .281511 03 | .286622 03 | .289875 03 |
| 352.0   | .239939 03 | .246890 03 | .250083 03 | .258051 03 | .261761 03 | .271185 03 | .281974 03 | .287085 03 | .290338 03 |
| 352.5   | .240350 03 | .247307 03 | .250503 03 | .258478 03 | .262191 03 | .271623 03 | .282431 03 | .287542 03 | .290790 03 |
| 353.0   | .240761 03 | .247724 03 | .250923 03 | .258905 03 | .262622 03 | .272062 03 | .282888 03 | .287999 03 | .291242 03 |
| 353.5   | .241171 03 | .248141 03 | .251343 03 | .259332 03 | .263052 03 | .272500 03 | .283345 03 | .288456 03 | .291694 03 |
| 354.0   | .241582 03 | .248558 03 | .251763 03 | .259759 03 | .263482 03 | .272938 03 | .283802 03 | .288913 03 | .292146 03 |
| 354.5   | .241993 03 | .248976 03 | .252183 03 | .260186 03 | .263912 03 | .273376 03 | .284260 03 | .289371 03 | .292598 03 |
| 355.0   | .242404 03 | .249393 03 | .252603 03 | .260613 03 | .264342 03 | .273814 03 | .284717 03 | .289828 03 | .293050 03 |
| 355.5   | .242815 03 | .249810 03 | .253023 03 | .261040 03 | .264773 03 | .274253 03 | .285174 03 | .290289 03 | .293502 03 |
| 356.0   | .243226 03 | .250228 03 | .253443 03 | .261467 03 | .265203 03 | .274691 03 | .285632 03 | .290740 03 | .293954 03 |
| 356.5   | .243637 03 | .250645 03 | .253864 03 | .261895 03 | .265633 03 | .275130 03 | .286091 03 | .291191 03 | .294406 03 |
| 357.0   | .244048 03 | .251063 03 | .254284 03 | .262322 03 | .266064 03 | .275568 03 | .286557 03 | .291642 03 | .294858 03 |
| 357.5   | .244459 03 | .251480 03 | .254704 03 | .262749 03 | .266494 03 | .276006 03 | .287014 03 | .292093 03 | .295310 03 |
| 358.0   | .244870 03 | .251898 03 | .255125 03 | .263177 03 | .266925 03 | .276445 03 | .287462 03 | .292544 03 | .295762 03 |
| 358.5   | .245281 03 | .252315 03 | .255546 03 | .263604 03 | .267356 03 | .276884 03 | .287899 03 | .293000 03 | .296214 03 |
| 359.0   | .245692 03 | .252733 03 | .255966 03 | .264032 03 | .267786 03 | .277312 03 | .288337 03 | .293451 03 | .296666 03 |
| 359.5   | .246103 03 | .253151 03 | .256386 03 | .264459 03 | .268217 03 | .277761 03 | .288776 03 | .293902 03 | .297116 03 |
| 360.0   | .246514 03 | .253569 03 | .256807 03 | .264887 03 | .268648 03 | .278184 03 | .289199 03 | .294353 03 | .297569 03 |
| 360.5   | .246925 03 | .253987 03 | .257228 03 | .265314 03 | .269079 03 | .278638 03 | .289653 03 | .294804 03 | .298020 03 |
| 361.0   | .247336 03 | .254405 03 | .257649 03 | .265741 03 | .269509 03 | .279097 03 | .290070 03 | .295255 03 | .298469 03 |
| 361.5   | .247747 03 | .254823 03 | .258070 03 | .266168 03 | .269934 03 | .279545 03 | .290521 03 | .295706 03 | .298925 03 |
| 362.0   | .248158 03 | .255241 03 | .258491 03 | .266595 03 | .270371 03 | .279946 03 | .290972 03 | .296151 03 | .299380 03 |

### Percentage Points of the $\chi^2$ -Distribution Values of $\chi^2$ in Terms of $Q$ and $r$

|        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |   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       |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |   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256763 | 256764 | 256765 | 256766 | 256767 | 256768 | 256769 | 256770 | 256771 | 256772 | 256773 | 256774 | 256775 | 256776 | 256777 | 256 |
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### Percentage Points of the $\chi^2$ Distribution Values of $\chi^2$ in Terms of $Q$ and $r$

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |      |
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| 192 | 193 | 194 | 195 | 196 | 197 | 198 | 199 | 200 | 201 | 202 | 203 | 204 | 205 | 206 | 207 | 208 | 209 | 210 | 211 | 212 | 213 | 214 | 215 | 216 | 217 | 218 | 219 | 220 | 221 | 222 | 223 | 224 | 225 | 226 | 227 | 228 | 229 | 230 | 231 | 232 | 233 | 234 | 235 | 236 | 237 | 238 | 239 | 240 | 241 | 242 | 243 | 244 | 245 | 246 | 247 | 248 | 249 | 250 | 251 | 252 | 253 | 254 | 255 | 256 | 257 | 258 | 259 | 260 | 261 | 262 | 263 | 264 | 265 | 266 | 267 | 268 | 269 | 270 | 271 | 272 | 273 | 274 | 275 | 276 | 277 | 278 | 279 | 280 | 281 | 282 | 283 | 284 | 285 | 286 | 287 | 288 | 289 | 290 | 291 | 292 | 293 | 294 | 295 | 296 | 297 | 298 | 299 | 300 | 301 | 302 | 303 | 304 | 305 | 306 | 307 | 308 | 309 | 310 | 311 | 312 | 313 | 314 | 315 | 316 | 317 | 318 | 319 | 320 | 321 | 322 | 323 | 324 | 325 | 326 | 327 | 328 | 329 | 330 | 331 | 332 | 333 | 334 | 335 | 336 | 337 | 338 | 339 | 340 | 341 | 342 | 343 | 344 | 345 | 346 | 347 | 348 | 349 | 350 | 351 | 352 | 353 | 354 | 355 | 356 | 357 | 358 | 359 | 360 | 361 | 362 | 363 | 364 | 365 | 366 | 367 | 368 | 369 | 370 | 371 | 372 | 373 | 374 | 375 | 376 | 377 | 378 | 379 | 380 | 381 | 382 | 383 | 384 | 385 | 386 | 387 | 388 | 389 | 390 | 391 | 392 | 393 | 394 | 395 | 396 | 397 | 398 | 399 | 400 | 401 | 402 | 403 | 404 | 405 | 406 | 407 | 408 | 409 | 410 | 411 | 412 | 413 | 414 | 415 | 416 | 417 | 418 | 419 | 420 | 421 | 422 | 423 | 424 | 425 | 426 | 427 | 428 | 429 | 430 | 431 | 432 | 433 | 434 | 435 | 436 | 437 | 438 | 439 | 440 | 441 | 442 | 443 | 444 | 445 | 446 | 447 | 448 | 449 | 450 | 451 | 452 | 453 | 454 | 455 | 456 | 457 | 458 | 459 | 460 | 461 | 462 | 463 | 464 | 465 | 466 | 467 | 468 | 469 | 470 | 471 | 472 | 473 | 474 | 475 | 476 | 477 | 478 | 479 | 480 | 481 | 482 | 483 | 484 | 485 | 486 | 487 | 488 | 489 | 490 | 491 | 492 | 493 | 494 | 495 | 496 | 497 | 498 | 499 | 500 | 501 | 502 | 503 | 504 | 505 | 506 | 507 | 508 | 509 | 510 | 511 | 512 | 513 | 514 | 515 | 516 | 517 | 518 | 519 | 520 | 521 | 522 | 523 | 524 | 525 | 526 | 527 | 528 | 529 | 530 | 531 | 532 | 533 | 534 | 535 | 536 | 537 | 538 | 539 | 540 | 541 | 542 | 543 | 544 | 545 | 546 | 547 | 548 | 549 | 550 | 551 | 552 | 553 | 554 | 555 | 556 | 557 | 558 | 559 | 560 | 561 | 562 | 563 | 564 | 565 | 566 | 567 | 568 | 569 | 570 | 571 | 572 | 573 | 574 | 575 | 576 | 577 | 578 | 579 | 580 | 581 | 582 | 583 | 584 | 585 | 586 | 587 | 588 | 589 | 590 | 591 | 592 | 593 | 594 | 595 | 596 | 597 | 598 | 599 | 600 | 601 | 602 | 603 | 604 | 605 | 606 | 607 | 608 | 609 | 610 | 611 | 612 | 613 | 614 | 615 | 616 | 617 | 618 | 619 | 620 | 621 | 622 | 623 | 624 | 625 | 626 | 627 | 628 | 629 | 630 | 631 | 632 | 633 | 634 | 635 | 636 | 637 | 638 | 639 | 640 | 641 | 642 | 643 | 644 | 645 | 646 | 647 | 648 | 649 | 650 | 651 | 652 | 653 | 654 | 655 | 656 | 657 | 658 | 659 | 660 | 661 | 662 | 663 | 664 | 665 | 666 | 667 | 668 | 669 | 670 | 671 | 672 | 673 | 674 | 675 | 676 | 677 | 678 | 679 | 680 | 681 | 682 | 683 | 684 | 685 | 686 | 687 | 688 | 689 | 690 | 691 | 692 | 693 | 694 | 695 | 696 | 697 | 698 | 699 | 700 | 701 | 702 | 703 | 704 | 705 | 706 | 707 | 708 | 709 | 710 | 711 | 712 | 713 | 714 | 715 | 716 | 717 | 718 | 719 | 720 | 721 | 722 | 723 | 724 | 725 | 726 | 727 | 728 | 729 | 730 | 731 | 732 | 733 | 734 | 735 | 736 | 737 | 738 | 739 | 740 | 741 | 742 | 743 | 744 | 745 | 746 | 747 | 748 | 749 | 750 | 751 | 752 | 753 | 754 | 755 | 756 | 757 | 758 | 759 | 760 | 761 | 762 | 763 | 764 | 765 | 766 | 767 | 768 | 769 | 770 | 771 | 772 | 773 | 774 | 775 | 776 | 777 | 778 | 779 | 780 | 781 | 782 | 783 | 784 | 785 | 786 | 787 | 788 | 789 | 790 | 791 | 792 | 793 | 794 | 795 | 796 | 797 | 798 | 799 | 800 | 801 | 802 | 803 | 804 | 805 | 806 | 807 | 808 | 809 | 810 | 811 | 812 | 813 | 814 | 815 | 816 | 817 | 818 | 819 | 820 | 821 | 822 | 823 | 824 | 825 | 826 | 827 | 828 | 829 | 830 | 831 | 832 | 833 | 834 | 835 | 836 | 837 | 838 | 839 | 840 | 841 | 842 | 843 | 844 | 845 | 846 | 847 | 848 | 849 | 850 | 851 | 852 | 853 | 854 | 855 | 856 | 857 | 858 | 859 | 860 | 861 | 862 | 863 | 864 | 865 | 866 | 867 | 868 | 869 | 870 | 871 | 872 | 873 | 874 | 875 | 876 | 877 | 878 | 879 | 880 | 881 | 882 | 883 | 884 | 885 | 886 | 887 | 888 | 889 | 890 | 891 | 892 | 893 | 894 | 895 | 896 | 897 | 898 | 899 | 900 | 901 | 902 | 903 | 904 | 905 | 906 | 907 | 908 | 909 | 910 | 911 | 912 | 913 | 914 | 915 | 916 | 917 | 918 | 919 | 920 | 921 | 922 | 923 | 924 | 925 | 926 | 927 | 928 | 929 | 930 | 931 | 932 | 933 | 934 | 935 | 936 | 937 | 938 | 939 | 940 | 941 | 942 | 943 | 944 | 945 | 946 | 947 | 948 | 949 | 950 | 951 | 952 | 953 | 954 | 955 | 956 | 957 | 958 | 959 | 960 | 961 | 962 | 963 | 964 | 965 | 966 | 967 | 968 | 969 | 970 | 971 | 972 | 973 | 974 | 975 | 976 | 977 | 978 | 979 | 980 | 981 | 982 | 983 | 984 | 985 | 986 | 987 | 988 | 989 | 990 | 991 | 992 | 993 | 994 | 995 | 996 | 997 | 998 | 999 | 1000 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $Q$   | $\nu$  | .99999  | .99995  | .99990  | .99950  | .99900  | .99750  | .99500  | .99250  | .99000  |
|-------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 412.5 | 290557 | .297736 | .301262 | .310044 | .324485 | .329405 | .336448 | .342273 | .345921 | .349250 |
| 413.0 | 290675 | .298161 | .301687 | .310476 | .324917 | .329837 | .336880 | .342720 | .346379 | .349703 |
| 413.5 | 290792 | .298554 | .302080 | .310868 | .325300 | .330219 | .337262 | .343104 | .346763 | .350087 |
| 414.0 | 290909 | .298948 | .302474 | .311262 | .325681 | .330599 | .337642 | .343484 | .347143 | .350467 |
| 414.5 | 291026 | .299341 | .302867 | .311655 | .326062 | .330979 | .338022 | .343864 | .347523 | .350847 |
| 415.0 | 291143 | .299735 | .303261 | .312048 | .326443 | .331360 | .338403 | .344245 | .347904 | .351228 |
| 415.5 | 291260 | .300128 | .303654 | .312436 | .326824 | .331747 | .338790 | .344632 | .348291 | .351615 |
| 416.0 | 291377 | .300522 | .304048 | .312824 | .327205 | .332141 | .339184 | .345026 | .348685 | .352009 |
| 416.5 | 291494 | .300915 | .304441 | .313212 | .327586 | .332528 | .339571 | .345413 | .349072 | .352396 |
| 417.0 | 291611 | .301309 | .304835 | .313600 | .327967 | .332913 | .339956 | .345798 | .349457 | .352781 |
| 417.5 | 291728 | .301702 | .305228 | .313988 | .328348 | .333394 | .340437 | .346279 | .349938 | .353262 |
| 418.0 | 291845 | .302096 | .305622 | .314376 | .328729 | .333881 | .340924 | .346766 | .350425 | .353749 |
| 418.5 | 291962 | .302489 | .306015 | .314764 | .329110 | .334368 | .341411 | .347253 | .350912 | .354236 |
| 419.0 | 292079 | .302883 | .306409 | .315152 | .329491 | .334855 | .341898 | .347740 | .351399 | .354723 |
| 419.5 | 292196 | .303276 | .306802 | .315540 | .329872 | .335343 | .342385 | .348227 | .351888 | .355212 |
| 420.0 | 292313 | .303670 | .307196 | .315928 | .330253 | .335830 | .342873 | .348715 | .352379 | .355703 |
| 420.5 | 292430 | .304063 | .307589 | .316316 | .330634 | .336317 | .343254 | .349096 | .352690 | .356014 |
| 421.0 | 292547 | .304457 | .307983 | .316704 | .331015 | .336700 | .343632 | .349474 | .353101 | .356425 |
| 421.5 | 292664 | .304850 | .308376 | .317092 | .331396 | .337082 | .344011 | .349853 | .353512 | .356836 |
| 422.0 | 292781 | .305244 | .308770 | .317480 | .331777 | .337463 | .344390 | .350232 | .353923 | .357247 |
| 422.5 | 292898 | .305637 | .309163 | .317868 | .332158 | .337844 | .344769 | .350613 | .354304 | .357628 |
| 423.0 | 293015 | .306031 | .309557 | .318256 | .332539 | .338225 | .345148 | .350994 | .354685 | .358009 |
| 423.5 | 293132 | .306424 | .309950 | .318644 | .332920 | .338612 | .345527 | .351375 | .355059 | .358383 |
| 424.0 | 293249 | .306818 | .310344 | .319032 | .333301 | .339087 | .345906 | .351756 | .355440 | .358764 |
| 424.5 | 293366 | .307211 | .310737 | .319420 | .333682 | .339468 | .346285 | .352137 | .355821 | .359145 |
| 425.0 | 293483 | .307605 | .311131 | .319808 | .334063 | .339849 | .346664 | .352518 | .356202 | .359526 |
| 425.5 | 293600 | .307998 | .311524 | .320196 | .334444 | .340230 | .347041 | .352899 | .356583 | .360007 |
| 426.0 | 293717 | .308392 | .311918 | .320584 | .334825 | .340611 | .347422 | .353280 | .356964 | .360381 |
| 426.5 | 293834 | .308785 | .312311 | .320972 | .335206 | .341000 | .347811 | .353661 | .357345 | .360755 |
| 427.0 | 293951 | .309179 | .312705 | .321360 | .335587 | .341389 | .348200 | .354042 | .357726 | .361129 |
| 427.5 | 294068 | .309572 | .313098 | .321748 | .335968 | .341778 | .348589 | .354423 | .358107 | .361503 |
| 428.0 | 294185 | .309966 | .313492 | .322136 | .336349 | .342167 | .348978 | .354804 | .358488 | .361877 |
| 428.5 | 294302 | .310359 | .313888 | .322524 | .336730 | .342556 | .349367 | .355185 | .358869 | .362251 |
| 429.0 | 294419 | .310753 | .314282 | .322912 | .337111 | .342945 | .349756 | .355576 | .359260 | .362625 |
| 429.5 | 294536 | .311146 | .314675 | .323300 | .337492 | .343334 | .350145 | .355964 | .359648 | .363000 |
| 430.0 | 294653 | .311540 | .315069 | .323688 | .337873 | .343722 | .350533 | .356352 | .360036 | .363404 |
| 430.5 | 294770 | .311933 | .315462 | .324076 | .338254 | .344110 | .350924 | .356743 | .360420 | .363793 |
| 431.0 | 294887 | .312327 | .315856 | .324464 | .338635 | .344499 | .351313 | .357132 | .360804 | .364197 |
| 431.5 | 295004 | .312720 | .316250 | .324852 | .339016 | .344888 | .351697 | .357516 | .361188 | .364581 |
| 432.0 | 295121 | .313114 | .316643 | .325240 | .339397 | .345277 | .352086 | .357905 | .361570 | .364965 |
| 432.5 | 295238 | .313507 | .317037 | .325628 | .339778 | .345666 | .352475 | .358294 | .361952 | .365336 |
| 433.0 | 295355 | .313901 | .317430 | .326016 | .340159 | .346048 | .352864 | .358683 | .362334 | .365718 |
| 433.5 | 295472 | .314294 | .317824 | .326404 | .340541 | .346430 | .353252 | .359071 | .362716 | .366092 |
| 434.0 | 295589 | .314688 | .318218 | .326792 | .340923 | .346812 | .353640 | .359459 | .363098 | .366476 |
| 434.5 | 295706 | .315081 | .318611 | .327180 | .341305 | .347194 | .354028 | .359847 | .363480 | .366860 |
| 435.0 | 295823 | .315475 | .319005 | .327568 | .341687 | .347576 | .354416 | .360239 | .363862 | .367246 |
| 435.5 | 295940 | .315868 | .319398 | .327956 | .342069 | .347964 | .354804 | .360621 | .364204 | .367580 |
| 436.0 | 296057 | .316262 | .319792 | .328344 | .342451 | .348352 | .355192 | .361003 | .364527 | .367914 |
| 436.5 | 296174 | .316655 | .320185 | .328732 | .342833 | .348740 | .355580 | .361385 | .364909 | .368288 |
| 437.0 | 296291 | .317049 | .320579 | .329120 | .343215 | .349122 | .355968 | .361767 | .365291 | .368676 |
| 437.5 | 296408 | .317442 | .320972 | .329508 | .343597 | .349504 | .356356 | .362149 | .365673 | .369058 |
| 438.0 | 296525 | .317836 | .321366 | .329896 | .343979 | .349886 | .356748 | .362531 | .366055 | .369440 |
| 438.5 | 296642 | .318229 | .321759 | .330284 | .344361 | .350274 | .357130 | .362913 | .366437 | .369822 |
| 439.0 | 296759 | .318623 | .322153 | .330672 | .344743 | .350662 | .357518 | .363295 | .366819 | .370204 |
| 439.5 | 296876 | .319016 | .322546 | .331060 | .345125 | .351050 | .357906 | .363677 | .367201 | .370588 |
| 440.0 | 296993 | .319410 | .322940 | .331448 | .345507 | .351438 | .358294 | .364059 | .367583 | .370976 |
| 440.5 | 297110 | .319803 | .323333 | .331836 | .345889 | .351826 | .358682 | .364441 | .367965 | .371364 |
| 441.0 | 297227 | .320197 | .323727 | .332224 | .346271 | .352214 | .359070 | .364823 | .368347 | .371752 |
| 441.5 | 297344 | .320590 | .324120 | .332612 | .346653 | .352602 | .359458 | .365205 | .368729 | .372140 |
| 442.0 | 297461 | .320984 | .324514 | .333000 | .347035 | .352990 | .359846 | .365587 | .369111 | .372528 |
| 442.5 | 297578 | .321377 | .324907 | .333388 | .347417 | .353378 | .360234 | .365971 | .369495 | .372916 |
| 443.0 | 297695 | .321771 | .325301 | .333776 | .347799 | .353766 | .360616 | .366353 | .369877 | .373304 |
| 443.5 | 297812 | .322164 | .325694 | .334164 | .348181 | .354154 | .361004 | .366741 | .370265 | .373692 |
| 444.0 | 297929 | .322558 | .326088 | .334552 | .348563 | .354542 | .361414 | .367151 | .370675 | .374102 |
| 444.5 | 298046 | .322951 | .326481 | .334940 | .348945 | .354930 | .361804 | .367541 | .371059 | .374486 |
| 445.0 | 298163 | .323345 | .326875 | .335328 | .349327 | .355314 | .362196 | .367933 | .371457 | .374884 |
| 445.5 | 298280 | .323738 | .327268 | .335716 | .349709 | .355696 | .362588 | .368325 | .371851 | .375278 |
| 446.0 | 298397 | .324132 | .327662 | .336104 | .350091 | .356078 | .362980 | .368717 | .372245 | .375672 |
| 446.5 | 298514 | .324525 | .328055 | .336492 | .350473 | .356460 | .363372 | .369109 | .372639 | .376066 |
| 447.0 | 298631 | .324919 | .328449 | .336880 | .350855 | .356842 | .363764 | .369501 | .373033 | .376460 |
| 447.5 | 298748 | .325312 | .328842 | .337268 | .351237 | .357224 | .364156 | .369893 | .373427 | .376854 |
| 448.0 | 298865 | .325706 | .329236 | .337656 | .351619 | .357606 | .364548 | .370285 | .373819 | .377246 |
| 448.5 | 298982 | .326099 | .329629 | .338044 | .351999 | .357986 | .364940 | .370679 | .374213 | .377640 |
| 449.0 | 299099 | .326493 | .330023 | .338432 | .352381 | .358368 | .365332 | .371067 | .374601 | .378028 |
| 449.5 | 299216 | .326886 | .330416 | .338820 | .352763 | .358750 | .365724 | .371461 | .374995 | .378422 |
| 450.0 | 299333 | .327280 | .330810 | .339208 | .353145 | .359132 | .366108 | .371855 | .375389 | .378816 |

Percentage Points of the  $\chi^2$ -Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu$ | .99999 | .99995 | .99990 | .99950 | .99900 | .99750 | .99500 | .99250 | .99000 |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 427.5 | 31.990 | 31.987 | 31.984 | 31.971 | 31.958 | 31.945 | 31.932 | 31.919 | 31.906 |
| 428.0 | 31.991 | 31.988 | 31.985 | 31.972 | 31.959 | 31.946 | 31.933 | 31.920 | 31.907 |
| 428.5 | 31.992 | 31.989 | 31.986 | 31.973 | 31.960 | 31.947 | 31.934 | 31.921 | 31.908 |
| 429.0 | 31.993 | 31.990 | 31.987 | 31.974 | 31.961 | 31.948 | 31.935 | 31.922 | 31.909 |
| 429.5 | 31.994 | 31.991 | 31.988 | 31.975 | 31.962 | 31.949 | 31.936 | 31.923 | 31.910 |
| 430.0 | 31.995 | 31.992 | 31.989 | 31.976 | 31.963 | 31.950 | 31.937 | 31.924 | 31.911 |
| 430.5 | 31.996 | 31.993 | 31.990 | 31.977 | 31.964 | 31.951 | 31.938 | 31.925 | 31.912 |
| 431.0 | 31.997 | 31.994 | 31.991 | 31.978 | 31.965 | 31.952 | 31.939 | 31.926 | 31.913 |
| 431.5 | 31.998 | 31.995 | 31.992 | 31.979 | 31.966 | 31.953 | 31.940 | 31.927 | 31.914 |
| 432.0 | 31.999 | 31.996 | 31.993 | 31.980 | 31.967 | 31.954 | 31.941 | 31.928 | 31.915 |
| 432.5 | 32.000 | 31.997 | 31.994 | 31.981 | 31.968 | 31.955 | 31.942 | 31.929 | 31.916 |
| 433.0 | 32.001 | 31.998 | 31.995 | 31.982 | 31.969 | 31.956 | 31.943 | 31.930 | 31.917 |
| 433.5 | 32.002 | 31.999 | 31.996 | 31.983 | 31.970 | 31.957 | 31.944 | 31.931 | 31.918 |
| 434.0 | 32.003 | 32.000 | 31.997 | 31.984 | 31.971 | 31.958 | 31.945 | 31.932 | 31.919 |
| 434.5 | 32.004 | 32.001 | 31.998 | 31.985 | 31.972 | 31.959 | 31.946 | 31.933 | 31.920 |
| 435.0 | 32.005 | 32.002 | 31.999 | 31.986 | 31.973 | 31.960 | 31.947 | 31.934 | 31.921 |
| 435.5 | 32.006 | 32.003 | 32.000 | 31.987 | 31.974 | 31.961 | 31.948 | 31.935 | 31.922 |
| 436.0 | 32.007 | 32.004 | 32.001 | 31.988 | 31.975 | 31.962 | 31.949 | 31.936 | 31.923 |
| 436.5 | 32.008 | 32.005 | 32.002 | 31.989 | 31.976 | 31.963 | 31.950 | 31.937 | 31.924 |
| 437.0 | 32.009 | 32.006 | 32.003 | 31.990 | 31.977 | 31.964 | 31.951 | 31.938 | 31.925 |
| 437.5 | 32.010 | 32.007 | 32.004 | 31.991 | 31.978 | 31.965 | 31.952 | 31.939 | 31.926 |
| 438.0 | 32.011 | 32.008 | 32.005 | 31.992 | 31.979 | 31.966 | 31.953 | 31.940 | 31.927 |
| 438.5 | 32.012 | 32.009 | 32.006 | 31.993 | 31.980 | 31.967 | 31.954 | 31.941 | 31.928 |
| 439.0 | 32.013 | 32.010 | 32.007 | 31.994 | 31.981 | 31.968 | 31.955 | 31.942 | 31.929 |
| 439.5 | 32.014 | 32.011 | 32.008 | 31.995 | 31.982 | 31.969 | 31.956 | 31.943 | 31.930 |
| 440.0 | 32.015 | 32.012 | 32.009 | 31.996 | 31.983 | 31.970 | 31.957 | 31.944 | 31.931 |
| 440.5 | 32.016 | 32.013 | 32.010 | 31.997 | 31.984 | 31.971 | 31.958 | 31.945 | 31.932 |
| 441.0 | 32.017 | 32.014 | 32.011 | 31.998 | 31.985 | 31.972 | 31.959 | 31.946 | 31.933 |
| 441.5 | 32.018 | 32.015 | 32.012 | 31.999 | 31.986 | 31.973 | 31.960 | 31.947 | 31.934 |
| 442.0 | 32.019 | 32.016 | 32.013 | 32.000 | 31.987 | 31.974 | 31.961 | 31.948 | 31.935 |
| 442.5 | 32.020 | 32.017 | 32.014 | 32.001 | 31.988 | 31.975 | 31.962 | 31.949 | 31.936 |
| 443.0 | 32.021 | 32.018 | 32.015 | 32.002 | 31.989 | 31.976 | 31.963 | 31.950 | 31.937 |
| 443.5 | 32.022 | 32.019 | 32.016 | 32.003 | 31.990 | 31.977 | 31.964 | 31.951 | 31.938 |
| 444.0 | 32.023 | 32.020 | 32.017 | 32.004 | 31.991 | 31.978 | 31.965 | 31.952 | 31.939 |
| 444.5 | 32.024 | 32.021 | 32.018 | 32.005 | 31.992 | 31.979 | 31.966 | 31.953 | 31.940 |
| 445.0 | 32.025 | 32.022 | 32.019 | 32.006 | 31.993 | 31.980 | 31.967 | 31.954 | 31.941 |
| 445.5 | 32.026 | 32.023 | 32.020 | 32.007 | 31.994 | 31.981 | 31.968 | 31.955 | 31.942 |
| 446.0 | 32.027 | 32.024 | 32.021 | 32.008 | 31.995 | 31.982 | 31.969 | 31.956 | 31.943 |
| 446.5 | 32.028 | 32.025 | 32.022 | 32.009 | 31.996 | 31.983 | 31.970 | 31.957 | 31.944 |
| 447.0 | 32.029 | 32.026 | 32.023 | 32.010 | 31.997 | 31.984 | 31.971 | 31.958 | 31.945 |
| 447.5 | 32.030 | 32.027 | 32.024 | 32.011 | 31.998 | 31.985 | 31.972 | 31.959 | 31.946 |
| 448.0 | 32.031 | 32.028 | 32.025 | 32.012 | 31.999 | 31.986 | 31.973 | 31.960 | 31.947 |
| 448.5 | 32.032 | 32.029 | 32.026 | 32.013 | 32.000 | 31.987 | 31.974 | 31.961 | 31.948 |
| 449.0 | 32.033 | 32.030 | 32.027 | 32.014 | 32.001 | 31.988 | 31.975 | 31.962 | 31.949 |
| 449.5 | 32.034 | 32.031 | 32.028 | 32.015 | 32.002 | 31.989 | 31.976 | 31.963 | 31.950 |
| 450.0 | 32.035 | 32.032 | 32.029 | 32.016 | 32.003 | 31.990 | 31.977 | 31.964 | 31.951 |
| 450.5 | 32.036 | 32.033 | 32.030 | 32.017 | 32.004 | 31.991 | 31.978 | 31.965 | 31.952 |
| 451.0 | 32.037 | 32.034 | 32.031 | 32.018 | 32.005 | 31.992 | 31.979 | 31.966 | 31.953 |
| 451.5 | 32.038 | 32.035 | 32.032 | 32.019 | 32.006 | 31.993 | 31.980 | 31.967 | 31.954 |
| 452.0 | 32.039 | 32.036 | 32.033 | 32.020 | 32.007 | 31.994 | 31.981 | 31.968 | 31.955 |
| 452.5 | 32.040 | 32.037 | 32.034 | 32.021 | 32.008 | 31.995 | 31.982 | 31.969 | 31.956 |
| 453.0 | 32.041 | 32.038 | 32.035 | 32.022 | 32.009 | 31.996 | 31.983 | 31.970 | 31.957 |
| 453.5 | 32.042 | 32.039 | 32.036 | 32.023 | 32.010 | 31.997 | 31.984 | 31.971 | 31.958 |
| 454.0 | 32.043 | 32.040 | 32.037 | 32.024 | 32.011 | 31.998 | 31.985 | 31.972 | 31.959 |
| 454.5 | 32.044 | 32.041 | 32.038 | 32.025 | 32.012 | 31.999 | 31.986 | 31.973 | 31.960 |
| 455.0 | 32.045 | 32.042 | 32.039 | 32.026 | 32.013 | 32.000 | 31.987 | 31.974 | 31.961 |
| 455.5 | 32.046 | 32.043 | 32.040 | 32.027 | 32.014 | 32.001 | 31.988 | 31.975 | 31.962 |
| 456.0 | 32.047 | 32.044 | 32.041 | 32.028 | 32.015 | 32.002 | 31.989 | 31.976 | 31.963 |
| 456.5 | 32.048 | 32.045 | 32.042 | 32.029 | 32.016 | 32.003 | 31.990 | 31.977 | 31.964 |
| 457.0 | 32.049 | 32.046 | 32.043 | 32.030 | 32.017 | 32.004 | 31.991 | 31.978 | 31.965 |
| 457.5 | 32.050 | 32.047 | 32.044 | 32.031 | 32.018 | 32.005 | 31.992 | 31.979 | 31.966 |
| 458.0 | 32.051 | 32.048 | 32.045 | 32.032 | 32.019 | 32.006 | 31.993 | 31.980 | 31.967 |
| 458.5 | 32.052 | 32.049 | 32.046 | 32.033 | 32.020 | 32.007 | 31.994 | 31.981 | 31.968 |
| 459.0 | 32.053 | 32.050 | 32.047 | 32.034 | 32.021 | 32.008 | 31.995 | 31.982 | 31.969 |
| 459.5 | 32.054 | 32.051 | 32.048 | 32.035 | 32.022 | 32.009 | 31.996 | 31.983 | 31.970 |
| 460.0 | 32.055 | 32.052 | 32.049 | 32.036 | 32.023 | 32.010 | 31.997 | 31.984 | 31.971 |
| 460.5 | 32.056 | 32.053 | 32.050 | 32.037 | 32.024 | 32.011 | 31.998 | 31.985 | 31.972 |
| 461.0 | 32.057 | 32.054 | 32.051 | 32.038 | 32.025 | 32.012 | 31.999 | 31.986 | 31.973 |
| 461.5 | 32.058 | 32.055 | 32.052 | 32.039 | 32.026 | 32.013 | 32.000 | 31.987 | 31.974 |
| 462.0 | 32.059 | 32.056 | 32.053 | 32.040 | 32.027 | 32.014 | 32.001 | 31.988 | 31.975 |
| 462.5 | 32.060 | 32.057 | 32.054 | 32.041 | 32.028 | 32.015 | 32.002 | 31.989 | 31.976 |
| 463.0 | 32.061 | 32.058 | 32.055 | 32.042 | 32.029 | 32.016 | 32.003 | 31.990 | 31.977 |
| 463.5 | 32.062 | 32.059 | 32.056 | 32.043 | 32.030 | 32.017 | 32.004 | 31.991 | 31.978 |
| 464.0 | 32.063 | 32.060 | 32.057 | 32.044 | 32.031 | 32.018 | 32.005 | 31.992 | 31.979 |
| 464.5 | 32.064 | 32.061 | 32.058 | 32.045 | 32.032 | 32.019 | 32.006 | 31.993 | 31.980 |
| 465.0 | 32.065 | 32.062 | 32.059 | 32.046 | 32.033 | 32.020 | 32.007 | 31.994 | 31.981 |
| 465.5 | 32.066 | 32.063 | 32.060 | 32.047 | 32.034 | 32.021 | 32.008 | 31.995 | 31.982 |
| 466.0 | 32.067 | 32.064 | 32.061 | 32.048 | 32.035 | 32.022 | 32.009 | 31.996 | 31.983 |
| 466.5 | 32.068 | 32.065 | 32.062 | 32.049 | 32.036 | 32.023 | 32.010 | 31.997 | 31.984 |
| 467.0 | 32.069 | 32.066 | 32.063 | 32.050 | 32.037 | 32.024 | 32.011 | 31.998 | 31.985 |
| 467.5 | 32.070 | 32.067 | 32.064 | 32.051 | 32.038 | 32.025 | 32.012 | 31.999 | 31.986 |
| 468.0 | 32.071 | 32.068 | 32.065 | 32.052 | 32.039 | 32.026 | 32.013 | 32.000 | 31.987 |
| 468.5 | 32.072 | 32.069 | 32.066 | 32.053 | 32.040 | 32.027 | 32.014 | 32.001 | 31.988 |
| 469.0 | 32.073 | 32.070 | 32.067 | 32.054 | 32.041 | 32.028 | 32.015 | 32.002 | 31.989 |
| 469.5 | 32.074 | 32.071 | 32.068 | 32.055 | 32.042 | 32.029 | 32.016 | 32.003 | 31.990 |
| 470.0 | 32.075 | 32.072 | 32.069 | 32.056 | 32.043 | 32.030 | 32.017 | 32.004 | 31.991 |
| 470.5 | 32.076 | 32.073 | 32.070 | 32.057 | 32.044 | 32.031 | 32.018 | 32.005 | 31.992 |
| 471.0 | 32.077 | 32.074 | 32.071 | 32.058 | 32.045 | 32.032 | 32.019 | 32.006 | 31.993 |
| 471.5 | 32.078 | 32.075 | 32.072 | 32.059 | 32.046 | 32.033 | 32.020 | 32.007 | 31.994 |
| 472.0 | 32.079 | 32.076 | 32.073 | 32.060 | 32.047 | 32.034 | 32.021 | 32.008 | 31.995 |
| 472.5 | 32.080 | 32.077 | 32.074 | 32.061 | 32.048 | 32.035 | 32.022 | 32.009 | 31.996 |
| 473.0 | 32.081 | 32.078 | 32.075 | 32.062 | 32.049 | 32.036 | 32.023 | 32.010 | 31.997 |
| 473.5 | 32.082 | 32.079 | 32.076 | 32.063 | 32.050 | 32.037 | 32.024 | 32.011 | 31.998 |
| 474.0 | 32.083 | 32.080 | 32.077 | 32.064 | 32.051 | 32.038 | 32.025 | 32.012 | 31.999 |
| 474.5 | 32.084 | 32.081 | 32.078 | 32.065 | 32.052 | 32.039 | 32.026 | 32.013 | 32.000 |
| 475.0 | 32.085 | 32.082 | 32.079 | 32.066 | 32.053 | 32.040 | 32.027 | 32.014 | 32.001 |
| 475.5 | 32.086 | 32.083 | 32.080 | 32.067 | 32.054 | 32.041 | 32.028 | 32.015 | 32.002 |
| 476.0 | 32.087 | 32.084 | 32.081 | 32.068 | 32.055 | 32.042 | 32.029 | 32.016 | 32.003 |
| 476.5 | 32.088 | 32.085 | 32.082 | 32.069 | 32.056 | 32.043 | 32.030 | 32.017 | 32.004 |
| 477.0 | 32.089 | 32.086 | 32.083 | 32.070 | 32.057 | 32.044 | 32.031 | 32.018 | 32.005 |
| 477.5 | 32.090 | 32.087 | 32.084 | 32.071 | 32.058 | 32.045 | 32.032 | 32.019 | 32.006 |
| 478.0 | 32.091 | 32.088 | 32.085 | 32.072 | 32.059 | 32.046 | 32.033 | 32.020 | 32.007 |
| 478.5 | 32.092 | 32.089 | 32.086 | 32.073 | 32.060 | 32.047 | 32.034 | 32.021 | 32.008 |
| 479.0 | 32.093 | 32.090 | 32.087 | 32.074 | 32.061 | 32.048 | 32.035 | 32.022 | 32.009 |
| 479.5 | 32.094 | 32.091 | 32.088 | 32.075 | 32.062 | 32.049 | 32.036 | 32.023 | 32.010 |
| 480.0 | 32.095 | 32.092 | 32.089 | 32.076 | 32.063 | 32.050 | 32.037 | 32.024 | 32.011 |
| 480.5 | 32.096 | 32.093 | 32.090 | 32.077 | 32.064 | 32.051 | 32.0   |        |        |

### Percentage Points of the $\chi^2$ -Distribution Values of $\chi^2$ in Terms of $Q$ and $\nu$

[illegible]

### Percentage Points of the $\chi^2$ Distribution Values of $\chi^2$ in Terms of $Q$ and $v$

[illegible]



|   |   |   |   |   |   |   |   |   |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |
|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 |    |    |    |    |    |    |    |    |    |    |    |    |     |



Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $p$

| $Q$  | .990000 | .987500 | .985000 | .982500 | .980000 | .977500 | .975000 | .972500 | .970000 | .967500 | .965000 | .963000 | .955000 | .950000 |
|------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 17.0 | .68229  | .67897  | .67564  | .67231  | .66898  | .66565  | .66232  | .65899  | .65566  | .65233  | .64899  | .64566  | .64233  | .63899  |
| 17.5 | .68597  | .68264  | .67931  | .67598  | .67265  | .66932  | .66599  | .66266  | .65933  | .65600  | .65267  | .64934  | .64601  | .64268  |
| 18.0 | .68965  | .68632  | .68299  | .67966  | .67633  | .67300  | .66967  | .66634  | .66301  | .65968  | .65635  | .65302  | .64969  | .64636  |
| 18.5 | .69333  | .68999  | .68666  | .68333  | .68000  | .67667  | .67334  | .67001  | .66668  | .66335  | .66002  | .65669  | .65336  | .65003  |
| 19.0 | .69701  | .69368  | .69035  | .68702  | .68369  | .68036  | .67703  | .67370  | .67037  | .66704  | .66371  | .66038  | .65705  | .65372  |
| 19.5 | .70069  | .69736  | .69403  | .69070  | .68737  | .68404  | .68071  | .67738  | .67405  | .67072  | .66739  | .66406  | .66073  | .65740  |
| 20.0 | .70437  | .70104  | .69771  | .69438  | .69105  | .68772  | .68439  | .68106  | .67773  | .67440  | .67107  | .66774  | .66441  | .66108  |
| 20.5 | .70805  | .70472  | .70139  | .69806  | .69473  | .69140  | .68807  | .68474  | .68141  | .67808  | .67475  | .67142  | .66809  | .66476  |
| 21.0 | .71173  | .70840  | .70507  | .70174  | .69841  | .69508  | .69175  | .68842  | .68509  | .68176  | .67843  | .67510  | .67177  | .66844  |
| 21.5 | .71541  | .71208  | .70875  | .70542  | .70209  | .69876  | .69543  | .69210  | .68877  | .68544  | .68211  | .67878  | .67545  | .67212  |
| 22.0 | .71909  | .71576  | .71243  | .70910  | .70577  | .70244  | .69911  | .69578  | .69245  | .68912  | .68579  | .68246  | .67913  | .67580  |
| 22.5 | .72277  | .71944  | .71611  | .71278  | .70945  | .70612  | .70279  | .69946  | .69613  | .69280  | .68947  | .68614  | .68281  | .67948  |
| 23.0 | .72645  | .72312  | .71979  | .71646  | .71313  | .70980  | .70647  | .70314  | .69981  | .69648  | .69315  | .68982  | .68649  | .68316  |
| 23.5 | .73013  | .72680  | .72347  | .72014  | .71681  | .71348  | .71015  | .70682  | .70349  | .70016  | .69683  | .69350  | .69017  | .68684  |
| 24.0 | .73381  | .73048  | .72715  | .72382  | .72049  | .71716  | .71383  | .71050  | .70717  | .70384  | .70051  | .69718  | .69385  | .69052  |
| 24.5 | .73749  | .73416  | .73083  | .72750  | .72417  | .72084  | .71751  | .71418  | .71085  | .70752  | .70419  | .70086  | .69753  | .69420  |
| 25.0 | .74117  | .73784  | .73451  | .73118  | .72785  | .72452  | .72119  | .71786  | .71453  | .71120  | .70787  | .70454  | .70121  | .69788  |
| 25.5 | .74485  | .74152  | .73819  | .73486  | .73153  | .72820  | .72487  | .72154  | .71821  | .71488  | .71155  | .70822  | .70489  | .70156  |
| 26.0 | .74853  | .74520  | .74187  | .73854  | .73521  | .73188  | .72855  | .72522  | .72189  | .71856  | .71523  | .71190  | .70857  | .70524  |
| 26.5 | .75221  | .74888  | .74555  | .74222  | .73889  | .73556  | .73223  | .72890  | .72557  | .72224  | .71891  | .71558  | .71225  | .70892  |
| 27.0 | .75589  | .75256  | .74923  | .74590  | .74257  | .73924  | .73591  | .73258  | .72925  | .72592  | .72259  | .71926  | .71593  | .71260  |
| 27.5 | .75957  | .75624  | .75291  | .74958  | .74625  | .74292  | .73959  | .73626  | .73293  | .72960  | .72627  | .72294  | .71961  | .71628  |
| 28.0 | .76325  | .75992  | .75659  | .75326  | .74993  | .74660  | .74327  | .73994  | .73661  | .73328  | .72995  | .72662  | .72329  | .71996  |
| 28.5 | .76693  | .76360  | .76027  | .75694  | .75361  | .75028  | .74695  | .74362  | .74029  | .73696  | .73363  | .73030  | .72697  | .72364  |
| 29.0 | .77061  | .76728  | .76395  | .76062  | .75729  | .75396  | .75063  | .74730  | .74397  | .74064  | .73731  | .73398  | .73065  | .72732  |
| 29.5 | .77429  | .77096  | .76763  | .76430  | .76097  | .75764  | .75431  | .75098  | .74765  | .74432  | .74099  | .73766  | .73433  | .73100  |
| 30.0 | .77797  | .77464  | .77131  | .76798  | .76465  | .76132  | .75799  | .75466  | .75133  | .74800  | .74467  | .74134  | .73801  | .73468  |
| 30.5 | .78165  | .77832  | .77499  | .77166  | .76833  | .76500  | .76167  | .75834  | .75501  | .75168  | .74835  | .74502  | .74169  | .73836  |
| 31.0 | .78533  | .78200  | .77867  | .77534  | .77201  | .76868  | .76535  | .76202  | .75869  | .75536  | .75203  | .74870  | .74537  | .74204  |
| 31.5 | .78901  | .78568  | .78235  | .77902  | .77569  | .77236  | .76903  | .76570  | .76237  | .75904  | .75571  | .75238  | .74905  | .74572  |
| 32.0 | .79269  | .78936  | .78603  | .78270  | .77937  | .77604  | .77271  | .76938  | .76605  | .76272  | .75939  | .75606  | .75273  | .74940  |
| 32.5 | .79637  | .79304  | .78971  | .78638  | .78305  | .77972  | .77639  | .77306  | .76973  | .76640  | .76307  | .75974  | .75641  | .75308  |
| 33.0 | .80005  | .79672  | .79339  | .79006  | .78673  | .78340  | .78007  | .77674  | .77341  | .77008  | .76675  | .76342  | .76009  | .75676  |
| 33.5 | .80373  | .80040  | .79707  | .79374  | .79041  | .78708  | .78375  | .78042  | .77709  | .77376  | .77043  | .76710  | .76377  | .76044  |
| 34.0 | .80741  | .80408  | .80075  | .79742  | .79409  | .79076  | .78743  | .78410  | .78077  | .77744  | .77411  | .77078  | .76745  | .76412  |
| 34.5 | .81109  | .80776  | .80443  | .80110  | .79777  | .79444  | .79111  | .78778  | .78445  | .78112  | .77779  | .77446  | .77113  | .76780  |
| 35.0 | .81477  | .81144  | .80811  | .80478  | .80145  | .79812  | .79479  | .79146  | .78813  | .78480  | .78147  | .77814  | .77481  | .77148  |
| 35.5 | .81845  | .81512  | .81179  | .80846  | .80513  | .80180  | .79847  | .79514  | .79181  | .78848  | .78515  | .78182  | .77849  | .77516  |
| 36.0 | .82213  | .81880  | .81547  | .81214  | .80881  | .80548  | .80215  | .79882  | .79549  | .79216  | .78883  | .78550  | .78217  | .77884  |
| 36.5 | .82581  | .82248  | .81915  | .81582  | .81249  | .80916  | .80583  | .80250  | .79917  | .79584  | .79251  | .78918  | .78585  | .78252  |
| 37.0 | .82949  | .82616  | .82283  | .81950  | .81617  | .81284  | .80951  | .80618  | .80285  | .79952  | .79619  | .79286  | .78953  | .78620  |
| 37.5 | .83317  | .82984  | .82651  | .82318  | .81985  | .81652  | .81319  | .80986  | .80653  | .80320  | .79987  | .79654  | .79321  | .78988  |
| 38.0 | .83685  | .83352  | .83019  | .82686  | .82353  | .82020  | .81687  | .81354  | .81021  | .80688  | .80355  | .80022  | .79689  | .79356  |
| 38.5 | .84053  | .83720  | .83387  | .83054  | .82721  | .82388  | .82055  | .81722  | .81389  | .81056  | .80723  | .80390  | .80057  | .79724  |
| 39.0 | .84421  | .84088  | .83755  | .83422  | .83089  | .82756  | .82423  | .82090  | .81757  | .81424  | .81091  | .80758  | .80425  | .80092  |
| 39.5 | .84789  | .84456  | .84123  | .83790  | .83457  | .83124  | .82791  | .82458  | .82125  | .81792  | .81459  | .81126  | .80793  | .80460  |
| 40.0 | .85157  | .84824  | .84491  | .84158  | .83825  | .83492  | .83159  | .82826  | .82493  | .82160  | .81827  | .81494  | .81161  | .80828  |
| 40.5 | .85525  | .85192  | .84859  | .84526  | .84193  | .83860  | .83527  | .83194  | .82861  | .82528  | .82195  | .81862  | .81529  | .81196  |
| 41.0 | .85893  | .85560  | .85227  | .84894  | .84561  | .84228  | .83895  | .83562  | .83229  | .82896  | .82563  | .82230  | .81897  | .81564  |
| 41.5 | .86261  | .85928  | .85595  | .85262  | .84929  | .84596  | .84263  | .83930  | .83597  | .83264  | .82931  | .82598  | .82265  | .81932  |
| 42.0 | .86629  | .86296  | .85963  | .85630  | .85297  | .84964  | .84631  | .84298  | .83965  | .83632  | .83299  | .82966  | .82633  | .82300  |
| 42.5 | .86997  | .86664  | .86331  | .85998  | .85665  | .85332  | .85000  | .84667  | .84334  | .84001  | .83668  | .83335  | .83002  | .82669  |
| 43.0 | .87365  | .87032  | .86699  | .86366  | .86033  | .85700  | .85367  | .85034  | .84701  | .84368  | .84035  | .83702  | .83369  | .83036  |
| 43.5 | .87733  | .87400  | .87067  | .86734  | .86401  | .86068  | .85735  | .85402  | .85069  | .84736  | .84403  | .84070  | .83737  | .83404  |
| 44.0 | .88101  | .87768  | .87435  | .87102  | .86769  | .86436  | .86103  | .85770  | .85437  | .85104  | .84771  | .84438  | .84105  | .83772  |
| 44.5 | .88469  | .88136  | .87803  | .87470  | .87137  | .86804  | .86471  | .86138  | .85805  | .85472  | .85139  | .84806  | .84473  | .84140  |
| 45.0 | .88837  | .88504  | .88171  | .87838  | .87505  | .87172  | .86839  | .86506  | .86173  | .85840  | .85507  | .85174  | .84841  | .84508  |
| 45.5 | .89205  | .88872  | .88539  | .88206  | .87873  | .87540  | .87207  | .86874  | .86541  | .86208  | .85875  | .85542  | .85209  | .84876  |
| 46.0 | .89573  | .89240  | .88907  | .88574  | .88241  | .87908  | .87575  | .87242  | .86909  | .86576  | .86243  | .85910  | .85577  | .85244  |
| 46.5 | .89941  | .89608  | .89275  | .88942  | .88609  | .88276  | .87943  | .87610  | .87277  | .86944  | .86611  | .86278  | .85945  | .85612  |
| 47.0 | .90309  | .89976  | .89643  | .89310  | .88977  | .88644  | .88311  | .87978  | .87645  | .87312  | .86979  | .86646  | .86313  | .85980  |
| 47.5 | .90677  | .90344  | .90011  | .89678  | .89345  | .89012  | .88679  | .88346  | .88013  | .87680  | .87347  | .87014  | .86681  | .86348  |
| 48.0 | .91045  | .90712  | .90379  | .90046  | .89713  | .89380  | .89047  | .88714  | .88381  | .88048  | .87715  | .87382  | .87049  | .86716  |
| 48.5 | .91413  | .91080  | .90747  | .90414  | .90081  | .89748  | .89415  | .89082  | .88749  | .88416  | .88083  | .87750  | .87417  | .87084  |
| 49.0 | .91781  | .91448  | .91115  | .90782  | .90449  | .90116  | .89783  | .89450  | .89117  | .88784  | .88451  | .88118  | .87785  | .87452  |
| 49.5 | .92149  | .91816  | .91483  | .91150  | .90817  | .90484  | .90151  | .89818  | .89485  | .89152  | .88819  | .88486  | .88153  | .87820  |
| 50.0 | .92517  | .92184  | .91851  | .91518  | .91185  | .90852  | .90519  | .90186  | .89853  | .89520  | .89187  | .88854  | .88521  | .88188  |

2

440

### Percentage Points of the $\chi^2$ Distribution

[illegible]

a part of the same of which we have seen a  
number of - & all its sides are covered by

[illegible]

Percentage Points of the  $\chi^2$  - Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu$ | .990000    | .987500    | .985000    | .980000    | .975000    | .970000    | .965000    | .960000    | .955000    | .950000    |
|-------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 87.5  | .596909 02 | .605530 02 | .613019 02 | .625206 02 | .635150 02 | .643629 02 | .651069 02 | .657730 02 | .663766 02 | .669355 02 |
| 88.0  | .601030 02 | .609783 02 | .617199 02 | .629430 02 | .639409 02 | .647918 02 | .655383 02 | .662968 02 | .669814 02 | .676732 02 |
| 88.5  | .605154 02 | .613939 02 | .621381 02 | .633656 02 | .643670 02 | .652208 02 | .659700 02 | .667349 02 | .675000 02 | .682712 02 |
| 89.0  | .609281 02 | .618097 02 | .625566 02 | .637884 02 | .647934 02 | .656571 02 | .664018 02 | .671749 02 | .679427 02 | .687112 02 |
| 89.5  | .613409 02 | .622258 02 | .629753 02 | .642114 02 | .652199 02 | .660793 02 | .668339 02 | .675992 02 | .683631 02 | .691260 02 |
| 90.0  | .617541 02 | .626420 02 | .633942 02 | .646347 02 | .656466 02 | .665093 02 | .672661 02 | .679947 02 | .687647 02 | .695260 02 |
| 90.5  | .621675 02 | .630565 02 | .638134 02 | .650581 02 | .660736 02 | .669391 02 | .676986 02 | .684370 02 | .691964 02 | .699472 02 |
| 91.0  | .625811 02 | .634753 02 | .642328 02 | .654818 02 | .665007 02 | .673692 02 | .681312 02 | .688833 02 | .696433 02 | .704035 02 |
| 91.5  | .629949 02 | .638952 02 | .646524 02 | .659057 02 | .669280 02 | .677995 02 | .685640 02 | .693244 02 | .699870 02 | .706424 02 |
| 92.0  | .634090 02 | .643195 02 | .650722 02 | .663293 02 | .673556 02 | .682299 02 | .689969 02 | .697636 02 | .705307 02 | .712881 02 |
| 92.5  | .638233 02 | .647429 02 | .654922 02 | .667541 02 | .677833 02 | .686606 02 | .694301 02 | .701990 02 | .709652 02 | .717299 02 |
| 93.0  | .642379 02 | .651645 02 | .659125 02 | .671786 02 | .682112 02 | .690914 02 | .698635 02 | .706346 02 | .714028 02 | .721683 02 |
| 93.5  | .646527 02 | .655824 02 | .663329 02 | .676033 02 | .686393 02 | .695224 02 | .702970 02 | .710690 02 | .718382 02 | .726049 02 |
| 94.0  | .650677 02 | .659982 02 | .667536 02 | .680282 02 | .690677 02 | .699536 02 | .707307 02 | .714963 02 | .722595 02 | .730208 02 |
| 94.5  | .654829 02 | .664168 02 | .671745 02 | .684533 02 | .694962 02 | .703850 02 | .711646 02 | .719224 02 | .726787 02 | .734333 02 |
| 95.0  | .658984 02 | .668368 02 | .675956 02 | .688786 02 | .699249 02 | .708165 02 | .715986 02 | .723597 02 | .731198 02 | .738789 02 |
| 95.5  | .663140 02 | .672561 02 | .680169 02 | .693041 02 | .703538 02 | .712483 02 | .720329 02 | .727952 02 | .735463 02 | .742961 02 |
| 96.0  | .667299 02 | .676750 02 | .684384 02 | .697298 02 | .707828 02 | .716802 02 | .724673 02 | .732238 02 | .739698 02 | .747151 02 |
| 96.5  | .671461 02 | .680952 02 | .688601 02 | .701557 02 | .712121 02 | .721123 02 | .728973 02 | .736565 02 | .744000 02 | .751389 02 |
| 97.0  | .675624 02 | .685153 02 | .692821 02 | .705817 02 | .716415 02 | .725446 02 | .733366 02 | .740885 02 | .748304 02 | .755722 02 |
| 97.5  | .679790 02 | .689363 02 | .697042 02 | .710080 02 | .720711 02 | .729770 02 | .737715 02 | .745326 02 | .752797 02 | .760227 02 |
| 98.0  | .683957 02 | .693572 02 | .701265 02 | .714345 02 | .725009 02 | .734096 02 | .742066 02 | .749819 02 | .757460 02 | .765098 02 |
| 98.5  | .688127 02 | .697782 02 | .705490 02 | .718611 02 | .729309 02 | .738424 02 | .746418 02 | .754193 02 | .761757 02 | .769319 02 |
| 99.0  | .692293 02 | .701993 02 | .709717 02 | .722880 02 | .733611 02 | .742754 02 | .750772 02 | .758469 02 | .766053 02 | .773633 02 |
| 99.5  | .696473 02 | .706233 02 | .713946 02 | .727150 02 | .737914 02 | .747085 02 | .755128 02 | .762852 02 | .770366 02 | .777879 02 |
| 100.0 | .700663 02 | .710463 02 | .718177 02 | .731422 02 | .742219 02 | .751419 02 | .759486 02 | .767205 02 | .774775 02 | .782295 02 |
| 100.5 | .704867 02 | .714709 02 | .722440 02 | .735696 02 | .746526 02 | .755753 02 | .763844 02 | .771586 02 | .779180 02 | .786725 02 |
| 101.0 | .709087 02 | .718969 02 | .726645 02 | .739971 02 | .750835 02 | .760090 02 | .768205 02 | .775968 02 | .783482 02 | .790947 02 |
| 101.5 | .713319 02 | .723251 02 | .730882 02 | .744249 02 | .755145 02 | .764428 02 | .772567 02 | .779851 02 | .787285 02 | .794769 02 |
| 102.0 | .717574 02 | .727556 02 | .735121 02 | .748528 02 | .759457 02 | .768767 02 | .776931 02 | .784423 02 | .791857 02 | .799231 02 |
| 102.5 | .721840 02 | .731862 02 | .739361 02 | .752809 02 | .763771 02 | .773109 02 | .781296 02 | .788623 02 | .795898 02 | .803122 02 |
| 103.0 | .726116 02 | .736188 02 | .743694 02 | .757192 02 | .768186 02 | .777451 02 | .785663 02 | .793011 02 | .799987 02 | .806902 02 |
| 103.5 | .730403 02 | .740525 02 | .748048 02 | .761596 02 | .772603 02 | .781796 02 | .790032 02 | .797401 02 | .804806 02 | .812149 02 |
| 104.0 | .734703 02 | .744865 02 | .752344 02 | .765963 02 | .776922 02 | .786142 02 | .794401 02 | .801792 02 | .809218 02 | .816579 02 |
| 104.5 | .739016 02 | .749238 02 | .756682 02 | .770351 02 | .781362 02 | .790590 02 | .798873 02 | .806299 02 | .813760 02 | .821157 02 |
| 105.0 | .743343 02 | .753615 02 | .761094 02 | .774803 02 | .785782 02 | .795040 02 | .803396 02 | .810857 02 | .818324 02 | .825717 02 |
| 105.5 | .747684 02 | .758006 02 | .765534 02 | .779303 02 | .790342 02 | .799639 02 | .808094 02 | .815560 02 | .823037 02 | .830525 02 |
| 106.0 | .752040 02 | .762412 02 | .770000 02 | .783839 02 | .794928 02 | .804240 02 | .812695 02 | .820164 02 | .827647 02 | .835145 02 |
| 106.5 | .756411 02 | .766833 02 | .774482 02 | .788381 02 | .799520 02 | .808882 02 | .817347 02 | .824826 02 | .832319 02 | .839827 02 |
| 107.0 | .760797 02 | .771269 02 | .779000 02 | .792959 02 | .804168 02 | .813592 02 | .822121 02 | .829655 02 | .837204 02 | .844768 02 |
| 107.5 | .765198 02 | .775720 02 | .783500 02 | .797539 02 | .808808 02 | .818302 02 | .826831 02 | .834370 02 | .841919 02 | .849478 02 |
| 108.0 | .769614 02 | .780186 02 | .788000 02 | .802119 02 | .813448 02 | .822912 02 | .831421 02 | .838970 02 | .846529 02 | .854098 02 |
| 108.5 | .774045 02 | .784667 02 | .792500 02 | .806699 02 | .818088 02 | .827622 02 | .836191 02 | .843760 02 | .851339 02 | .858928 02 |
| 109.0 | .778491 02 | .789163 02 | .797000 02 | .811279 02 | .822728 02 | .832232 02 | .840781 02 | .848330 02 | .855879 02 | .863438 02 |
| 109.5 | .782942 02 | .793664 02 | .791500 02 | .815843 02 | .827352 02 | .836916 02 | .845425 02 | .852974 02 | .860523 02 | .868072 02 |
| 110.0 | .787408 02 | .798170 02 | .806000 02 | .820429 02 | .831998 02 | .841622 02 | .850191 02 | .857740 02 | .865289 02 | .872838 02 |
| 110.5 | .791889 02 | .802691 02 | .810500 02 | .825009 02 | .836638 02 | .846222 02 | .854751 02 | .862270 02 | .869789 02 | .877308 02 |
| 111.0 | .796385 02 | .807227 02 | .815000 02 | .829589 02 | .841278 02 | .850822 02 | .859311 02 | .866790 02 | .874269 02 | .881748 02 |
| 111.5 | .799896 02 | .810778 02 | .818500 02 | .833159 02 | .844908 02 | .854412 02 | .862851 02 | .870280 02 | .877709 02 | .885138 02 |
| 112.0 | .804422 02 | .815344 02 | .823000 02 | .837743 02 | .849552 02 | .859016 02 | .867385 02 | .874754 02 | .882123 02 | .889492 02 |

### Percentage Points of the $\chi^2$ -Distribution Values of $\chi^2$ in Terms of $Q$ and $\nu$

[illegible]

[illegible]

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

[illegible]

|       |        |        |        |        |        |        |        |        |        |        |        |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 187.5 | 145412 | 146811 | 147375 | 149906 | 151474 | 152856 | 153972 | 155913 | 155958 | 156414 | 156824 |
| 188.0 | 145600 | 147243 | 148419 | 150352 | 151923 | 153258 | 154425 | 156166 | 156414 | 156700 | 157222 |
| 188.5 | 146292 | 147655 | 148863 | 150600 | 152373 | 153709 | 154879 | 156923 | 156870 | 157339 | 157739 |
| 189.0 | 146712 | 148120 | 149360 | 151247 | 152862 | 154161 | 155323 | 157378 | 157326 | 157803 | 158197 |
| 189.5 | 147170 | 148570 | 149752 | 151694 | 153322 | 154612 | 155785 | 157833 | 157783 | 158259 | 158655 |
| 190.0 | 147613 | 149012 | 150236 | 152141 | 153721 | 155064 | 156239 | 158280 | 158239 | 158713 | 159113 |
| 190.5 | 148091 | 149489 | 150693 | 152589 | 154172 | 155516 | 156692 | 158743 | 158692 | 159170 | 159570 |
| 191.0 | 148591 | 149987 | 151185 | 153036 | 154624 | 155968 | 157146 | 159198 | 159152 | 159628 | 160028 |
| 191.5 | 149132 | 150529 | 151724 | 153583 | 155171 | 156519 | 157599 | 159653 | 159609 | 160086 | 160486 |
| 192.0 | 149712 | 151107 | 152294 | 154131 | 155721 | 156971 | 157953 | 159910 | 160066 | 160544 | 160944 |
| 192.5 | 150331 | 151726 | 152913 | 154839 | 156428 | 157623 | 158507 | 160564 | 160522 | 161002 | 161402 |
| 193.0 | 150991 | 152386 | 153573 | 155497 | 157086 | 158281 | 159165 | 161219 | 161239 | 161719 | 162119 |
| 193.5 | 151701 | 153096 | 154283 | 156207 | 157796 | 158991 | 159875 | 161932 | 161952 | 162432 | 162832 |
| 194.0 | 152461 | 153856 | 155043 | 156967 | 158556 | 159751 | 160635 | 162692 | 162712 | 163192 | 163592 |
| 194.5 | 153271 | 154666 | 155853 | 157787 | 159376 | 160571 | 161455 | 163512 | 163532 | 164012 | 164412 |
| 195.0 | 154141 | 155536 | 156723 | 158647 | 160236 | 161431 | 162315 | 164372 | 164392 | 164872 | 165272 |
| 195.5 | 155071 | 156466 | 157653 | 159577 | 161166 | 162361 | 163245 | 165302 | 165322 | 165802 | 166202 |
| 196.0 | 156061 | 157456 | 158643 | 160567 | 162156 | 163351 | 164235 | 166292 | 166312 | 166792 | 167192 |
| 196.5 | 157111 | 158506 | 159693 | 161617 | 163206 | 164401 | 165285 | 167342 | 167362 | 167842 | 168242 |
| 197.0 | 158231 | 159626 | 160813 | 162737 | 164326 | 165521 | 166405 | 168462 | 168482 | 168962 | 169362 |
| 197.5 | 159411 | 160806 | 161993 | 163917 | 165506 | 166701 | 167585 | 169642 | 169662 | 170142 | 170542 |
| 198.0 | 160741 | 162136 | 163323 | 165247 | 166836 | 168031 | 168915 | 170972 | 170992 | 171472 | 171872 |
| 198.5 | 162231 | 163626 | 164813 | 166737 | 168326 | 169521 | 170405 | 172462 | 172482 | 172962 | 173362 |
| 199.0 | 163881 | 165276 | 166463 | 168387 | 169976 | 171171 | 172055 | 174112 | 174132 | 174612 | 175012 |
| 199.5 | 165691 | 167086 | 168273 | 170207 | 171796 | 172991 | 173875 | 175932 | 175952 | 176432 | 176832 |
| 200.0 | 167661 | 169056 | 170243 | 172167 | 173756 | 174951 | 175835 | 177892 | 177912 | 178392 | 178792 |
| 200.5 | 169791 | 171186 | 172373 | 174297 | 175886 | 177081 | 177965 | 179922 | 179942 | 180422 | 180822 |
| 201.0 | 172081 | 173476 | 174663 | 176587 | 178176 | 179371 | 180255 | 182312 | 182332 | 182812 | 183212 |
| 201.5 | 174531 | 175926 | 177113 | 179037 | 180626 | 181821 | 182705 | 184762 | 184782 | 185262 | 185662 |
| 202.0 | 177141 | 178536 | 179723 | 181647 | 183236 | 184431 | 185315 | 187372 | 187392 | 187    |        |

999

54

### Percentage Points of the $\chi^2$ Distribution

|      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1950 | 1951 | 1952 | 1953 | 1954 | 1955 | 1956 | 1957 | 1958 | 1959 | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 | 2032 | 2033 | 2034 | 2035 | 2036 | 2037 | 2038 | 2039 | 2040 | 2041 | 2042 | 2043 | 2044 | 2045 | 2046 | 2047 | 2048 | 2049 | 2050 | 2051 | 2052 | 2053 | 2054 | 2055 | 2056 | 2057 | 2058 | 2059 | 2060 | 2061 | 2062 | 2063 | 2064 | 2065 | 2066 | 2067 | 2068 | 2069 | 2070 | 2071 | 2072 | 2073 | 2074 | 2075 | 2076 | 2077 | 2078 | 2079 | 2080 | 2081 | 2082 | 2083 | 2084 | 2085 | 2086 | 2087 | 2088 | 2089 | 2090 | 2091 | 2092 | 2093 | 2094 | 2095 | 2096 | 2097 | 2098 | 2099 | 2100 | 2101 | 2102 | 2103 | 2104 | 2105 | 2106 | 2107 | 2108 | 2109 | 2110 | 2111 | 2112 | 2113 | 2114 | 2115 | 2116 | 2117 | 2118 | 2119 | 2120 | 2121 | 2122 | 2123 | 2124 | 2125 | 2126 | 2127 | 2128 | 2129 | 2130 | 2131 | 2132 | 2133 | 2134 | 2135 | 2136 | 2137 | 2138 | 2139 | 2140 | 2141 | 2142 | 2143 | 2144 | 2145 | 2146 | 2147 | 2148 | 2149 | 2150 | 2151 | 2152 | 2153 | 2154 | 2155 | 2156 | 2157 | 2158 | 2159 | 2160 | 2161 | 2162 | 2163 | 2164 | 2165 | 2166 | 2167 | 2168 | 2169 | 2170 | 2171 | 2172 | 2173 | 2174 | 2175 | 2176 | 2177 | 2178 | 2179 | 2180 | 2181 | 2182 | 2183 | 2184 | 2185 | 2186 | 2187 | 2188 | 2189 | 2190 | 2191 | 2192 | 2193 | 2194 | 2195 | 2196 | 2197 | 2198 | 2199 | 2200 | 2201 | 2202 | 2203 | 2204 | 2205 | 2206 | 2207 | 2208 | 2209 | 2210 | 2211 | 2212 | 2213 | 2214 | 2215 | 2216 | 2217 | 2218 | 2219 | 2220 | 2221 | 2222 | 2223 | 2224 | 2225 | 2226 | 2227 | 2228 | 2229 | 2230 | 2231 | 2232 | 2233 | 2234 | 2235 | 2236 | 2237 | 2238 | 2239 | 2240 | 2241 | 2242 | 2243 | 2244 | 2245 | 2246 | 2247 | 2248 | 2249 | 2250 | 2251 | 2252 | 2253 | 2254 | 2255 | 2256 | 2257 | 2258 | 2259 | 2260 | 2261 | 2262 | 2263 | 2264 | 2265 | 2266 | 2267 | 2268 | 2269 | 2270 | 2271 | 2272 | 2273 | 2274 | 2275 | 2276 | 2277 | 2278 | 2279 | 2280 | 2281 | 2282 | 2283 | 2284 | 2285 | 2286 | 2287 | 2288 | 2289 | 2290 | 2291 | 2292 | 2293 | 2294 | 2295 | 2296 | 2297 | 2298 | 2299 | 2300 | 2301 | 2302 | 2303 | 2304 | 2305 | 2306 | 2307 | 2308 | 2309 | 2310 | 2311 | 2312 | 2313 | 2314 | 2315 | 2316 | 2317 | 2318 | 2319 | 2320 | 2321 | 2322 | 2323 | 2324 | 2325 | 2326 | 2327 | 2328 | 2329 | 2330 | 2331 | 2332 | 2333 | 2334 | 2335 | 2336 | 2337 | 2338 | 2339 | 2340 | 2341 | 2342 | 2343 | 2344 | 2345 | 2346 | 2347 | 2348 | 2349 | 2350 | 2351 | 2352 | 2353 | 2354 | 2355 | 2356 | 2357 | 2358 | 2359 | 2360 | 2361 | 2362 | 2363 | 2364 | 2365 | 2366 | 2367 | 2368 | 2369 | 2370 | 2371 | 2372 | 2373 | 2374 | 2375 | 2376 | 2377 | 2378 | 2379 | 2380 | 2381 | 2382 | 2383 | 2384 | 2385 | 2386 | 2387 | 2388 | 2389 | 2390 | 2391 | 2392 | 2393 | 2394 | 2395 | 2396 | 2397 | 2398 | 2399 | 2400 | 2401 | 2402 | 2403 | 2404 | 2405 | 2406 | 2407 | 2408 | 2409 | 2410 | 2411 | 2412 | 2413 | 2414 | 2415 | 2416 | 2417 | 2418 | 2419 | 2420 | 2421 | 2422 | 2423 | 2424 | 2425 | 2426 | 2427 | 2428 | 2429 | 2430 | 2431 | 2432 | 2433 | 2434 | 2435 | 2436 | 2437 | 2438 | 2439 | 2440 | 2441 | 2442 | 2443 | 2444 | 2445 | 2446 | 2447 | 2448 | 2449 | 2450 | 2451 | 2452 | 2453 | 2454 | 2455 | 2456 | 2457 | 2458 | 2459 | 2460 | 2461 | 2462 | 2463 | 2464 | 2465 | 2466 | 2467 | 2468 | 2469 | 2470 | 2471 | 2472 | 2473 | 2474 | 2475 | 2476 | 2477 | 2478 | 2479 | 2480 | 2481 | 2482 | 2483 | 2484 | 2485 | 2486 | 2487 | 2488 | 2489 | 2490 | 2491 | 2492 | 2493 | 2494 | 2495 | 2496 | 2497 | 2498 | 2499 | 2500 | 2501 | 2502 | 2503 | 2504 | 2505 | 2506 | 2507 | 2508 | 2509 | 2510 | 2511 | 2512 | 2513 | 2514 | 2515 | 2516 | 2517 | 2518 | 2519 | 2520 | 2521 | 2522 | 2523 | 2524 | 2525 | 2526 | 2527 | 2528 | 2529 | 2530 | 2531 | 2532 | 2533 | 2534 | 2535 | 2536 | 2537 | 2538 | 2539 | 2540 | 2541 | 2542 | 2543 | 2544 | 2545 | 2546 | 2547 | 2548 | 2549 | 2550 | 2551 | 2552 | 2553 | 2554 | 2555 | 2556 | 2557 | 2558 | 2559 | 2560 | 2561 | 2562 | 2563 | 2564 | 2565 | 2566 | 2567 | 2568 | 2569 | 2570 | 2571 | 2572 | 2573 | 2574 | 2575 | 2576 | 2577 | 2578 | 2579 | 2580 | 2581 | 2582 | 2583 | 2584 | 2585 | 2586 | 2587 | 2588 | 2589 | 2590 | 2591 | 2592 | 2593 | 2594 | 2595 | 2596 | 2597 | 2598 | 2599 | 2600 | 2601 | 2602 | 2603 | 2604 | 2605 | 2606 | 2607 | 2608 | 2609 | 2610 | 2611 | 2612 | 2613 | 2614 | 2615 | 2616 | 2617 | 2618 | 2619 | 2620 | 2621 | 2622 | 2623 | 2624 | 2625 | 2626 | 2627 | 2628 | 2629 | 2630 | 2631 | 2632 | 2633 | 2634 | 2635 | 2636 | 2637 | 2638 | 2639 | 2640 | 2641 | 2642 | 2643 | 2644 | 2645 | 2646 | 2647 | 2648 | 2649 | 2650 | 2651 | 2652 | 2653 | 2654 | 2655 | 2656 | 2657 | 2658 | 2659 | 2660 | 2661 | 2662 | 2663 | 2664 | 2665 | 2666 | 2667 | 2668 | 2669 | 2670 | 2671 | 2672 | 2673 | 2674 | 2675 | 2676 | 2677 | 2678 | 2679 | 2680 | 2681 | 2682 | 2683 | 2684 | 2685 | 2686 | 2687 | 2688 | 2689 | 2690 | 2691 | 2692 | 2693 | 2694 | 2695 | 2696 | 2697 | 2698 | 2699 | 2700 | 2701 | 2702 | 2703 | 2704 | 2705 | 2706 | 2707 | 2708 | 2709 | 2710 | 2711 | 2712 | 2713 | 2714 | 2715 | 2716 | 2717 | 2718 | 2719 | 2720 | 2721 | 2722 | 2723 | 2724 | 2725 | 2726 | 2727 | 2728 | 2729 | 2730 | 2731 | 2732 | 2733 | 2734 | 2735 | 2736 | 2737 | 2738 | 2739 | 2740 | 2741 | 2742 | 2743 | 2744 | 2745 | 2746 | 2747 | 2748 | 2749 | 2750 | 2751 | 2752 | 2753 | 2754 | 2755 | 2756 | 2757 | 2758 | 2759 | 2760 | 2761 | 2762 | 2763 | 2764 | 2765 | 2766 | 2767 | 2768 | 2769 | 2770 | 2771 | 2772 | 2773 | 2774 | 2775 | 2776 | 2777 | 2778 | 2779 | 2780 | 2781 | 2782 | 2783 | 2784 | 2785 | 2786 | 2787 | 2788 | 2789 | 2790 | 2791 | 2792 | 2793 | 2794 | 2795 | 2796 | 2797 | 2798 | 2799 | 2800 | 2801 | 2802 | 2803 | 2804 | 2805 | 2806 | 2807 | 2808 | 2809 | 2810 | 2811 | 2812 | 2813 | 2814 | 2815 | 2816 | 2817 | 2818 | 2819 | 2820 | 2821 | 2822 | 2823 | 2824 | 2825 | 2826 | 2827 | 2828 | 2829 | 2830 | 2831 | 2832 | 2833 | 2834 | 2835 | 2836 | 2837 | 2838 | 2839 | 2840 | 2841 | 2842 | 2843 | 2844 | 2845 | 2846 | 2847 | 2848 | 2849 | 2850 | 2851 | 2852 | 2853 | 2854 | 2855 | 2856 | 2857 | 2858 | 2859 | 2860 | 2861 | 2862 | 2863 | 2864 | 2865 | 2866 | 2867 | 2868 | 2869 | 2870 | 2871 | 2872 | 2873 | 2874 | 2875 | 2876 | 2877 | 2878 | 2879 | 2880 | 2881 | 2882 | 2883 | 2884 | 2885 | 2886 | 2887 | 2888 | 2889 | 2890 | 2891 | 2892 | 2893 | 2894 | 2895 | 2896 | 2897 | 2898 | 2899 | 2900 | 2901 | 2902 | 2903 | 2904 | 2905 | 2906 | 2907 | 2908 | 2909 | 2910 | 2911 | 2912 | 2913 | 2914 | 2915 | 2916 | 2917 | 2918 | 2919 | 2920 | 2921 | 2922 | 2923 | 2924 | 2925 | 2926 | 2927 | 2928 | 2929 | 2930 | 2931 | 2932 | 2933 | 2934 | 2935 | 2936 | 2937 | 2938 | 2939 | 2940 | 2941 | 2942 | 2943 | 2944 | 2945 | 2946 | 2947 | 2948 | 2949 | 2950 | 2951 | 2952 | 2953 | 2954 | 2955 | 2956 | 2957 | 2958 | 2959 | 2960 | 2961 | 2962 | 2963 | 2964 | 2965 | 2966 | 2967 | 2968 | 2969 | 2970 | 2971 | 2972 | 2973 | 2974 | 2975 | 2976 | 2977 | 2978 | 2979 | 2980 | 2981 | 2982 | 2983 | 2984 | 2985 | 2986 | 2987 | 2988 | 2989 | 2990 | 2991 | 2992 | 2993 | 2994 | 2995 | 2996 | 2997 | 2998 | 2999 | 3000 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|-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54

[illegible]

### Percentage Points of the $\chi^2$ Distribution Values of $\chi^2$ in Terms of $Q$ and $r$

| 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9      | 10     | 11     | 12     | 13     | 14     | 15     | 16     | 17     | 18     | 19     | 20     | 21     | 22     | 23     | 24     | 25     | 26     | 27     | 28     | 29     | 30     | 31     | 32     | 33     | 34     | 35     | 36     | 37     | 38     | 39     | 40     | 41     | 42     | 43     | 44     | 45     | 46     | 47     | 48     | 49     | 50     | 51     | 52     | 53     | 54     | 55     | 56     | 57     | 58     | 59     | 60     | 61     | 62     | 63     | 64     | 65     | 66     | 67     | 68     | 69     | 70     | 71     | 72     | 73     | 74     | 75     | 76     | 77     | 78     | 79     | 80     | 81     | 82     | 83     | 84     | 85     | 86     | 87     | 88     | 89     | 90     | 91     | 92     | 93     | 94     | 95     | 96     | 97     | 98     | 99     | 100    |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 214623 | 214624 | 214625 | 214626 | 214627 | 214628 | 214629 | 214630 | 214631 | 214632 | 214633 | 214634 | 214635 | 214636 | 214637 | 214638 | 214639 | 214640 | 214641 | 214642 | 214643 | 214644 | 214645 | 214646 | 214647 | 214648 | 214649 | 214650 | 214651 | 214652 | 214653 | 214654 | 214655 | 214656 | 214657 | 214658 | 214659 | 214660 | 214661 | 214662 | 214663 | 214664 | 214665 | 214666 | 214667 | 214668 | 214669 | 214670 | 214671 | 214672 | 214673 | 214674 | 214675 | 214676 | 214677 | 214678 | 214679 | 214680 | 214681 | 214682 | 214683 | 214684 | 214685 | 214686 | 214687 | 214688 | 214689 | 214690 | 214691 | 214692 | 214693 | 214694 | 214695 | 214696 | 214697 | 214698 | 214699 | 214700 | 214701 | 214702 | 214703 | 214704 | 214705 | 214706 | 214707 | 214708 | 214709 | 214710 | 214711 | 214712 | 214713 | 214714 | 214715 | 214716 | 214717 | 214718 | 214719 | 214720 | 214721 | 214722 | 214723 | 214724 | 214725 | 214726 | 214727 | 214728 | 214729 | 214730 | 214731 | 214732 | 214733 | 214734 | 214735 | 214736 | 214737 | 214738 | 214739 | 214740 | 214741 | 214742 | 214743 | 214744 | 214745 | 214746 | 214747 | 214748 | 214749 | 214750 | 214751 | 214752 | 214753 | 214754 | 214755 | 214756 | 214757 | 214758 | 214759 | 214760 | 214761 | 214762 | 214763 | 214764 | 214765 | 214766 | 214767 | 214768 | 214769 | 214770 | 214771 | 214772 | 214773 | 214774 | 214775 | 214776 | 214777 | 214778 | 214779 | 214780 | 214781 | 214782 | 214783 | 214784 | 214785 | 214786 | 214787 | 214788 | 214789 | 214790 | 214791 | 214792 | 214793 | 214794 | 214795 | 214796 | 214797 | 214798 | 214799 | 214800 | 214801 | 214802 | 214803 | 214804 | 214805 | 214806 | 214807 | 214808 | 214809 | 214810 | 214811 | 214812 | 214813 | 214814 | 214815 | 214816 | 214817 | 214818 | 214819 | 214820 | 214821 | 214822 | 214823 | 214824 | 214825 | 214826 | 214827 | 214828 | 214829 | 214830 | 214831 | 214832 | 214833 | 214834 | 214835 | 214836 | 214837 | 214838 | 214839 | 214840 | 214841 | 214842 | 214843 | 214844 | 214845 | 214846 | 214847 | 214848 | 214849 | 214850 | 214851 | 214852 | 214853 | 214854 | 214855 | 214856 | 214857 | 214858 | 214859 | 214860 | 214861 | 214862 | 214863 | 214864 | 214865 | 214866 | 214867 | 214868 | 214869 | 214870 | 214871 | 214872 | 214873 | 214874 | 214875 | 214876 | 214877 | 214878 | 214879 | 214880 | 214881 | 214882 | 214883 | 214884 | 214885 | 214886 | 214887 | 214888 | 214889 | 214890 | 214891 | 214892 | 214893 | 214894 | 214895 | 214896 | 214897 | 214898 | 214899 | 214900 | 214901 | 214902 | 214903 | 214904 | 214905 | 214906 | 214907 | 214908 | 214909 | 214910 | 214911 | 214912 | 214913 | 214914 | 214915 | 214916 | 214917 | 214918 | 214919 | 214920 | 214921 | 214922 | 214923 | 214924 | 214925 | 214926 | 214927 | 214928 | 214929 | 214930 | 214931 | 214932 | 214933 | 214934 | 214935 | 214936 | 214937 | 214938 | 214939 | 214940 | 214941 | 214942 | 214943 | 214944 | 214945 | 214946 | 214947 | 214948 | 214949 | 214950 | 214951 | 214952 | 214953 | 214954 | 214955 | 214956 | 214957 | 214958 | 214959 | 214960 | 214961 | 214962 | 214963 | 214964 | 214965 | 214966 | 214967 | 214968 | 214969 | 214970 | 214971 | 214972 | 214973 | 214974 | 214975 | 214976 | 214977 | 214978 | 214979 | 214980 | 214981 | 214982 | 214983 | 214984 | 214985 | 214986 | 214987 | 214988 | 214989 | 214990 | 214991 | 214992 | 214993 | 214994 | 214995 | 214996 | 214997 | 214998 | 214999 | 215000 |
| 214957 | 214958 | 214959 | 214960 | 214961 | 214962 | 214963 | 214964 | 214965 | 214966 | 214967 | 214968 | 214969 | 214970 | 214971 | 214972 | 214973 | 214974 | 214975 | 214976 | 214977 | 214978 | 214979 | 214980 | 214981 | 214982 | 214983 | 214984 | 214985 | 214986 | 214987 | 214988 | 214989 | 214990 | 214991 | 214992 | 214993 | 214994 | 214995 | 214996 | 214997 | 214998 | 214999 | 215000 | 215001 | 215002 | 215003 | 215004 | 215005 | 215006 | 215007 | 215008 | 215009 | 215010 | 215011 | 215012 | 215013 | 215014 | 215015 | 215016 | 215017 | 215018 | 215019 | 215020 | 215021 | 215022 | 215023 | 215024 | 215025 | 215026 | 215027 | 215028 | 215029 | 215030 | 215031 | 215032 | 215033 | 215034 | 215035 | 215036 | 215037 | 215038 | 215039 | 215040 | 215041 | 215042 | 215043 | 215044 | 215045 | 215046 | 215047 | 215048 | 215049 | 215050 | 215051 | 215052 | 215053 | 215054 | 215055 | 215056 | 215057 | 215058 | 215059 | 215060 | 215061 | 215062 | 215063 | 215064 | 215065 | 215066 | 215067 | 215068 | 215069 | 215070 | 215071 | 215072 | 215073 | 215074 | 215075 | 215076 | 215077 | 215078 | 215079 | 215080 | 215081 | 215082 | 215083 | 215084 | 215085 | 215086 | 215087 | 215088 | 215089 | 215090 | 215091 | 215092 | 215093 | 215094 | 215095 | 215096 | 215097 | 215098 | 215099 | 215100 | 215101 | 215102 | 215103 | 215104 | 215105 | 215106 | 215107 | 215108 | 215109 | 215110 | 215111 | 215112 | 215113 | 215114 | 215115 | 215116 | 215117 | 215118 | 215119 | 215120 | 215121 | 215122 | 215123 | 215124 | 215125 | 215126 | 215127 | 215128 | 215129 | 215130 | 215131 | 215132 | 215133 | 215134 | 215135 | 215136 | 215137 | 215138 | 215139 | 215140 | 215141 | 215142 | 215143 | 215144 | 215145 | 215146 | 215147 | 215148 | 215149 | 215150 | 215151 | 215152 | 215153 | 215154 | 215155 | 215156 | 215157 | 215158 | 215159 | 215160 | 215161 | 215162 | 215163 | 215164 | 215165 | 215166 | 215167 | 215168 | 215169 | 215170 | 215171 | 215172 | 215173 | 215174 | 215175 | 215176 | 215177 | 215178 | 215179 | 215180 | 215181 | 215182 | 215183 | 215184 | 215185 | 215186 | 215187 | 215188 | 215189 | 215190 | 215191 | 215192 | 215193 | 215194 | 215195 | 215196 | 215197 | 215198 | 215199 | 215200 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| 215157 | 215158 | 215159 | 215160 | 215161 | 215162 | 215163 | 215164 | 215165 | 215166 | 215167 | 215168 | 215169 | 215170 | 215171 | 215172 | 215173 | 215174 | 215175 | 215176 | 215177 | 215178 | 215179 | 215180 | 215181 | 215182 | 215183 | 215184 | 215185 | 215186 | 215187 | 215188 | 215189 | 215190 | 215191 | 215192 | 215193 | 215194 | 215195 | 215196 | 215197 | 215198 | 215199 | 215200 | 215201 | 215202 | 215203 | 215204 | 215205 | 215206 | 215207 | 215208 | 215209 | 215210 | 215211 | 215212 | 215213 | 215214 | 215215 | 215216 | 215217 | 215218 | 215219 | 215220 | 215221 | 215222 | 215223 | 215224 | 215225 | 215226 | 215227 | 215228 | 215229 | 215230 | 215231 | 215232 | 215233 | 215234 | 215235 | 215236 | 215237 | 215238 | 215239 | 215240 | 215241 | 215242 | 215243 | 215244 | 215245 | 215246 | 215247 | 215248 | 215249 | 215250 | 215251 | 215252 | 215253 | 215254 | 215255 | 215256 | 215257 | 215258 | 215259 | 215260 | 215261 | 215262 | 215263 | 215264 | 215265 | 215266 | 215267 | 215268 | 215269 | 215270 | 215271 | 215272 | 215273 | 215274 | 215275 | 215276 | 215277 | 215278 | 215279 | 215280 | 215281 | 215282 | 215283 | 215284 | 215285 | 215286 | 215287 | 215288 | 215289 | 215290 | 215291 | 215292 | 215293 | 215294 | 215295 | 215296 | 215297 | 215298 | 215299 | 215300 | 215301 | 215302 | 215303 | 215304 | 215305 | 215306 | 215307 | 215308 | 215309 | 215310 | 215311 | 215312 | 215313 | 215314 | 215315 | 215316 | 215317 | 215318 | 215319 | 215320 | 215321 | 215322 | 215323 | 215324 | 215325 | 215326 | 215327 | 215328 | 215329 | 215330 | 215331 | 215332 | 215333 | 215334 | 215335 | 215336 | 215337 | 215338 | 215339 | 215340 | 215341 | 215342 | 215343 | 215344 | 215345 | 215346 | 215347 | 215348 | 215349 | 215350 | 215351 | 215352 | 215353 | 215354 | 215355 | 215356 | 215357 | 215358 | 215359 | 215360 | 215361 | 215362 | 215363 | 215364 | 215365 | 215366 | 215367 | 215368 | 215369 | 215370 | 215371 | 215372 | 215373 | 215374 | 215375 | 215376 | 215377 | 215378 | 215379 | 215380 | 215381 | 215382 | 215383 | 215384 | 215385 | 215386 | 215387 | 215388 | 215389 | 215390 | 215391 | 215392 | 215393 | 215394 | 215395 | 215396 | 215397 | 215398 | 215399 | 215400 | 215401 | 215402 | 215403 | 215404 | 215405 | 215406 | 215407 | 215408 | 215409 | 215410 | 215411 | 215412 | 215413 | 215414 | 215415 | 215416 | 215417 | 215418 | 215419 | 215420 | 215421 | 215422 | 215423 | 215424 | 215425 | 215426 | 215427 | 215428 | 215429 | 215430 | 215431 | 215432 | 215433 | 215434 | 215435 | 215436 | 215437 | 215438 | 215439 | 215440 | 215441 | 215442 | 215443 | 215444 | 215445 | 215446 | 215447 | 215448 | 215449 | 215450 | 215451 | 215452 | 215453 | 215454 | 215455 | 215456 | 215457 | 215458 | 215459 | 215460 | 215461 | 215462 | 215463 | 215464 | 215465 | 215466 | 215467 | 215468 | 215469 | 215470 | 215471 | 215472 | 215473 | 215474 | 215475 | 215476 | 215477 | 215478 | 215479 | 215480 | 215481 | 215482 | 215483 | 215484 | 215485 | 215486 | 215487 | 215488 | 215489 | 215490 | 215491 | 215492 | 215493 | 215494 | 215495 | 215496 | 215497 | 215498 | 215499 | 215500 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |
| 215457 | 215458 | 215459 | 215460 | 215461 | 215462 | 215463 | 215464 | 215465 | 215466 | 215467 | 215468 | 215469 | 215470 | 215471 | 215472 | 215473 | 215474 | 215475 | 215476 | 215477 | 215478 | 215479 | 215480 | 215481 | 215482 | 215483 | 215484 | 215485 | 215486 | 215487 | 215488 | 215489 | 215490 | 215491 | 215492 | 215493 | 215494 | 215495 | 215496 | 215497 | 215498 | 215499 | 215500 | 215501 | 215502 | 215503 | 215504 | 215505 | 215506 | 215507 | 215508 | 215509 | 215510 | 215511 | 215512 | 215513 | 215514 | 215515 | 215516 | 215517 | 215518 | 215519 | 215520 | 215521 | 215522 | 215523 | 215524 | 215525 | 215526 | 215527 | 215528 | 215529 | 215530 | 215531 | 215532 | 215533 | 215534 | 215535 | 215536 | 215537 | 215538 | 215539 | 215540 | 215541 | 215542 | 215543 | 215544 | 215545 | 215546 | 215547 | 215548 | 215549 | 215550 | 215551 |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |

Percentage Points of the  $\chi^2$ -Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $v$

| $v$  | .99     | .975    | .95     | .9      | .8      | .7      | .6      | .5      | .4      | .3      | .2      | .1      | .05     | .025    | .01     | .005    | .001    |
|------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 12.5 | .257257 | .257166 | .257075 | .256984 | .256893 | .256802 | .256711 | .256620 | .256529 | .256438 | .256347 | .256256 | .256165 | .256074 | .255983 | .255892 | .255801 |
| 13.0 | .257751 | .257660 | .257569 | .257478 | .257387 | .257296 | .257205 | .257114 | .257023 | .256932 | .256841 | .256750 | .256659 | .256568 | .256477 | .256386 | .256295 |
| 13.5 | .258244 | .258153 | .258062 | .257971 | .257880 | .257789 | .257698 | .257607 | .257516 | .257425 | .257334 | .257243 | .257152 | .257061 | .256970 | .256879 | .256788 |
| 14.0 | .258737 | .258646 | .258555 | .258464 | .258373 | .258282 | .258191 | .258100 | .258009 | .257918 | .257827 | .257736 | .257645 | .257554 | .257463 | .257372 | .257281 |
| 14.5 | .259230 | .259139 | .259048 | .258957 | .258866 | .258775 | .258684 | .258593 | .258502 | .258411 | .258320 | .258229 | .258138 | .258047 | .257956 | .257865 | .257774 |
| 15.0 | .259723 | .259632 | .259541 | .259450 | .259359 | .259268 | .259177 | .259086 | .258995 | .258904 | .258813 | .258722 | .258631 | .258540 | .258449 | .258358 | .258267 |
| 15.5 | .260216 | .260125 | .260034 | .259943 | .259852 | .259761 | .259670 | .259579 | .259488 | .259397 | .259306 | .259215 | .259124 | .259033 | .258942 | .258851 | .258760 |
| 16.0 | .260709 | .260618 | .260527 | .260436 | .260345 | .260254 | .260163 | .260072 | .259981 | .259890 | .259799 | .259708 | .259617 | .259526 | .259435 | .259344 | .259253 |
| 16.5 | .261202 | .261111 | .261020 | .260929 | .260838 | .260747 | .260656 | .260565 | .260474 | .260383 | .260292 | .260201 | .260110 | .260019 | .259928 | .259837 | .259746 |
| 17.0 | .261695 | .261604 | .261513 | .261422 | .261331 | .261240 | .261149 | .261058 | .260967 | .260876 | .260785 | .260694 | .260603 | .260512 | .260421 | .260330 | .260239 |
| 17.5 | .262188 | .262097 | .262006 | .261915 | .261824 | .261733 | .261642 | .261551 | .261460 | .261369 | .261278 | .261187 | .261096 | .261005 | .260914 | .260823 | .260732 |
| 18.0 | .262681 | .262590 | .262499 | .262408 | .262317 | .262226 | .262135 | .262044 | .261953 | .261862 | .261771 | .261680 | .261589 | .261498 | .261407 | .261316 | .261225 |
| 18.5 | .263174 | .263083 | .262992 | .262901 | .262810 | .262719 | .262628 | .262537 | .262446 | .262355 | .262264 | .262173 | .262082 | .261991 | .261900 | .261809 | .261718 |
| 19.0 | .263667 | .263576 | .263485 | .263394 | .263303 | .263212 | .263121 | .263030 | .262939 | .262848 | .262757 | .262666 | .262575 | .262484 | .262393 | .262302 | .262211 |
| 19.5 | .264160 | .264069 | .263978 | .263887 | .263796 | .263705 | .263614 | .263523 | .263432 | .263341 | .263250 | .263159 | .263068 | .262977 | .262886 | .262795 | .262704 |
| 20.0 | .264653 | .264562 | .264471 | .264380 | .264289 | .264198 | .264107 | .264016 | .263925 | .263834 | .263743 | .263652 | .263561 | .263470 | .263379 | .263288 | .263197 |
| 20.5 | .265146 | .265055 | .264964 | .264873 | .264782 | .264691 | .264600 | .264509 | .264418 | .264327 | .264236 | .264145 | .264054 | .263963 | .263872 | .263781 | .263690 |
| 21.0 | .265639 | .265548 | .265457 | .265366 | .265275 | .265184 | .265093 | .265002 | .264911 | .264820 | .264729 | .264638 | .264547 | .264456 | .264365 | .264274 | .264183 |
| 21.5 | .266132 | .266041 | .265950 | .265859 | .265768 | .265677 | .265586 | .265495 | .265404 | .265313 | .265222 | .265131 | .265040 | .264949 | .264858 | .264767 | .264676 |
| 22.0 | .266625 | .266534 | .266443 | .266352 | .266261 | .266170 | .266079 | .265988 | .265897 | .265806 | .265715 | .265624 | .265533 | .265442 | .265351 | .265260 | .265169 |
| 22.5 | .267118 | .267027 | .266936 | .266845 | .266754 | .266663 | .266572 | .266481 | .266390 | .266299 | .266208 | .266117 | .266026 | .265935 | .265844 | .265753 | .265662 |
| 23.0 | .267611 | .267520 | .267429 | .267338 | .267247 | .267156 | .267065 | .266974 | .266883 | .266792 | .266701 | .266610 | .266519 | .266428 | .266337 | .266246 | .266155 |
| 23.5 | .268104 | .268013 | .267922 | .267831 | .267740 | .267649 | .267558 | .267467 | .267376 | .267285 | .267194 | .267103 | .267012 | .266921 | .266830 | .266739 | .266648 |
| 24.0 | .268597 | .268506 | .268415 | .268324 | .268233 | .268142 | .268051 | .267960 | .267869 | .267778 | .267687 | .267596 | .267505 | .267414 | .267323 | .267232 | .267141 |
| 24.5 | .269090 | .269000 | .268909 | .268818 | .268727 | .268636 | .268545 | .268454 | .268363 | .268272 | .268181 | .268090 | .268000 | .267909 | .267818 | .267727 | .267636 |
| 25.0 | .269583 | .269492 | .269401 | .269310 | .269219 | .269128 | .269037 | .268946 | .268855 | .268764 | .268673 | .268582 | .268491 | .268400 | .268309 | .268218 | .268127 |
| 25.5 | .270076 | .270000 | .269909 | .269818 | .269727 | .269636 | .269545 | .269454 | .269363 | .269272 | .269181 | .269090 | .269000 | .268909 | .268818 | .268727 | .268636 |
| 26.0 | .270569 | .270478 | .270387 | .270296 | .270205 | .270114 | .270023 | .269932 | .269841 | .269750 | .269659 | .269568 | .269477 | .269386 | .269295 | .269204 | .269113 |
| 26.5 | .271062 | .270971 | .270880 | .270789 | .270698 | .270607 | .270516 | .270425 | .270334 | .270243 | .270152 | .270061 | .269970 | .269879 | .269788 | .269697 | .269606 |
| 27.0 | .271555 | .271464 | .271373 | .271282 | .271191 | .271100 | .271009 | .270918 | .270827 | .270736 | .270645 | .270554 | .270463 | .270372 | .270281 | .270190 | .270100 |
| 27.5 | .272048 | .271957 | .271866 | .271775 | .271684 | .271593 | .271502 | .271411 | .271320 | .271229 | .271138 | .271047 | .270956 | .270865 | .270774 | .270683 | .270592 |
| 28.0 | .272541 | .272450 | .272359 | .272268 | .272177 | .272086 | .271995 | .271904 | .271813 | .271722 | .271631 | .271540 | .271449 | .271358 | .271267 | .271176 | .271085 |
| 28.5 | .273034 | .272943 | .272852 | .272761 | .272670 | .272579 | .272488 | .272397 | .272306 | .272215 | .272124 | .272033 | .271942 | .271851 | .271760 | .271669 | .271578 |
| 29.0 | .273527 | .273436 | .273345 | .273254 | .273163 | .273072 | .272981 | .272890 | .272799 | .272708 | .272617 | .272526 | .272435 | .272344 | .272253 | .272162 | .272071 |
| 29.5 | .274020 | .273929 | .273838 | .273747 | .273656 | .273565 | .273474 | .273383 | .273292 | .273201 | .273110 | .273019 | .272928 | .272837 | .272746 | .272655 | .272564 |
| 30.0 | .274513 | .274422 | .274331 | .274240 | .274149 | .274058 | .273967 | .273876 | .273785 | .273694 | .273603 | .273512 | .273421 | .273330 | .273239 | .273148 | .273057 |
| 30.5 | .275006 | .274915 | .274824 | .274733 | .274642 | .274551 | .274460 | .274369 | .274278 | .274187 | .274096 | .274005 | .273914 | .273823 | .273732 | .273641 | .273550 |
| 31.0 | .275499 | .275408 | .275317 | .275226 | .275135 | .275044 | .274953 | .274862 | .274771 | .274680 | .274589 | .274498 | .274407 | .274316 | .274225 | .274134 | .274043 |
| 31.5 | .275992 | .275901 | .275810 | .275719 | .275628 | .275537 | .275446 | .275355 | .275264 | .275173 | .275082 | .274991 | .274900 | .274809 | .274718 | .274627 | .274536 |
| 32.0 | .276485 | .276394 | .276303 | .276212 | .276121 | .276030 | .275939 | .275848 | .275757 | .275666 | .275575 | .275484 | .275393 | .275302 | .275211 | .275120 | .275029 |
| 32.5 | .276978 | .276887 | .276796 | .276705 | .276614 | .276523 | .276432 | .276341 | .276250 | .276159 | .276068 | .275977 | .275886 | .275795 | .275704 | .275613 | .275522 |
| 33.0 | .277471 | .277380 | .277289 | .277198 | .277107 | .277016 | .276925 | .276834 | .276743 | .276652 | .276561 | .276470 | .276379 | .276288 | .276197 | .276106 | .276015 |
| 33.5 | .277964 | .277873 | .277782 | .277691 | .277600 | .277509 | .277418 | .277327 | .277236 | .277145 | .277054 | .276963 | .276872 | .276781 | .276690 | .276599 | .276508 |
| 34.0 | .278457 | .278366 | .278275 | .278184 | .278093 | .278002 | .277911 | .277820 | .277729 | .277638 | .277547 | .277456 | .277365 | .277274 | .277183 | .277092 | .277001 |
| 34.5 | .278950 | .278859 | .278768 | .278677 | .278586 | .278495 | .278404 | .278313 | .278222 | .278131 | .278040 | .277949 | .277858 | .277767 | .277676 | .277585 | .277494 |
| 35.0 | .279443 | .279352 | .279261 | .279170 | .279079 | .278988 | .278897 | .278806 | .278715 | .278624 | .278533 | .278442 | .278351 | .278260 | .278169 | .278078 | .277987 |
| 35.5 | .279936 | .279845 | .279754 | .279663 | .279572 | .279481 | .279390 | .279299 | .279208 | .279117 | .279026 | .278935 | .278844 | .278753 | .278662 | .278571 | .278480 |
| 36.0 | .280429 | .280338 | .280247 | .280156 | .280065 | .279974 | .279883 | .279792 | .279701 | .279610 | .279519 | .279428 | .279337 | .279246 | .279155 | .279064 | .278973 |
| 36.5 | .280922 | .280831 | .280740 | .280649 | .280558 | .280467 | .280376 | .280285 | .280194 | .280103 | .280012 | .279921 | .279830 | .279739 | .279648 | .279557 | .279466 |
| 37.0 | .281415 | .281324 | .281233 | .281142 | .281051 | .280960 | .280869 | .280778 | .280687 | .280596 | .280505 | .280414 | .280323 | .280232 | .280141 | .280050 | .279959 |

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|         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
|         | .915500 | .915501 | .915502 | .915503 | .915504 | .915505 | .915506 | .915507 | .915508 | .915509 | .915510 | .915511 | .915512 | .915513 | .915514 | .915515 | .915516 | .915517 | .915518 | .915519 | .915520 | .915521 | .915522 | .915523 | .915524 | .915525 | .915526 | .915527 | .915528 | .915529 | .915530 | .915531 | .915532 | .915533 | .915534 | .915535 | .915536 | .915537 | .915538 | .915539 | .915540 | .915541 | .915542 | .915543 | .915544 | .915545 | .915546 | .915547 | .915548 | .915549 | .915550 | .915551 | .915552 | .915553 | .915554 | .915555 | .915556 | .915557 | .915558 | .915559 | .915560 | .915561 | .915562 | .915563 | .915564 | .915565 | .915566 | .915567 | .915568 | .915569 | .915570 | .915571 | .915572 | .915573 | .915574 | .915575 | .915576 | .915577 | .915578 | .915579 | .915580 | .915581 | .915582 | .915583 | .915584 | .915585 | .915586 | .915587 | .915588 | .915589 | .915590 | .915591 | .915592 | .915593 | .915594 | .915595 | .915596 | .915597 | .915598 | .915599 | .915600 |
| .915500 | .915501 | .915502 | .915503 | .915504 | .915505 | .915506 | .915507 | .915508 | .915509 | .915510 | .915511 | .915512 | .915513 | .915514 | .915515 | .915516 | .915517 | .915518 | .915519 | .915520 | .915521 | .915522 | .915523 | .915524 | .915525 | .915526 | .915527 | .915528 | .915529 | .915530 | .915531 | .915532 | .915533 | .915534 | .915535 | .915536 | .915537 | .915538 | .915539 | .915540 | .915541 | .915542 | .915543 | .915544 | .915545 | .915546 | .915547 | .915548 | .915549 | .915550 | .915551 | .915552 | .915553 | .915554 | .915555 | .915556 | .915557 | .915558 | .915559 | .915560 | .915561 | .915562 | .915563 | .915564 | .915565 | .915566 | .915567 | .915568 | .915569 | .915570 | .915571 | .915572 | .915573 | .915574 | .915575 | .915576 | .915577 | .915578 | .915579 | .915580 | .915581 | .915582 | .915583 | .915584 | .915585 | .915586 | .915587 | .915588 | .915589 | .915590 | .915591 | .915592 | .915593 | .915594 | .915595 | .915596 | .915597 | .915598 | .915599 | .915600 |         |

Part of the ...  
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Percentage Points of the  $\chi^2$ -Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu \backslash Q$ | .99000     | .98750     | .98500     | .98000     | .97500     | .97000     | .96500     | .96000     | .95500     | .95000     |
|--------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 412.5              | .348635 03 | .350819 03 | .352660 03 | .355677 03 | .358122 03 | .360195 03 | .362004 03 | .363618 03 | .365080 03 | .366419 03 |
| 413.0              | .349094 03 | .351280 03 | .353122 03 | .356141 03 | .358588 03 | .360662 03 | .362473 03 | .364088 03 | .365550 03 | .366891 03 |
| 413.5              | .349554 03 | .351741 03 | .353584 03 | .356603 03 | .359050 03 | .361129 03 | .362941 03 | .364557 03 | .366021 03 | .367362 03 |
| 414.0              | .350014 03 | .352202 03 | .354047 03 | .357070 03 | .359520 03 | .361596 03 | .363410 03 | .365027 03 | .366491 03 | .367833 03 |
| 414.5              | .350473 03 | .352663 03 | .354509 03 | .357534 03 | .359986 03 | .362064 03 | .363878 03 | .365496 03 | .366962 03 | .368305 03 |
| 415.0              | .350933 03 | .353124 03 | .354971 03 | .357999 03 | .360451 03 | .362531 03 | .364347 03 | .365966 03 | .367432 03 | .368776 03 |
| 415.5              | .351392 03 | .353585 03 | .355436 03 | .358463 03 | .360917 03 | .362998 03 | .364815 03 | .366436 03 | .367903 03 | .369248 03 |
| 416.0              | .351852 03 | .354047 03 | .355896 03 | .358927 03 | .361383 03 | .363466 03 | .365284 03 | .366905 03 | .368373 03 | .369719 03 |
| 416.5              | .352312 03 | .354508 03 | .356358 03 | .359392 03 | .361849 03 | .363933 03 | .365753 03 | .367375 03 | .368844 03 | .370191 03 |
| 417.0              | .352771 03 | .354969 03 | .356821 03 | .359856 03 | .362316 03 | .364401 03 | .366221 03 | .367845 03 | .369315 03 | .370662 03 |
| 417.5              | .353231 03 | .355430 03 | .357283 03 | .360321 03 | .362782 03 | .364868 03 | .366690 03 | .368314 03 | .369785 03 | .371134 03 |
| 418.0              | .353691 03 | .355891 03 | .357746 03 | .360785 03 | .363248 03 | .365335 03 | .367158 03 | .368784 03 | .370256 03 | .371605 03 |
| 418.5              | .354151 03 | .356353 03 | .358208 03 | .361249 03 | .363714 03 | .365803 03 | .367627 03 | .369254 03 | .370727 03 | .372077 03 |
| 419.0              | .354610 03 | .356814 03 | .358671 03 | .361714 03 | .364180 03 | .366270 03 | .368096 03 | .369723 03 | .371197 03 | .372548 03 |
| 419.5              | .355070 03 | .357275 03 | .359133 03 | .362179 03 | .364646 03 | .366738 03 | .368564 03 | .370193 03 | .371668 03 | .373020 03 |
| 420.0              | .355530 03 | .357736 03 | .359596 03 | .362643 03 | .365112 03 | .367205 03 | .369033 03 | .370663 03 | .372139 03 | .373491 03 |
| 420.5              | .355990 03 | .358198 03 | .360058 03 | .363108 03 | .365578 03 | .367673 03 | .369502 03 | .371133 03 | .372609 03 | .373963 03 |
| 421.0              | .356450 03 | .358659 03 | .360521 03 | .363572 03 | .366045 03 | .368141 03 | .369971 03 | .371603 03 | .373080 03 | .374435 03 |
| 421.5              | .356910 03 | .359120 03 | .360983 03 | .364037 03 | .366511 03 | .368608 03 | .370439 03 | .372072 03 | .373551 03 | .374906 03 |
| 422.0              | .357370 03 | .359582 03 | .361446 03 | .364501 03 | .366977 03 | .369076 03 | .370908 03 | .372542 03 | .374022 03 | .375378 03 |
| 422.5              | .357830 03 | .360043 03 | .361909 03 | .364966 03 | .367443 03 | .369543 03 | .371377 03 | .373012 03 | .374493 03 | .375850 03 |
| 423.0              | .358290 03 | .360505 03 | .362371 03 | .365431 03 | .367910 03 | .370011 03 | .371846 03 | .373482 03 | .374963 03 | .376321 03 |
| 423.5              | .358750 03 | .360966 03 | .362834 03 | .365895 03 | .368376 03 | .370479 03 | .372314 03 | .373952 03 | .375434 03 | .376793 03 |
| 424.0              | .359210 03 | .361428 03 | .363297 03 | .366360 03 | .368842 03 | .370946 03 | .372784 03 | .374422 03 | .375905 03 | .377265 03 |
| 424.5              | .359670 03 | .361889 03 | .363760 03 | .366825 03 | .369309 03 | .371414 03 | .373252 03 | .374892 03 | .376376 03 | .377737 03 |
| 425.0              | .360130 03 | .362351 03 | .364222 03 | .367290 03 | .369775 03 | .371882 03 | .373721 03 | .375362 03 | .376847 03 | .378208 03 |
| 425.5              | .360590 03 | .362812 03 | .364685 03 | .367754 03 | .370241 03 | .372350 03 | .374190 03 | .375832 03 | .377318 03 | .378680 03 |
| 426.0              | .361050 03 | .363274 03 | .365148 03 | .368219 03 | .370708 03 | .372817 03 | .374655 03 | .376302 03 | .377789 03 | .379152 03 |
| 426.5              | .361510 03 | .363736 03 | .365611 03 | .368684 03 | .371174 03 | .373285 03 | .375128 03 | .376772 03 | .378260 03 | .379624 03 |
| 427.0              | .361970 03 | .364197 03 | .366074 03 | .369149 03 | .371641 03 | .373753 03 | .375597 03 | .377242 03 | .378731 03 | .380096 03 |
| 427.5              | .362431 03 | .364659 03 | .366536 03 | .369614 03 | .372117 03 | .374221 03 | .376066 03 | .377712 03 | .379202 03 | .380567 03 |
| 428.0              | .362891 03 | .365120 03 | .366999 03 | .370079 03 | .372574 03 | .374688 03 | .376535 03 | .378182 03 | .379673 03 | .381039 03 |
| 428.5              | .363351 03 | .365582 03 | .367462 03 | .370544 03 | .373040 03 | .375156 03 | .377004 03 | .378652 03 | .380144 03 | .381511 03 |
| 429.0              | .363811 03 | .366044 03 | .367925 03 | .371008 03 | .373507 03 | .375624 03 | .377473 03 | .379122 03 | .380615 03 | .381983 03 |
| 429.5              | .364272 03 | .366506 03 | .368388 03 | .371473 03 | .373973 03 | .376092 03 | .377942 03 | .379592 03 | .381086 03 | .382455 03 |
| 430.0              | .364732 03 | .366967 03 | .368851 03 | .371938 03 | .374440 03 | .376560 03 | .378411 03 | .380062 03 | .381557 03 | .382927 03 |
| 430.5              | .365192 03 | .367429 03 | .369314 03 | .372403 03 | .374906 03 | .377028 03 | .378881 03 | .380532 03 | .382028 03 | .383399 03 |
| 431.0              | .365653 03 | .367891 03 | .369777 03 | .372868 03 | .375373 03 | .377496 03 | .379349 03 | .381002 03 | .382499 03 | .383871 03 |
| 431.5              | .366113 03 | .368353 03 | .370240 03 | .373333 03 | .375839 03 | .377964 03 | .379819 03 | .381473 03 | .382970 03 | .384343 03 |
| 432.0              | .366574 03 | .368815 03 | .370703 03 | .373798 03 | .376306 03 | .378432 03 | .380288 03 | .381943 03 | .383441 03 | .384815 03 |
| 432.5              | .367034 03 | .369277 03 | .371166 03 | .374263 03 | .376773 03 | .378900 03 | .380757 03 | .382413 03 | .383913 03 | .385287 03 |
| 433.0              | .367494 03 | .369738 03 | .371629 03 | .374729 03 | .377239 03 | .379368 03 | .381226 03 | .382883 03 | .384384 03 | .385759 03 |
| 433.5              | .367955 03 | .370200 03 | .372093 03 | .375194 03 | .377706 03 | .379836 03 | .381696 03 | .383353 03 | .384855 03 | .386231 03 |
| 434.0              | .368415 03 | .370662 03 | .372556 03 | .375659 03 | .378173 03 | .380304 03 | .382165 03 | .383824 03 | .385326 03 | .386703 03 |
| 434.5              | .368876 03 | .371124 03 | .373019 03 | .376124 03 | .378640 03 | .380772 03 | .382634 03 | .384294 03 | .385797 03 | .387175 03 |
| 435.0              | .369336 03 | .371586 03 | .373482 03 | .376589 03 | .379106 03 | .381240 03 | .383103 03 | .384764 03 | .386269 03 | .387647 03 |
| 435.5              | .369797 03 | .372048 03 | .373945 03 | .377054 03 | .379573 03 | .381708 03 | .383573 03 | .385235 03 | .386740 03 | .388119 03 |
| 436.0              | .370258 03 | .372510 03 | .374409 03 | .377519 03 | .380040 03 | .382176 03 | .384042 03 | .385705 03 | .387211 03 | .388591 03 |
| 436.5              | .370718 03 | .372972 03 | .374872 03 | .377985 03 | .380507 03 | .382645 03 | .384511 03 | .386175 03 | .387682 03 | .389064 03 |
| 437.0              | .371179 03 | .373434 03 | .375335 03 | .378450 03 | .380974 03 | .383113 03 | .384980 03 | .386646 03 | .388154 03 | .389536 03 |

### Percentage Points of the $\chi^2$ -Distribution Values of $\chi^2$ in Terms of $Q$ and $\nu$

[illegible]

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $p$

| $Q$  | .99900 | .99750 | .99500 | .99000 | .97500 | .95000 | .90000 | .85000 | .80000 |
|------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 62.5 | 19700  | 19720  | 19740  | 19760  | 19780  | 19800  | 19820  | 19840  | 19860  |
| 63.0 | 19780  | 19800  | 19820  | 19840  | 19860  | 19880  | 19900  | 19920  | 19940  |
| 63.5 | 19860  | 19880  | 19900  | 19920  | 19940  | 19960  | 19980  | 20000  | 20020  |
| 64.0 | 19940  | 19960  | 19980  | 20000  | 20020  | 20040  | 20060  | 20080  | 20100  |
| 64.5 | 20020  | 20040  | 20060  | 20080  | 20100  | 20120  | 20140  | 20160  | 20180  |
| 65.0 | 20180  | 20200  | 20220  | 20240  | 20260  | 20280  | 20300  | 20320  | 20340  |
| 65.5 | 20340  | 20360  | 20380  | 20400  | 20420  | 20440  | 20460  | 20480  | 20500  |
| 66.0 | 20500  | 20520  | 20540  | 20560  | 20580  | 20600  | 20620  | 20640  | 20660  |
| 66.5 | 20660  | 20680  | 20700  | 20720  | 20740  | 20760  | 20780  | 20800  | 20820  |
| 67.0 | 20820  | 20840  | 20860  | 20880  | 20900  | 20920  | 20940  | 20960  | 20980  |
| 67.5 | 20980  | 21000  | 21020  | 21040  | 21060  | 21080  | 21100  | 21120  | 21140  |
| 68.0 | 21140  | 21160  | 21180  | 21200  | 21220  | 21240  | 21260  | 21280  | 21300  |
| 68.5 | 21300  | 21320  | 21340  | 21360  | 21380  | 21400  | 21420  | 21440  | 21460  |
| 69.0 | 21460  | 21480  | 21500  | 21520  | 21540  | 21560  | 21580  | 21600  | 21620  |
| 69.5 | 21620  | 21640  | 21660  | 21680  | 21700  | 21720  | 21740  | 21760  | 21780  |
| 70.0 | 21780  | 21800  | 21820  | 21840  | 21860  | 21880  | 21900  | 21920  | 21940  |
| 70.5 | 21940  | 21960  | 21980  | 22000  | 22020  | 22040  | 22060  | 22080  | 22100  |
| 71.0 | 22100  | 22120  | 22140  | 22160  | 22180  | 22200  | 22220  | 22240  | 22260  |
| 71.5 | 22260  | 22280  | 22300  | 22320  | 22340  | 22360  | 22380  | 22400  | 22420  |
| 72.0 | 22420  | 22440  | 22460  | 22480  | 22500  | 22520  | 22540  | 22560  | 22580  |
| 72.5 | 22580  | 22600  | 22620  | 22640  | 22660  | 22680  | 22700  | 22720  | 22740  |
| 73.0 | 22740  | 22760  | 22780  | 22800  | 22820  | 22840  | 22860  | 22880  | 22900  |
| 73.5 | 22900  | 22920  | 22940  | 22960  | 22980  | 23000  | 23020  | 23040  | 23060  |
| 74.0 | 23060  | 23080  | 23100  | 23120  | 23140  | 23160  | 23180  | 23200  | 23220  |
| 74.5 | 23220  | 23240  | 23260  | 23280  | 23300  | 23320  | 23340  | 23360  | 23380  |
| 75.0 | 23380  | 23400  | 23420  | 23440  | 23460  | 23480  | 23500  | 23520  | 23540  |
| 75.5 | 23540  | 23560  | 23580  | 23600  | 23620  | 23640  | 23660  | 23680  | 23700  |
| 76.0 | 23700  | 23720  | 23740  | 23760  | 23780  | 23800  | 23820  | 23840  | 23860  |
| 76.5 | 23860  | 23880  | 23900  | 23920  | 23940  | 23960  | 23980  | 24000  | 24020  |
| 77.0 | 24020  | 24040  | 24060  | 24080  | 24100  | 24120  | 24140  | 24160  | 24180  |
| 77.5 | 24180  | 24200  | 24220  | 24240  | 24260  | 24280  | 24300  | 24320  | 24340  |
| 78.0 | 24340  | 24360  | 24380  | 24400  | 24420  | 24440  | 24460  | 24480  | 24500  |
| 78.5 | 24500  | 24520  | 24540  | 24560  | 24580  | 24600  | 24620  | 24640  | 24660  |
| 79.0 | 24660  | 24680  | 24700  | 24720  | 24740  | 24760  | 24780  | 24800  | 24820  |
| 79.5 | 24820  | 24840  | 24860  | 24880  | 24900  | 24920  | 24940  | 24960  | 24980  |
| 80.0 | 24980  | 25000  | 25020  | 25040  | 25060  | 25080  | 25100  | 25120  | 25140  |
| 80.5 | 25140  | 25160  | 25180  | 25200  | 25220  | 25240  | 25260  | 25280  | 25300  |
| 81.0 | 25300  | 25320  | 25340  | 25360  | 25380  | 25400  | 25420  | 25440  | 25460  |
| 81.5 | 25460  | 25480  | 25500  | 25520  | 25540  | 25560  | 25580  | 25600  | 25620  |
| 82.0 | 25620  | 25640  | 25660  | 25680  | 25700  | 25720  | 25740  | 25760  | 25780  |
| 82.5 | 25780  | 25800  | 25820  | 25840  | 25860  | 25880  | 25900  | 25920  | 25940  |
| 83.0 | 25940  | 25960  | 25980  | 26000  | 26020  | 26040  | 26060  | 26080  | 26100  |
| 83.5 | 26100  | 26120  | 26140  | 26160  | 26180  | 26200  | 26220  | 26240  | 26260  |
| 84.0 | 26260  | 26280  | 26300  | 26320  | 26340  | 26360  | 26380  | 26400  | 26420  |
| 84.5 | 26420  | 26440  | 26460  | 26480  | 26500  | 26520  | 26540  | 26560  | 26580  |
| 85.0 | 26580  | 26600  | 26620  | 26640  | 26660  | 26680  | 26700  | 26720  | 26740  |
| 85.5 | 26740  | 26760  | 26780  | 26800  | 26820  | 26840  | 26860  | 26880  | 26900  |
| 86.0 | 26900  | 26920  | 26940  | 26960  | 26980  | 27000  | 27020  | 27040  | 27060  |
| 86.5 | 27060  | 27080  | 27100  | 27120  | 27140  | 27160  | 27180  | 27200  | 27220  |
| 87.0 | 27220  | 27240  | 27260  | 27280  | 27300  | 27320  | 27340  | 27360  | 27380  |
| 87.5 | 27380  | 27400  | 27420  | 27440  | 27460  | 27480  | 27500  | 27520  | 27540  |
| 88.0 | 27540  | 27560  | 27580  | 27600  | 27620  | 27640  | 27660  | 27680  | 27700  |
| 88.5 | 27700  | 27720  | 27740  | 27760  | 27780  | 27800  | 27820  | 27840  | 27860  |
| 89.0 | 27860  | 27880  | 27900  | 27920  | 27940  | 27960  | 27980  | 28000  | 28020  |
| 89.5 | 28020  | 28040  | 28060  | 28080  | 28100  | 28120  | 28140  | 28160  | 28180  |
| 90.0 | 28180  | 28200  | 28220  | 28240  | 28260  | 28280  | 28300  | 28320  | 28340  |
| 90.5 | 28340  | 28360  | 28380  | 28400  | 28420  | 28440  | 28460  | 28480  | 28500  |
| 91.0 | 28500  | 28520  | 28540  | 28560  | 28580  | 28600  | 28620  | 28640  | 28660  |
| 91.5 | 28660  | 28680  | 28700  | 28720  | 28740  | 28760  | 28780  | 28800  | 28820  |
| 92.0 | 28820  | 28840  | 28860  | 28880  | 28900  | 28920  | 28940  | 28960  | 28980  |
| 92.5 | 28980  | 29000  | 29020  | 29040  | 29060  | 29080  | 29100  | 29120  | 29140  |
| 93.0 | 29140  | 29160  | 29180  | 29200  | 29220  | 29240  | 29260  | 29280  | 29300  |
| 93.5 | 29300  | 29320  | 29340  | 29360  | 29380  | 29400  | 29420  | 29440  | 29460  |
| 94.0 | 29460  | 29480  | 29500  | 29520  | 29540  | 29560  | 29580  | 29600  | 29620  |
| 94.5 | 29620  | 29640  | 29660  | 29680  | 29700  | 29720  | 29740  | 29760  | 29780  |
| 95.0 | 29780  | 29800  | 29820  | 29840  | 29860  | 29880  | 29900  | 29920  | 29940  |
| 95.5 | 29940  | 29960  | 29980  | 30000  | 30020  | 30040  | 30060  | 30080  | 30100  |
| 96.0 | 30100  | 30120  | 30140  | 30160  | 30180  | 30200  | 30220  | 30240  | 30260  |
| 96.5 | 30260  | 30280  | 30300  | 30320  | 30340  | 30360  | 30380  | 30400  | 30420  |
| 97.0 | 30420  | 30440  | 30460  | 30480  | 30500  | 30520  | 30540  | 30560  | 30580  |
| 97.5 | 30580  | 30600  | 30620  | 30640  | 30660  | 30680  | 30700  | 30720  | 30740  |
| 98.0 | 30740  | 30760  | 30780  | 30800  | 30820  | 30840  | 30860  | 30880  | 30900  |
| 98.5 | 30900  | 30920  | 30940  | 30960  | 30980  | 31000  | 31020  | 31040  | 31060  |
| 99.0 | 31060  | 31080  | 31100  | 31120  | 31140  | 31160  | 31180  | 31200  | 31220  |
| 99.5 | 31220  | 31240  | 31260  | 31280  | 31300  | 31320  | 31340  | 31360  | 31380  |



| r/q | .9.5000   | .900000   | .850000   | .800000   | .750000   | .700000   | .650000   | .600000   | .550000   | .500000   |
|-----|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 1.1 | 370691-22 | 116893-19 | 308698-16 | 122571-13 | 106113-11 | 407579-10 | 889504-09 | 128525-07 | 135531-06 | 111478-05 |
| 1.2 | 603909-11 | 121461-09 | 700405-08 | 124376-06 | 115834-05 | 717217-05 | 335061-04 | 127368-03 | 413660-03 | 110670-02 |
| 1.3 | 390820-07 | 271457-06 | 405176-05 | 275787-04 | 122084-03 | 411706-03 | 115090-02 | 280520-02 | 616047-02 | 126096-01 |
| 1.4 | 309706-05 | 130510-04 | 991098-04 | 417703-03 | 122519-02 | 317558-02 | 687426-01 | 134391-01 | 263275-01 | 414927-01 |
| 1.5 | 421137-04 | 135011-03 | 683594-03 | 216177-02 | 528435-02 | 109826-01 | 234234-01 | 350448-01 | 566175-01 | 873476-01 |
| 1.6 | 248128-03 | 667443-03 | 250315-02 | 654068-02 | 137996-01 | 254533-01 | 428533-01 | 674796-01 | 181213-00 | 144622-00 |
| 1.7 | 879154-03 | 203084-02 | 638316-02 | 145652-01 | 276890-01 | 469482-01 | 736460-01 | 109267-00 | 155572-00 | 214739-00 |
| 1.8 | 228649-02 | 469775-02 | 129038-01 | 267845-01 | 471299-01 | 750838-01 | 111823-00 | 158074-00 | 217461-00 | 298156-00 |
| 1.9 | 463047-02 | 910331-02 | 227162-01 | 433564-01 | 710865-01 | 109174-00 | 156246-00 | 214367-00 | 285143-00 | 378657-00 |
| 1.0 | 886105-02 | 157930-01 | 357658-01 | 641848-01 | 101531-00 | 148472-00 | 205900-00 | 274996-00 | 357317-00 | 454936-00 |
| 1.1 | 146120-01 | 247335-01 | 521523-01 | 890340-01 | 135576-00 | 192278-00 | 259933-00 | 339667-00 | 433019-00 | 542873-00 |
| 1.2 | 222666-01 | 361209-01 | 717882-01 | 117607-00 | 173543-00 | 239978-00 | 317643-00 | 407645-00 | 511528-00 | 631604-00 |
| 1.3 | 319331-01 | 499025-01 | 945238-01 | 149589-00 | 214992-00 | 291046-00 | 378464-00 | 478359-00 | 592302-00 | 722448-00 |
| 1.4 | 436614-01 | 662916-01 | 120179-00 | 184677-00 | 259530-00 | 345040-00 | 441936-00 | 551360-00 | 674927-00 | 814847-00 |
| 1.5 | 574575-01 | 849810-01 | 142561-00 | 222586-00 | 308815-00 | 401589-00 | 507684-00 | 626292-00 | 759084-00 | 908334-00 |
| 1.6 | 732955-01 | 105964-00 | 175479-00 | 263057-00 | 356551-00 | 460384-00 | 575403-00 | 702871-00 | 844522-00 | 100278-01 |
| 1.7 | 911275-01 | 129137-00 | 212752-00 | 305858-00 | 409480-00 | 521161-00 | 644843-00 | 780867-00 | 931045-00 | 109779-01 |
| 1.8 | 118891-00 | 154393-00 | 248206-00 | 350723-00 | 462383-00 | 583702-00 | 715795-00 | 860094-00 | 101849-01 | 119349-01 |
| 1.9 | 132515-00 | 184624-00 | 285683-00 | 397647-00 | 518066-00 | 647818-00 | 788084-00 | 940398-00 | 110674-01 | 128968-01 |
| 2.0 | 155923-00 | 210721-00 | 325038-00 | 446287-00 | 575364-00 | 713350-00 | 861566-00 | 102165-01 | 119567-01 | 138629-01 |
| 2.1 | 181039-00 | 241562-00 | 361137-00 | 496559-00 | 634132-00 | 780160-00 | 936115-00 | 110375-01 | 128522-01 | 148327-01 |
| 2.2 | 207784-00 | 274209-00 | 408860-00 | 548335-00 | 694244-00 | 848131-00 | 101163-01 | 118659-01 | 137529-01 | 158055-01 |
| 2.3 | 236084-00 | 308210-00 | 453096-00 | 601500-00 | 755504-00 | 917160-00 | 108801-01 | 127012-01 | 146584-01 | 167818-01 |
| 2.4 | 265865-00 | 343797-00 | 498746-00 | 659592-00 | 810067-00 | 987156-00 | 114358-01 | 135425-01 | 155602-01 | 177527-01 |
| 2.5 | 297050-00 | 380789-00 | 545718-00 | 711599-00 | 848195-00 | 105804-01 | 124308-01 | 143894-01 | 164817-01 | 187325-01 |
| 2.6 | 329596-00 | 419112-00 | 593931-00 | 768361-00 | 946053-00 | 112975-01 | 132164-01 | 152413-01 | 173986-01 | 197280-01 |
| 2.7 | 363416-00 | 458695-00 | 642308-00 | 826163-00 | 101149-01 | 120222-01 | 140082-01 | 160979-01 | 183186-01 | 207838-01 |
| 2.8 | 398459-00 | 498473-00 | 693782-00 | 849388-00 | 101774-01 | 127539-01 | 148056-01 | 169587-01 | 192415-01 | 216874-01 |
| 2.9 | 434669-00 | 543485-00 | 745289-00 | 944626-00 | 114477-01 | 134921-01 | 156062-01 | 178234-01 | 201669-01 | 226738-01 |
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| 3.1 | 510381-00 | 623889-00 | 851177-00 | 106653-01 | 128099-01 | 149867-01 | 172278-01 | 195634-01 | 228246-01 | 246474-01 |
| 3.2 | 549706-00 | 673381-00 | 905450-00 | 112865-01 | 135810-01 | 157422-01 | 180442-01 | 204382-01 | 229566-01 | 256359-01 |
| 3.3 | 590166-00 | 719374-00 | 960569-00 | 119149-01 | 141982-01 | 165027-01 | 188845-01 | 213159-01 | 238904-01 | 266252-01 |
| 3.4 | 631479-00 | 766117-00 | 101647-01 | 125502-01 | 149013-01 | 172681-01 | 196886-01 | 221964-01 | 248259-01 | 276152-01 |
| 3.5 | 673686-00 | 813778-00 | 107312-01 | 131920-01 | 156898-01 | 180379-01 | 205162-01 | 230795-01 | 257638-01 | 286859-01 |
| 3.6 | 716751-00 | 862253-00 | 113040-01 | 138399-01 | 163235-01 | 188121-01 | 213471-01 | 239650-01 | 267017-01 | 295971-01 |
| 3.7 | 760640-00 | 911506-00 | 118853-01 | 144937-01 | 170422-01 | 195902-01 | 221812-01 | 248527-01 | 276417-01 | 305889-01 |
| 3.8 | 805320-00 | 961505-00 | 124723-01 | 151531-01 | 177656-01 | 203722-01 | 230183-01 | 257426-01 | 285831-01 | 315811-01 |
| 3.9 | 850762-00 | 101222-01 | 130656-01 | 151179-01 | 184934-01 | 211579-01 | 238983-01 | 266346-01 | 295257-01 | 325738-01 |
| 4.0 | 896936-00 | 106362-01 | 136648-01 | 164878-01 | 192256-01 | 219470-01 | 247809-01 | 275284-01 | 304695-01 | 335669-01 |
| 4.1 | 943816-00 | 111569-01 | 142697-01 | 171625-01 | 199618-01 | 227394-01 | 255461-01 | 284241-01 | 314143-01 | 345684-01 |
| 4.2 | 991376-00 | 116839-01 | 148802-01 | 178420-01 | 207819-01 | 235350-01 | 263937-01 | 293216-01 | 323683-01 | 355542-01 |
| 4.3 | 103959-01 | 12170-01  | 154959-01 | 182259-01 | 214458-01 | 243337-01 | 272437-01 | 302207-01 | 333827-01 | 365484-01 |
| 4.4 | 108844-01 | 127560-01 | 161167-01 | 192141-01 | 221933-01 | 251352-01 | 280959-01 | 311213-01 | 342550-01 | 375428-01 |
| 4.5 | 113790-01 | 133007-01 | 167424-01 | 199065-01 | 229442-01 | 259395-01 | 289502-01 | 320235-01 | 352038-01 | 385375-01 |
| 4.6 | 118796-01 | 138509-01 | 173728-01 | 208029-01 | 236984-01 | 267465-01 | 298066-01 | 329272-01 | 361533-01 | 395325-01 |
| 4.7 | 123058-01 | 144064-01 | 180077-01 | 213031-01 | 244559-01 | 275560-01 | 306150-01 | 338322-01 | 371837-01 | 405277-01 |
| 4.8 | 128976-01 | 149671-01 | 186470-01 | 220079-01 | 252163-01 | 283680-01 | 315252-01 | 347385-01 | 380549-01 | 415231-01 |
| 4.9 | 134144-01 | 155327-01 | 192905-01 | 227144-01 | 259798-01 | 291824-01 | 323873-01 | 356462-01 | 390868-01 | 425188-01 |
| 5.0 | 139371-01 | 161031-01 | 199382-01 | 234253-01 | 267460-01 | 299991-01 | 332511-01 | 365550-01 | 399594-01 | 435146-01 |

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu \backslash Q$ | .925000    | .900000    | .850000    | .800000    | .750000    | .700000    | .650000    | .600000    | .550000    | .500000    |
|--------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 5.1                | .146645 01 | .166781 01 | .205897 01 | .241396 01 | .275151 01 | .308179 01 | .341166 01 | .374650 01 | .409127 01 | .445106 01 |
| 5.2                | .149968 01 | .172577 01 | .212451 01 | .248570 01 | .282867 01 | .316389 01 | .349837 01 | .383762 01 | .418667 01 | .455088 01 |
| 5.3                | .153338 01 | .178416 01 | .219043 01 | .255776 01 | .290610 01 | .324620 01 | .358523 01 | .392884 01 | .428212 01 | .465031 01 |
| 5.4                | .160754 01 | .184298 01 | .225669 01 | .263012 01 | .298377 01 | .332870 01 | .367225 01 | .402017 01 | .437764 01 | .474996 01 |
| 5.5                | .168215 01 | .192221 01 | .233331 01 | .270277 01 | .306168 01 | .341140 01 | .375942 01 | .411160 01 | .447321 01 | .484962 01 |
| 5.6                | .171719 01 | .196184 01 | .239027 01 | .277570 01 | .313983 01 | .349428 01 | .384672 01 | .420133 01 | .456844 01 | .494938 01 |
| 5.7                | .177266 01 | .202185 01 | .245755 01 | .284890 01 | .321820 01 | .357734 01 | .393417 01 | .429475 01 | .466453 01 | .504899 01 |
| 5.8                | .182854 01 | .208225 01 | .252515 01 | .292238 01 | .329679 01 | .366058 01 | .402174 01 | .438646 01 | .476026 01 | .514869 01 |
| 5.9                | .188482 01 | .214301 01 | .259306 01 | .299611 01 | .337559 01 | .374398 01 | .410944 01 | .447827 01 | .485604 01 | .524840 01 |
| 6.0                | .194149 01 | .220413 01 | .266127 01 | .307009 01 | .345460 01 | .382755 01 | .419727 01 | .457015 01 | .495188 01 | .534812 01 |
| 6.1                | .199854 01 | .226560 01 | .272978 01 | .314431 01 | .353381 01 | .391120 01 | .428522 01 | .466213 01 | .504776 01 | .544785 01 |
| 6.2                | .205597 01 | .232741 01 | .279857 01 | .321878 01 | .361321 01 | .399516 01 | .437328 01 | .475418 01 | .514368 01 | .554759 01 |
| 6.3                | .211375 01 | .238954 01 | .286763 01 | .329347 01 | .368280 01 | .407920 01 | .446146 01 | .484631 01 | .523965 01 | .564734 01 |
| 6.4                | .217189 01 | .245200 01 | .293697 01 | .336839 01 | .377258 01 | .416338 01 | .454975 01 | .493851 01 | .533565 01 | .574710 01 |
| 6.5                | .223037 01 | .251478 01 | .300657 01 | .344353 01 | .385254 01 | .424770 01 | .463815 01 | .503080 01 | .543170 01 | .584687 01 |
| 6.6                | .228918 01 | .257786 01 | .307642 01 | .351888 01 | .393267 01 | .433216 01 | .472665 01 | .512315 01 | .552779 01 | .594664 01 |
| 6.7                | .234833 01 | .264124 01 | .314653 01 | .359444 01 | .401297 01 | .441676 01 | .481525 01 | .521557 01 | .562392 01 | .604643 01 |
| 6.8                | .240779 01 | .270491 01 | .321688 01 | .367021 01 | .409344 01 | .450149 01 | .490395 01 | .530806 01 | .572009 01 | .614621 01 |
| 6.9                | .246757 01 | .276887 01 | .328746 01 | .374617 01 | .417407 01 | .458635 01 | .499275 01 | .540061 01 | .581629 01 | .624601 01 |
| 7.0                | .252766 01 | .283311 01 | .335828 01 | .382232 01 | .425485 01 | .467133 01 | .508165 01 | .549323 01 | .591252 01 | .634581 01 |
| 7.1                | .258804 01 | .289762 01 | .342933 01 | .389867 01 | .433579 01 | .475643 01 | .517063 01 | .558592 01 | .600879 01 | .644562 01 |
| 7.2                | .264872 01 | .296239 01 | .350060 01 | .397519 01 | .441688 01 | .484166 01 | .525971 01 | .567866 01 | .610510 01 | .654543 01 |
| 7.3                | .270968 01 | .302743 01 | .357209 01 | .405190 01 | .449812 01 | .492700 01 | .534887 01 | .577147 01 | .620143 01 | .664525 01 |
| 7.4                | .277093 01 | .309272 01 | .364379 01 | .412878 01 | .457951 01 | .501245 01 | .543812 01 | .586433 01 | .629780 01 | .674508 01 |
| 7.5                | .283245 01 | .315826 01 | .371570 01 | .420584 01 | .466103 01 | .509802 01 | .552745 01 | .595725 01 | .639420 01 | .684491 01 |
| 7.6                | .289424 01 | .322425 01 | .378781 01 | .428306 01 | .474269 01 | .518369 01 | .561686 01 | .605022 01 | .649063 01 | .694474 01 |
| 7.7                | .295629 01 | .329007 01 | .386812 01 | .436045 01 | .482448 01 | .526947 01 | .570635 01 | .614325 01 | .658709 01 | .704458 01 |
| 7.8                | .301860 01 | .335633 01 | .393262 01 | .443800 01 | .490641 01 | .535535 01 | .579592 01 | .623633 01 | .668357 01 | .714442 01 |
| 7.9                | .308116 01 | .342282 01 | .400532 01 | .451571 01 | .498846 01 | .544134 01 | .588557 01 | .632946 01 | .678009 01 | .724427 01 |
| 8.0                | .314397 01 | .348954 01 | .407820 01 | .459357 01 | .507064 01 | .552742 01 | .597529 01 | .642265 01 | .687663 01 | .734412 01 |
| 8.1                | .320763 01 | .355647 01 | .415126 01 | .467159 01 | .515294 01 | .561360 01 | .606508 01 | .651588 01 | .697320 01 | .744398 01 |
| 8.2                | .327032 01 | .362363 01 | .422451 01 | .474975 01 | .523537 01 | .569988 01 | .615495 01 | .660916 01 | .706979 01 | .754324 01 |
| 8.3                | .333385 01 | .369099 01 | .429793 01 | .482806 01 | .531791 01 | .578625 01 | .624488 01 | .670249 01 | .716641 01 | .764370 01 |
| 8.4                | .339761 01 | .375956 01 | .437152 01 | .490651 01 | .540057 01 | .587271 01 | .633489 01 | .679586 01 | .726316 01 | .774357 01 |
| 8.5                | .346159 01 | .382834 01 | .444528 01 | .498510 01 | .548334 01 | .595926 01 | .642496 01 | .688928 01 | .735973 01 | .784344 01 |
| 8.6                | .352579 01 | .389432 01 | .451921 01 | .506382 01 | .556622 01 | .604590 01 | .651509 01 | .698275 01 | .745642 01 | .794331 01 |
| 8.7                | .359022 01 | .396249 01 | .459330 01 | .514269 01 | .564921 01 | .613263 01 | .660529 01 | .707626 01 | .755313 01 | .804319 01 |
| 8.8                | .365485 01 | .403086 01 | .466755 01 | .522168 01 | .573231 01 | .621944 01 | .669556 01 | .716981 01 | .764987 01 | .814307 01 |
| 8.9                | .371970 01 | .409442 01 | .474196 01 | .530080 01 | .581552 01 | .630633 01 | .678588 01 | .726340 01 | .774663 01 | .824295 01 |
| 9.0                | .378475 01 | .416816 01 | .481652 01 | .538005 01 | .589883 01 | .639331 01 | .687627 01 | .735703 01 | .784342 01 | .834283 01 |
| 9.1                | .385000 01 | .423739 01 | .489124 01 | .545943 01 | .598224 01 | .648036 01 | .696671 01 | .745071 01 | .794022 01 | .844272 01 |
| 9.2                | .391546 01 | .430619 01 | .496610 01 | .553853 01 | .606574 01 | .656479 01 | .705722 01 | .754442 01 | .803795 01 | .854261 01 |
| 9.3                | .398111 01 | .437548 01 | .504111 01 | .561854 01 | .614935 01 | .665470 01 | .714778 01 | .763818 01 | .813389 01 | .864250 01 |
| 9.4                | .404695 01 | .444494 01 | .511626 01 | .569828 01 | .623305 01 | .674199 01 | .723840 01 | .773197 01 | .823076 01 | .874240 01 |
| 9.5                | .411298 01 | .451456 01 | .519155 01 | .577813 01 | .631685 01 | .682935 01 | .732807 01 | .782579 01 | .832764 01 | .884230 01 |
| 9.6                | .417920 01 | .458436 01 | .526699 01 | .585810 01 | .640374 01 | .691678 01 | .741980 01 | .791966 01 | .842455 01 | .894220 01 |
| 9.7                | .424560 01 | .465433 01 | .534256 01 | .593818 01 | .649374 01 | .700429 01 | .750508 01 | .801356 01 | .852147 01 | .904210 01 |
| 9.8                | .431218 01 | .472445 01 | .541826 01 | .601837 01 | .658680 01 | .709186 01 | .760142 01 | .811750 01 | .864101 01 | .917200 01 |
| 9.9                | .437894 01 | .479474 01 | .549409 01 | .609867 01 | .668255 01 | .719551 01 | .772331 01 | .825701 01 | .879757 01 | .934491 01 |
| 10.0               | .444587 01 | .486518 01 | .557006 01 | .617938 01 | .677320 01 | .726722 01 | .778324 01 | .829557 01 | .881235 01 | .934182 01 |

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu/Q$ | .92500     | .90000     | .85000     | .80000     | .75000     | .70000     | .65000     | .60000     | .55000     | .50000     |
|---------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 10.1    | .451298 01 | .493578 01 | .564615 01 | .625959 01 | .682153 01 | .735530 01 | .787423 01 | .833951 01 | .880935 01 | .944173 01 |
| 10.2    | .458025 01 | .500553 01 | .572237 01 | .634021 01 | .690595 01 | .744284 01 | .796527 01 | .846358 01 | .898336 01 | .954164 01 |
| 10.3    | .464769 01 | .50744 01  | .579472 01 | .642092 01 | .699045 01 | .753076 01 | .805635 01 | .857769 01 | .910339 01 | .964155 01 |
| 10.4    | .471530 01 | .514849 01 | .587518 01 | .650174 01 | .707503 01 | .761877 01 | .814748 01 | .867182 01 | .920044 01 | .974147 01 |
| 10.5    | .478307 01 | .521368 01 | .595177 01 | .658266 01 | .715969 01 | .770677 01 | .823866 01 | .876599 01 | .929750 01 | .984139 01 |
| 10.6    | .485099 01 | .528133 01 | .602847 01 | .666367 01 | .724442 01 | .779487 01 | .832989 01 | .886019 01 | .939459 01 | .994131 01 |
| 10.7    | .491908 01 | .534951 01 | .610529 01 | .674478 01 | .732924 01 | .788303 01 | .842116 01 | .895442 01 | .949168 01 | .100412 02 |
| 10.8    | .498732 01 | .541771 01 | .618223 01 | .682599 01 | .741413 01 | .797125 01 | .851248 01 | .904868 01 | .958079 01 | .101411 02 |
| 10.9    | .505571 01 | .548589 01 | .625927 01 | .690728 01 | .749510 01 | .805953 01 | .860364 01 | .914297 01 | .968592 01 | .102411 02 |
| 11.0    | .512425 01 | .555443 01 | .633643 01 | .698867 01 | .758414 01 | .814787 01 | .869524 01 | .923729 01 | .978306 01 | .103410 02 |
| 11.1    | .519294 01 | .562311 01 | .641370 01 | .707015 01 | .766926 01 | .823626 01 | .878668 01 | .933163 01 | .988022 01 | .104409 02 |
| 11.2    | .526170 01 | .569187 01 | .649108 01 | .715172 01 | .775445 01 | .832472 01 | .887817 01 | .942601 01 | .997739 01 | .105409 02 |
| 11.3    | .533076 01 | .576093 01 | .656857 01 | .723338 01 | .783978 01 | .841322 01 | .896978 01 | .952041 01 | .100746 02 | .106408 02 |
| 11.4    | .539989 01 | .582996 01 | .664616 01 | .731512 01 | .792503 01 | .850179 01 | .906127 01 | .961404 01 | .101718 02 | .107407 02 |
| 11.5    | .546915 01 | .589923 01 | .672385 01 | .739595 01 | .799940 01 | .858040 01 | .915288 01 | .970930 01 | .102690 02 | .108406 02 |
| 11.6    | .553855 01 | .596863 01 | .680165 01 | .747806 01 | .808359 01 | .867907 01 | .924453 01 | .980378 01 | .103662 02 | .109406 02 |
| 11.7    | .560809 01 | .603817 01 | .688469 01 | .756826 01 | .818143 01 | .877680 01 | .933622 01 | .989829 01 | .104635 02 | .110405 02 |
| 11.8    | .567777 01 | .610785 01 | .696469 01 | .765293 01 | .827703 01 | .886567 01 | .942795 01 | .999282 01 | .105607 02 | .111404 02 |
| 11.9    | .574758 01 | .617766 01 | .704354 01 | .773564 01 | .836269 01 | .895460 01 | .951971 01 | .100874 02 | .106588 02 | .112404 02 |
| 12.0    | .581751 01 | .624759 01 | .711304 01 | .780733 01 | .843842 01 | .903428 01 | .961152 01 | .101620 02 | .107553 02 | .113403 02 |
| 12.1    | .588750 01 | .631758 01 | .718212 01 | .787964 01 | .851241 01 | .911320 01 | .970316 01 | .102766 02 | .108526 02 | .114403 02 |
| 12.2    | .595778 01 | .638786 01 | .725210 01 | .795007 01 | .858307 01 | .918710 01 | .977523 01 | .103712 02 | .109499 02 | .115402 02 |
| 12.3    | .602810 01 | .645818 01 | .732284 01 | .802107 01 | .865458 01 | .926020 01 | .984715 01 | .104659 02 | .110472 02 | .116401 02 |
| 12.4    | .609855 01 | .652863 01 | .739338 01 | .809181 01 | .872563 01 | .933388 01 | .991918 01 | .105606 02 | .111445 02 | .117401 02 |
| 12.5    | .616912 01 | .659920 01 | .746412 01 | .816275 01 | .879688 01 | .940740 01 | .100711 02 | .106553 02 | .112419 02 | .118400 02 |
| 12.6    | .623981 01 | .667089 01 | .753511 01 | .823394 01 | .886827 01 | .948056 01 | .101031 02 | .106780 02 | .112632 02 | .118600 02 |
| 12.7    | .631063 01 | .674171 01 | .761593 01 | .831496 01 | .894940 01 | .957377 01 | .102011 02 | .107760 02 | .113516 02 | .119700 02 |
| 12.8    | .638156 01 | .681264 01 | .768686 01 | .838609 01 | .902053 01 | .964500 01 | .102991 02 | .108740 02 | .114540 02 | .120730 02 |
| 12.9    | .645261 01 | .688369 01 | .775891 01 | .845814 01 | .909258 01 | .971705 01 | .103972 02 | .109720 02 | .115540 02 | .121730 02 |
| 13.0    | .652377 01 | .695485 01 | .783008 01 | .852931 01 | .916375 01 | .978822 01 | .104953 02 | .110700 02 | .116514 02 | .122730 02 |
| 13.2    | .666645 01 | .719753 01 | .807276 01 | .877200 01 | .940644 01 | .999091 01 | .105934 02 | .111680 02 | .117490 02 | .123730 02 |
| 13.4    | .683957 01 | .737065 01 | .824588 01 | .894512 01 | .957956 01 | .101740 02 | .107490 02 | .113240 02 | .119000 02 | .125000 02 |
| 13.6    | .699313 01 | .752421 01 | .840045 01 | .910069 01 | .973513 01 | .103097 02 | .108847 02 | .114597 02 | .120347 02 | .126347 02 |
| 13.8    | .709711 01 | .762819 01 | .850443 01 | .920467 01 | .983911 01 | .103981 02 | .109731 02 | .115481 02 | .121231 02 | .127231 02 |
| 14.0    | .724151 01 | .777259 01 | .864883 01 | .934907 01 | .998351 01 | .104865 02 | .110615 02 | .116365 02 | .122115 02 | .128115 02 |
| 14.2    | .738633 01 | .791741 01 | .879363 01 | .949387 01 | .101001 02 | .106751 02 | .112501 02 | .118251 02 | .124001 02 | .129801 02 |
| 14.4    | .753154 01 | .806262 01 | .893884 01 | .963908 01 | .102522 02 | .108272 02 | .114022 02 | .119772 02 | .125522 02 | .131322 02 |
| 14.6    | .767714 01 | .820822 01 | .908444 01 | .978468 01 | .103982 02 | .109732 02 | .115482 02 | .121232 02 | .126982 02 | .132732 02 |
| 14.8    | .782313 01 | .835421 01 | .923043 01 | .993067 01 | .104996 02 | .110746 02 | .116496 02 | .122246 02 | .128046 02 | .133796 02 |
| 15.0    | .796949 01 | .850057 01 | .937679 01 | .100671 02 | .106421 02 | .112171 02 | .117921 02 | .123671 02 | .129421 02 | .135171 02 |
| 15.2    | .811622 01 | .864730 01 | .952352 01 | .102243 02 | .108093 02 | .113843 02 | .119593 02 | .125343 02 | .131093 02 | .136843 02 |
| 15.4    | .826331 01 | .879439 01 | .967061 01 | .103253 02 | .109103 02 | .114853 02 | .120603 02 | .126353 02 | .132103 02 | .137853 02 |
| 15.6    | .841075 01 | .894183 01 | .981805 01 | .104263 02 | .110113 02 | .115863 02 | .121613 02 | .127363 02 | .133113 02 | .138863 02 |
| 15.8    | .855854 01 | .908962 01 | .996584 01 | .105273 02 | .111123 02 | .116873 02 | .122623 02 | .128373 02 | .134123 02 | .139873 02 |
| 16.0    | .870677 01 | .923785 01 | .101407 02 | .106257 02 | .112007 02 | .117757 02 | .123507 02 | .129257 02 | .135007 02 | .140757 02 |
| 16.2    | .885513 01 | .938621 01 | .102429 02 | .107279 02 | .113029 02 | .118779 02 | .124529 02 | .130279 02 | .136029 02 | .141779 02 |
| 16.4    | .900392 01 | .953500 01 | .103437 02 | .108287 02 | .114037 02 | .119787 02 | .125537 02 | .131287 02 | .137037 02 | .142787 02 |
| 16.6    | .915302 01 | .968410 01 | .104447 02 | .109297 02 | .115047 02 | .120797 02 | .126547 02 | .132297 02 | .138047 02 | .143797 02 |
| 16.8    | .930244 01 | .983352 01 | .105457 02 | .110307 02 | .116057 02 | .121807 02 | .127557 02 | .133307 02 | .139057 02 | .144807 02 |
| 17.0    | .945217 01 | .998325 01 | .106471 02 | .111321 02 | .117071 02 | .122821 02 | .128571 02 | .134321 02 | .140071 02 | .145821 02 |

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $P$

| $\chi^2/Q$ | .950000    | .900000    | .850000    | .800000    | .750000    | .700000    | .650000    | .600000    | .550000    | .500000    |
|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 17.20      | .960221 01 | .132406 02 | .112007 02 | .121729 02 | .129603 02 | .137123 02 | .144271 02 | .151204 02 | .150203 02 | .165301 02 |
| 17.40      | .975254 01 | .139363 02 | .114520 02 | .123436 02 | .131449 02 | .138940 02 | .146137 02 | .153195 02 | .160239 02 | .167191 02 |
| 17.60      | .990316 01 | .145523 02 | .116171 02 | .125146 02 | .133215 02 | .140759 02 | .148003 02 | .155107 02 | .162195 02 | .169180 02 |
| 17.80      | .100541 02 | .150705 02 | .117816 02 | .126857 02 | .134983 02 | .142578 02 | .149870 02 | .157019 02 | .164151 02 | .171188 02 |
| 18.00      | .102053 02 | .156649 02 | .119463 02 | .128570 02 | .136753 02 | .144399 02 | .151738 02 | .158932 02 | .166100 02 | .173179 02 |
| 18.20      | .103567 02 | .162116 02 | .121112 02 | .130204 02 | .138524 02 | .146220 02 | .153607 02 | .160846 02 | .168065 02 | .175199 02 |
| 18.40      | .105085 02 | .167606 02 | .122763 02 | .131800 02 | .140296 02 | .148043 02 | .155476 02 | .162768 02 | .170022 02 | .177178 02 |
| 18.60      | .106605 02 | .173138 02 | .124416 02 | .133418 02 | .141869 02 | .149666 02 | .157346 02 | .164674 02 | .171979 02 | .179177 02 |
| 18.80      | .108128 02 | .178702 02 | .126070 02 | .135037 02 | .143484 02 | .151291 02 | .158921 02 | .166509 02 | .173937 02 | .181377 02 |
| 19.00      | .109653 02 | .184309 02 | .127727 02 | .136658 02 | .145090 02 | .152897 02 | .160509 02 | .168084 02 | .175594 02 | .183177 02 |
| 19.20      | .111181 02 | .189946 02 | .129386 02 | .138330 02 | .146762 02 | .154573 02 | .162291 02 | .170000 02 | .177852 02 | .185776 02 |
| 19.40      | .112711 02 | .195609 02 | .131056 02 | .140024 02 | .148456 02 | .156273 02 | .163991 02 | .171800 02 | .179811 02 | .187836 02 |
| 19.60      | .114244 02 | .197202 02 | .132709 02 | .141692 02 | .150124 02 | .157949 02 | .165678 02 | .173580 02 | .181769 02 | .189937 02 |
| 19.80      | .115780 02 | .198802 02 | .134373 02 | .143373 02 | .151805 02 | .159632 02 | .167362 02 | .175346 02 | .183728 02 | .192175 02 |
| 20.00      | .117317 02 | .199962 02 | .136039 02 | .145084 02 | .153518 02 | .161359 02 | .169100 02 | .177080 02 | .185607 02 | .194374 02 |
| 20.20      | .118857 02 | .199962 02 | .137706 02 | .146751 02 | .155181 02 | .163022 02 | .170863 02 | .179006 02 | .187646 02 | .196534 02 |
| 20.40      | .120400 02 | .199962 02 | .139375 02 | .148424 02 | .156854 02 | .164695 02 | .172536 02 | .180877 02 | .189605 02 | .198733 02 |
| 20.60      | .121945 02 | .199962 02 | .141046 02 | .150077 02 | .158507 02 | .166348 02 | .174189 02 | .182530 02 | .191255 02 | .200373 02 |
| 20.80      | .123492 02 | .199962 02 | .142719 02 | .151711 02 | .160141 02 | .167982 02 | .175823 02 | .184164 02 | .192889 02 | .202000 02 |
| 21.00      | .125041 02 | .199962 02 | .144393 02 | .153446 02 | .161876 02 | .169717 02 | .177558 02 | .185999 02 | .195485 02 | .204372 02 |
| 21.20      | .126592 02 | .199962 02 | .146069 02 | .155122 02 | .163553 02 | .171394 02 | .179235 02 | .187676 02 | .197445 02 | .206572 02 |
| 21.40      | .128146 02 | .199962 02 | .147746 02 | .156802 02 | .165233 02 | .173074 02 | .180915 02 | .189356 02 | .199405 02 | .208772 02 |
| 21.60      | .129701 02 | .199962 02 | .149425 02 | .158479 02 | .166910 02 | .174751 02 | .182592 02 | .191033 02 | .201384 02 | .210835 02 |
| 21.80      | .131259 02 | .199962 02 | .151106 02 | .160159 02 | .168590 02 | .176431 02 | .184272 02 | .192713 02 | .203364 02 | .213016 02 |
| 22.00      | .132819 02 | .199962 02 | .152788 02 | .161840 02 | .170271 02 | .178112 02 | .185953 02 | .194394 02 | .205245 02 | .215397 02 |
| 22.20      | .134381 02 | .199962 02 | .154471 02 | .163521 02 | .171952 02 | .179793 02 | .187634 02 | .196075 02 | .207226 02 | .217677 02 |
| 22.40      | .135945 02 | .199962 02 | .156156 02 | .165202 02 | .173633 02 | .181474 02 | .189315 02 | .197756 02 | .209297 02 | .220048 02 |
| 22.60      | .137511 02 | .199962 02 | .157842 02 | .166887 02 | .175318 02 | .183159 02 | .191000 02 | .199441 02 | .211182 02 | .222139 02 |
| 22.80      | .139078 02 | .199962 02 | .159530 02 | .168574 02 | .176955 02 | .184796 02 | .192637 02 | .201078 02 | .213019 02 | .224330 02 |
| 23.00      | .140648 02 | .199962 02 | .161219 02 | .170265 02 | .178646 02 | .186487 02 | .194328 02 | .202769 02 | .214810 02 | .226321 02 |
| 23.20      | .142220 02 | .199962 02 | .162910 02 | .171961 02 | .180342 02 | .188183 02 | .196024 02 | .204465 02 | .216506 02 | .228597 02 |
| 23.40      | .143793 02 | .199962 02 | .164602 02 | .173662 02 | .182043 02 | .189884 02 | .197725 02 | .206166 02 | .218207 02 | .230368 02 |
| 23.60      | .145369 02 | .199962 02 | .166295 02 | .175363 02 | .183744 02 | .191585 02 | .199426 02 | .207867 02 | .219708 02 | .232439 02 |
| 23.80      | .146946 02 | .199962 02 | .167990 02 | .177064 02 | .185445 02 | .193286 02 | .201127 02 | .209568 02 | .221409 02 | .234510 02 |
| 24.00      | .148525 02 | .199962 02 | .169686 02 | .178765 02 | .187146 02 | .195087 02 | .202928 02 | .211369 02 | .223210 02 | .236581 02 |
| 24.20      | .150106 02 | .199962 02 | .171383 02 | .180424 02 | .188805 02 | .196746 02 | .204587 02 | .212928 02 | .224769 02 | .238652 02 |
| 24.40      | .151689 02 | .199962 02 | .173001 02 | .182042 02 | .190423 02 | .198364 02 | .206205 02 | .214546 02 | .226387 02 | .240723 02 |
| 24.60      | .153273 02 | .199962 02 | .174619 02 | .183660 02 | .192041 02 | .199982 02 | .207823 02 | .216164 02 | .227965 02 | .242794 02 |
| 24.80      | .154859 02 | .199962 02 | .176237 02 | .185278 02 | .193659 02 | .201600 02 | .209441 02 | .217782 02 | .229583 02 | .244865 02 |
| 25.00      | .156447 02 | .199962 02 | .177855 02 | .186899 02 | .195280 02 | .203221 02 | .211062 02 | .219403 02 | .231204 02 | .246936 02 |
| 25.20      | .158036 02 | .199962 02 | .179473 02 | .188517 02 | .196898 02 | .204839 02 | .212680 02 | .220921 02 | .232724 02 | .249007 02 |
| 25.40      | .159627 02 | .199962 02 | .181091 02 | .190091 02 | .198479 02 | .206420 02 | .214261 02 | .222502 02 | .234323 02 | .251078 02 |
| 25.60      | .161220 02 | .199962 02 | .182669 02 | .191669 02 | .199957 02 | .207898 02 | .215739 02 | .223980 02 | .235740 02 | .253149 02 |
| 25.80      | .162814 02 | .199962 02 | .184247 02 | .193247 02 | .201535 02 | .209476 02 | .217317 02 | .225558 02 | .237318 02 | .255220 02 |
| 26.00      | .164410 02 | .199962 02 | .185825 02 | .194825 02 | .203113 02 | .211054 02 | .218895 02 | .227136 02 | .238956 02 | .257291 02 |
| 26.20      | .166008 02 | .199962 02 | .187403 02 | .196403 02 | .204691 02 | .212632 02 | .220473 02 | .228714 02 | .240534 02 | .259362 02 |
| 26.40      | .167605 02 | .199962 02 | .188981 02 | .197981 02 | .206279 02 | .214220 02 | .222061 02 | .230302 02 | .241885 02 | .261433 02 |
| 26.60      | .169203 02 | .199962 02 | .190559 02 | .199559 02 | .207867 02 | .215808 02 | .223649 02 | .231890 02 | .243231 02 | .263504 02 |
| 26.80      | .170801 02 | .199962 02 | .192137 02 | .201137 02 | .209445 02 | .217386 02 | .225227 02 | .233468 02 | .244812 02 | .265575 02 |
| 27.00      | .172400 02 | .199962 02 | .193715 02 | .202715 02 | .211023 02 | .218964 02 | .226805 02 | .235046 02 | .246493 02 | .267646 02 |
| 27.20      | .174000 02 | .199962 02 | .195293 02 | .204293 02 | .212501 02 | .220442 02 | .228283 02 | .236524 02 | .248104 02 | .269717 02 |

Percentage Points of the  $\chi^2$ -Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu \backslash Q$ | .925000    | .900000    | .850000    | .800000    | .750000    | .700000    | .650000    | .600000    | .550000    | .500000    |
|--------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 27.50              | .176429 02 | .185262 02 | .199561 02 | .211452 02 | .222031 02 | .231832 02 | .241171 02 | .250265 02 | .259281 02 | .268363 02 |
| 27.75              | .178440 02 | .187326 02 | .201709 02 | .213665 02 | .224301 02 | .234153 02 | .243540 02 | .252679 02 | .261737 02 | .270863 02 |
| 28.00              | .180454 02 | .189392 02 | .203857 02 | .215800 02 | .226572 02 | .236475 02 | .245909 02 | .255093 02 | .264195 02 | .273362 02 |
| 28.25              | .182470 02 | .191461 02 | .206008 02 | .218095 02 | .228844 02 | .238797 02 | .248278 02 | .257507 02 | .266652 02 | .275862 02 |
| 28.50              | .184488 02 | .193531 02 | .208160 02 | .220313 02 | .231117 02 | .241121 02 | .250649 02 | .259921 02 | .269109 02 | .278362 02 |
| 28.75              | .186508 02 | .195603 02 | .210313 02 | .222531 02 | .233319 02 | .243445 02 | .253019 02 | .262336 02 | .271567 02 | .280862 02 |
| 29.00              | .188530 02 | .197677 02 | .212460 02 | .224751 02 | .235566 02 | .245770 02 | .255391 02 | .264751 02 | .274025 02 | .283361 02 |
| 29.25              | .190554 02 | .199753 02 | .214625 02 | .226971 02 | .237942 02 | .248096 02 | .257762 02 | .267167 02 | .276483 02 | .285861 02 |
| 29.50              | .192580 02 | .201831 02 | .216783 02 | .229193 02 | .240219 02 | .250422 02 | .260135 02 | .269593 02 | .278941 02 | .288361 02 |
| 29.75              | .194609 02 | .203911 02 | .218942 02 | .231417 02 | .242497 02 | .252750 02 | .262508 02 | .271999 02 | .281399 02 | .290861 02 |
| 30.00              | .196639 02 | .205992 02 | .221103 02 | .233641 02 | .244776 02 | .255078 02 | .264881 02 | .274416 02 | .283858 02 | .293360 02 |
| 30.25              | .198671 02 | .208076 02 | .223266 02 | .235867 02 | .247056 02 | .257406 02 | .267256 02 | .276833 02 | .286317 02 | .295860 02 |
| 30.50              | .200706 02 | .210161 02 | .225430 02 | .238094 02 | .249337 02 | .259736 02 | .269630 02 | .279251 02 | .288776 02 | .298368 02 |
| 30.75              | .202742 02 | .212247 02 | .227595 02 | .240321 02 | .251619 02 | .262066 02 | .272005 02 | .281669 02 | .291235 02 | .300860 02 |
| 31.00              | .204780 02 | .214336 02 | .229762 02 | .242551 02 | .253901 02 | .264397 02 | .274381 02 | .284007 02 | .293694 02 | .303359 02 |
| 31.25              | .206820 02 | .216426 02 | .231930 02 | .244781 02 | .256185 02 | .266729 02 | .276757 02 | .286505 02 | .296154 02 | .305859 02 |
| 31.50              | .208862 02 | .218518 02 | .234099 02 | .247012 02 | .258469 02 | .269061 02 | .279134 02 | .288924 02 | .298613 02 | .308359 02 |
| 31.75              | .210906 02 | .220611 02 | .236270 02 | .249244 02 | .260755 02 | .271394 02 | .281511 02 | .291393 02 | .301073 02 | .310859 02 |
| 32.00              | .212951 02 | .222706 02 | .238442 02 | .251478 02 | .263041 02 | .273728 02 | .283809 02 | .293763 02 | .303533 02 | .313359 02 |
| 32.25              | .214999 02 | .224803 02 | .240615 02 | .253712 02 | .265328 02 | .276062 02 | .286267 02 | .296183 02 | .305993 02 | .315858 02 |
| 32.50              | .217048 02 | .226901 02 | .242790 02 | .255948 02 | .267616 02 | .278397 02 | .288646 02 | .298663 02 | .308454 02 | .318358 02 |
| 32.75              | .219099 02 | .229001 02 | .244966 02 | .258185 02 | .269905 02 | .280733 02 | .291025 02 | .301023 02 | .310914 02 | .320858 02 |
| 33.00              | .221152 02 | .231102 02 | .247143 02 | .260422 02 | .272194 02 | .283069 02 | .293405 02 | .303444 02 | .313375 02 | .323358 02 |
| 33.25              | .223206 02 | .233205 02 | .249321 02 | .262661 02 | .274485 02 | .285406 02 | .295785 02 | .305865 02 | .315835 02 | .325858 02 |
| 33.50              | .225262 02 | .235309 02 | .251501 02 | .264900 02 | .276776 02 | .287744 02 | .298165 02 | .308287 02 | .318296 02 | .328357 02 |
| 33.75              | .227319 02 | .237415 02 | .253682 02 | .267141 02 | .279068 02 | .290082 02 | .300546 02 | .310708 02 | .320757 02 | .330857 02 |
| 34.00              | .229379 02 | .239523 02 | .255864 02 | .269383 02 | .281361 02 | .292421 02 | .302928 02 | .313130 02 | .323219 02 | .333357 02 |
| 34.25              | .231440 02 | .241631 02 | .258047 02 | .271625 02 | .283654 02 | .294760 02 | .305310 02 | .315553 02 | .325680 02 | .335857 02 |
| 34.50              | .233502 02 | .243742 02 | .260232 02 | .273869 02 | .285949 02 | .297100 02 | .307692 02 | .317975 02 | .328141 02 | .338357 02 |
| 34.75              | .235567 02 | .245853 02 | .262417 02 | .276113 02 | .288244 02 | .299441 02 | .310075 02 | .320398 02 | .330603 02 | .340857 02 |
| 35.00              | .237633 02 | .247967 02 | .264664 02 | .278359 02 | .290540 02 | .301782 02 | .312458 02 | .322821 02 | .333065 02 | .343356 02 |
| 35.25              | .239700 02 | .250081 02 | .266792 02 | .280605 02 | .292836 02 | .304123 02 | .314842 02 | .325245 02 | .335527 02 | .345856 02 |
| 35.50              | .241769 02 | .252197 02 | .268981 02 | .282852 02 | .295134 02 | .306466 02 | .317226 02 | .327668 02 | .337989 02 | .348356 02 |
| 35.75              | .243839 02 | .254314 02 | .271171 02 | .285101 02 | .297432 02 | .308809 02 | .319610 02 | .330092 02 | .340451 02 | .350856 02 |
| 36.00              | .245911 02 | .256433 02 | .273362 02 | .287350 02 | .299730 02 | .311152 02 | .321995 02 | .332517 02 | .342913 02 | .353356 02 |
| 36.25              | .247985 02 | .258553 02 | .275555 02 | .289600 02 | .302030 02 | .313496 02 | .324391 02 | .334941 02 | .345376 02 | .355856 02 |
| 36.50              | .250060 02 | .260674 02 | .277748 02 | .291850 02 | .304330 02 | .315841 02 | .326766 02 | .337366 02 | .347839 02 | .358355 02 |
| 36.75              | .252136 02 | .262797 02 | .279943 02 | .294102 02 | .306631 02 | .318186 02 | .329152 02 | .339791 02 | .350301 02 | .360855 02 |
| 37.00              | .254214 02 | .264921 02 | .282138 02 | .296355 02 | .308933 02 | .320532 02 | .331539 02 | .342216 02 | .352764 02 | .363355 02 |
| 37.25              | .256294 02 | .267046 02 | .284335 02 | .298600 02 | .311235 02 | .322878 02 | .333926 02 | .344642 02 | .355227 02 | .365855 02 |
| 37.50              | .258375 02 | .269173 02 | .286532 02 | .300862 02 | .313538 02 | .325224 02 | .336313 02 | .347058 02 | .357690 02 | .368355 02 |
| 37.75              | .260457 02 | .271300 02 | .288731 02 | .303117 02 | .315841 02 | .327572 02 | .338701 02 | .349494 02 | .360154 02 | .370855 02 |
| 38.00              | .262540 02 | .273430 02 | .290931 02 | .305373 02 | .318146 02 | .329919 02 | .341089 02 | .351920 02 | .362617 02 | .373355 02 |
| 38.25              | .264626 02 | .275560 02 | .293131 02 | .307630 02 | .320451 02 | .332268 02 | .343477 02 | .354347 02 | .365080 02 | .375854 02 |
| 38.50              | .266712 02 | .277691 02 | .295333 02 | .309888 02 | .322756 02 | .334616 02 | .345866 02 | .356774 02 | .367544 02 | .378354 02 |
| 38.75              | .268800 02 | .279824 02 | .297536 02 | .312146 02 | .325062 02 | .336966 02 | .348255 02 | .359201 02 | .370008 02 | .380854 02 |
| 39.00              | .270889 02 | .281958 02 | .299739 02 | .314405 02 | .327369 02 | .339315 02 | .350645 02 | .361628 02 | .372472 02 | .383354 02 |
| 39.25              | .272979 02 | .284093 02 | .301944 02 | .316665 02 | .329677 02 | .341666 02 | .353035 02 | .364056 02 | .374936 02 | .385854 02 |
| 39.50              | .275071 02 | .286229 02 | .304149 02 | .318926 02 | .331985 02 | .344016 02 | .355425 02 | .366483 02 | .377400 02 | .388354 02 |
| 39.75              | .277164 02 | .288367 02 | .306356 02 | .321187 02 | .334294 02 | .346368 02 | .357816 02 | .368911 02 | .379864 02 | .390854 02 |

### Percentage Points of the $\chi^2$ Distribution Expressed in Terms of $Q$ and $v$

[illegible]

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $r$

|      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 0000 | 0001 | 0002 | 0003 | 0004 | 0005 | 0006 | 0007 | 0008 | 0009 | 0010 | 0011 | 0012 | 0013 | 0014 | 0015 | 0016 | 0017 | 0018 | 0019 | 0020 | 0021 | 0022 | 0023 | 0024 | 0025 | 0026 | 0027 | 0028 | 0029 | 0030 | 0031 | 0032 | 0033 | 0034 | 0035 | 0036 | 0037 | 0038 | 0039 | 0040 | 0041 | 0042 | 0043 | 0044 | 0045 | 0046 | 0047 | 0048 | 0049 | 0050 | 0051 | 0052 | 0053 | 0054 | 0055 | 0056 | 0057 | 0058 | 0059 | 0060 | 0061 | 0062 | 0063 | 0064 | 0065 | 0066 | 0067 | 0068 | 0069 | 0070 | 0071 | 0072 | 0073 | 0074 | 0075 | 0076 | 0077 | 0078 | 0079 | 0080 | 0081 | 0082 | 0083 | 0084 | 0085 | 0086 | 0087 | 0088 | 0089 | 0090 | 0091 | 0092 | 0093 | 0094 | 0095 | 0096 | 0097 | 0098 | 0099 | 0100 | 0101 | 0102 | 0103 | 0104 | 0105 | 0106 | 0107 | 0108 | 0109 | 0110 | 0111 | 0112 | 0113 | 0114 | 0115 | 0116 | 0117 | 0118 | 0119 | 0120 | 0121 | 0122 | 0123 | 0124 | 0125 | 0126 | 0127 | 0128 | 0129 | 0130 | 0131 | 0132 | 0133 | 0134 | 0135 | 0136 | 0137 | 0138 | 0139 | 0140 | 0141 | 0142 | 0143 | 0144 | 0145 | 0146 | 0147 | 0148 | 0149 | 0150 | 0151 | 0152 | 0153 | 0154 | 0155 | 0156 | 0157 | 0158 | 0159 | 0160 | 0161 | 0162 | 0163 | 0164 | 0165 | 0166 | 0167 | 0168 | 0169 | 0170 | 0171 | 0172 | 0173 | 0174 | 0175 | 0176 | 0177 | 0178 | 0179 | 0180 | 0181 | 0182 | 0183 | 0184 | 0185 | 0186 | 0187 | 0188 | 0189 | 0190 | 0191 | 0192 | 0193 | 0194 | 0195 | 0196 | 0197 | 0198 | 0199 | 0200 | 0201 | 0202 | 0203 | 0204 | 0205 | 0206 | 0207 | 0208 | 0209 | 0210 | 0211 | 0212 | 0213 | 0214 | 0215 | 0216 | 0217 | 0218 | 0219 | 0220 | 0221 | 0222 | 0223 | 0224 | 0225 | 0226 | 0227 | 0228 | 0229 | 0230 | 0231 | 0232 | 0233 | 0234 | 0235 | 0236 | 0237 | 0238 | 0239 | 0240 | 0241 | 0242 | 0243 | 0244 | 0245 | 0246 | 0247 | 0248 | 0249 | 0250 | 0251 | 0252 | 0253 | 0254 | 0255 | 0256 | 0257 | 0258 | 0259 | 0260 | 0261 | 0262 | 0263 | 0264 | 0265 | 0266 | 0267 | 0268 | 0269 | 0270 | 0271 | 0272 | 0273 | 0274 | 0275 | 0276 | 0277 | 0278 | 0279 | 0280 | 0281 | 0282 | 0283 | 0284 | 0285 | 0286 | 0287 | 0288 | 0289 | 0290 | 0291 | 0292 | 0293 | 0294 | 0295 | 0296 | 0297 | 0298 | 0299 | 0300 | 0301 | 0302 | 0303 | 0304 | 0305 | 0306 | 0307 | 0308 | 0309 | 0310 | 0311 | 0312 | 0313 | 0314 | 0315 | 0316 | 0317 | 0318 | 0319 | 0320 | 0321 | 0322 | 0323 | 0324 | 0325 | 0326 | 0327 | 0328 | 0329 | 0330 | 0331 | 0332 | 0333 | 0334 | 0335 | 0336 | 0337 | 0338 | 0339 | 0340 | 0341 | 0342 | 0343 | 0344 | 0345 | 0346 | 0347 | 0348 | 0349 | 0350 | 0351 | 0352 | 0353 | 0354 | 0355 | 0356 | 0357 | 0358 | 0359 | 0360 | 0361 | 0362 | 0363 | 0364 | 0365 | 0366 | 0367 | 0368 | 0369 | 0370 | 0371 | 0372 | 0373 | 0374 | 0375 | 0376 | 0377 | 0378 | 0379 | 0380 | 0381 | 0382 | 0383 | 0384 | 0385 | 0386 | 0387 | 0388 | 0389 | 0390 | 0391 | 0392 | 0393 | 0394 | 0395 | 0396 | 0397 | 0398 | 0399 | 0400 | 0401 | 0402 | 0403 | 0404 | 0405 | 0406 | 0407 | 0408 | 0409 | 0410 | 0411 | 0412 | 0413 | 0414 | 0415 | 0416 | 0417 | 0418 | 0419 | 0420 | 0421 | 0422 | 0423 | 0424 | 0425 | 0426 | 0427 | 0428 | 0429 | 0430 | 0431 | 0432 | 0433 | 0434 | 0435 | 0436 | 0437 | 0438 | 0439 | 0440 | 0441 | 0442 | 0443 | 0444 | 0445 | 0446 | 0447 | 0448 | 0449 | 0450 | 0451 | 0452 | 0453 | 0454 | 0455 | 0456 | 0457 | 0458 | 0459 | 0460 | 0461 | 0462 | 0463 | 0464 | 0465 | 0466 | 0467 | 0468 | 0469 | 0470 | 0471 | 0472 | 0473 | 0474 | 0475 | 0476 | 0477 | 0478 | 0479 | 0480 | 0481 | 0482 | 0483 | 0484 | 0485 | 0486 | 0487 | 0488 | 0489 | 0490 | 0491 | 0492 | 0493 | 0494 | 0495 | 0496 | 0497 | 0498 | 0499 | 0500 |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|

Percentage Points of the  $\chi^2$  - Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu \backslash Q$ | .925000    | .900000    | .850000    | .800000    | .750000    | .700000    | .650000    | .600000    | .550000    | .500000    |
|--------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 87.5               | .692305 02 | .710324 02 | .730906 02 | .762170 02 | .782518 02 | .801099 02 | .818581 02 | .835403 02 | .851898 02 | .868342 02 |
| 88.0               | .696760 02 | .714838 02 | .735454 02 | .766851 02 | .787262 02 | .805901 02 | .823434 02 | .840307 02 | .856850 02 | .873342 02 |
| 88.5               | .701217 02 | .719355 02 | .740022 02 | .771533 02 | .792007 02 | .810782 02 | .828289 02 | .845211 02 | .861803 02 | .878342 02 |
| 89.0               | .705675 02 | .723872 02 | .744622 02 | .776216 02 | .796753 02 | .815505 02 | .833143 02 | .850116 02 | .866755 02 | .883342 02 |
| 89.5               | .710135 02 | .728391 02 | .749232 02 | .780900 02 | .801499 02 | .820308 02 | .837999 02 | .855020 02 | .871708 02 | .888342 02 |
| 90.0               | .714596 02 | .732911 02 | .753842 02 | .785584 02 | .806247 02 | .825111 02 | .842854 02 | .859925 02 | .876661 02 | .893342 02 |
| 90.5               | .719058 02 | .737432 02 | .758467 02 | .790270 02 | .810995 02 | .829915 02 | .847710 02 | .864831 02 | .881614 02 | .898342 02 |
| 91.0               | .723523 02 | .741955 02 | .763042 02 | .794956 02 | .815743 02 | .834719 02 | .852966 02 | .869736 02 | .886567 02 | .903342 02 |
| 91.5               | .727988 02 | .746479 02 | .767624 02 | .799644 02 | .820493 02 | .839525 02 | .857823 02 | .874642 02 | .891520 02 | .908342 02 |
| 92.0               | .732455 02 | .751005 02 | .772242 02 | .804332 02 | .825243 02 | .844330 02 | .862280 02 | .879548 02 | .896474 02 | .913342 02 |
| 92.5               | .736924 02 | .755532 02 | .776829 02 | .809021 02 | .829993 02 | .849136 02 | .867138 02 | .884454 02 | .901427 02 | .918342 02 |
| 93.0               | .741394 02 | .760060 02 | .781467 02 | .813711 02 | .834745 02 | .853943 02 | .871996 02 | .889361 02 | .906381 02 | .923342 02 |
| 93.5               | .745865 02 | .764589 02 | .786092 02 | .818401 02 | .839497 02 | .858750 02 | .876854 02 | .894268 02 | .911335 02 | .928342 02 |
| 94.0               | .750338 02 | .769119 02 | .790687 02 | .823093 02 | .844249 02 | .863558 02 | .881713 02 | .899175 02 | .916288 02 | .933342 02 |
| 94.5               | .754812 02 | .773651 02 | .795308 02 | .827785 02 | .848903 02 | .868366 02 | .886572 02 | .904082 02 | .921242 02 | .938342 02 |
| 95.0               | .759288 02 | .778184 02 | .800030 02 | .832478 02 | .853757 02 | .873175 02 | .891431 02 | .908990 02 | .926197 02 | .943342 02 |
| 95.5               | .763765 02 | .782719 02 | .804673 02 | .837172 02 | .858512 02 | .877984 02 | .896291 02 | .913897 02 | .931151 02 | .948342 02 |
| 96.0               | .768244 02 | .787294 02 | .809350 02 | .841867 02 | .863267 02 | .882794 02 | .901151 02 | .918806 02 | .936105 02 | .953342 02 |
| 96.5               | .772723 02 | .791791 02 | .813856 02 | .846562 02 | .868023 02 | .887604 02 | .906012 02 | .923714 02 | .941060 02 | .958342 02 |
| 97.0               | .777205 02 | .796329 02 | .818492 02 | .851259 02 | .872779 02 | .892415 02 | .910873 02 | .928622 02 | .946014 02 | .963342 02 |
| 97.5               | .781687 02 | .800868 02 | .823026 02 | .855956 02 | .877537 02 | .897226 02 | .915734 02 | .933531 02 | .950969 02 | .968341 02 |
| 98.0               | .786171 02 | .805408 02 | .827684 02 | .860654 02 | .882295 02 | .902038 02 | .920556 02 | .938440 02 | .955924 02 | .973341 02 |
| 98.5               | .790656 02 | .809950 02 | .832342 02 | .865343 02 | .887033 02 | .906850 02 | .925458 02 | .943349 02 | .960879 02 | .978341 02 |
| 99.0               | .795142 02 | .814493 02 | .836982 02 | .870052 02 | .891812 02 | .911663 02 | .930320 02 | .948259 02 | .965834 02 | .983341 02 |
| 99.5               | .799630 02 | .819036 02 | .841674 02 | .874752 02 | .896572 02 | .916476 02 | .935183 02 | .953169 02 | .970789 02 | .988341 02 |
| 100.0              | .804119 02 | .823581 02 | .846406 02 | .879453 02 | .901332 02 | .921289 02 | .940046 02 | .958078 02 | .975744 02 | .993341 02 |
| 100.5              | .808610 02 | .828127 02 | .850939 02 | .884155 02 | .906033 02 | .926104 02 | .944909 02 | .962989 02 | .980700 02 | .998341 02 |
| 101.0              | .813101 02 | .832675 02 | .855673 02 | .888888 02 | .910895 02 | .930918 02 | .949773 02 | .967899 02 | .985655 02 | .100334 03 |
| 101.5              | .817594 02 | .837223 02 | .860357 02 | .893561 02 | .915617 02 | .935733 02 | .954637 02 | .972810 02 | .990611 02 | .100834 03 |
| 102.0              | .822088 02 | .841773 02 | .864943 02 | .898265 02 | .920380 02 | .940549 02 | .959501 02 | .977720 02 | .995567 02 | .101334 03 |
| 102.5              | .826583 02 | .846323 02 | .869579 02 | .902970 02 | .925143 02 | .945365 02 | .964366 02 | .982631 02 | .100052 03 | .101834 03 |
| 103.0              | .831080 02 | .850875 02 | .874217 02 | .907675 02 | .929907 02 | .950181 02 | .969231 02 | .987543 02 | .100548 03 | .102334 03 |
| 103.5              | .835578 02 | .855428 02 | .878855 02 | .912381 02 | .934671 02 | .954998 02 | .974096 02 | .992454 02 | .101043 03 | .102834 03 |
| 104.0              | .840077 02 | .859982 02 | .883494 02 | .917088 02 | .939436 02 | .959815 02 | .978962 02 | .997366 02 | .101539 03 | .103334 03 |
| 104.5              | .844577 02 | .864537 02 | .888134 02 | .921796 02 | .944202 02 | .964633 02 | .983828 02 | .100228 03 | .102035 03 | .103834 03 |
| 105.0              | .849079 02 | .869093 02 | .892775 02 | .926504 02 | .948968 02 | .969451 02 | .988695 02 | .100719 03 | .102530 03 | .104334 03 |
| 105.5              | .853581 02 | .873650 02 | .897350 02 | .931213 02 | .953735 02 | .974270 02 | .993561 02 | .101210 03 | .103026 03 | .104834 03 |
| 106.0              | .858085 02 | .878208 02 | .901959 02 | .935922 02 | .958502 02 | .979689 02 | .998428 02 | .101701 03 | .103522 03 | .105334 03 |
| 106.5              | .862590 02 | .882767 02 | .906590 02 | .940633 02 | .963270 02 | .983908 02 | .100330 03 | .102193 03 | .104017 03 | .105834 03 |
| 107.0              | .867096 02 | .887327 02 | .911137 02 | .945344 02 | .968038 02 | .988728 02 | .100816 03 | .102664 03 | .104513 03 | .106334 03 |
| 107.5              | .871604 02 | .891889 02 | .915692 02 | .950056 02 | .972807 02 | .993548 02 | .101303 03 | .103175 03 | .105009 03 | .106834 03 |
| 108.0              | .876112 02 | .896451 02 | .920272 02 | .954768 02 | .977577 02 | .998369 02 | .101790 03 | .103667 03 | .105504 03 | .107334 03 |
| 108.5              | .880622 02 | .901014 02 | .924842 02 | .959481 02 | .982347 02 | .100319 03 | .102277 03 | .104158 03 | .106008 03 | .107834 03 |
| 109.0              | .885132 02 | .905579 02 | .929422 02 | .964195 02 | .987117 02 | .100801 03 | .102764 03 | .104649 03 | .106496 03 | .108334 03 |
| 109.5              | .889644 02 | .910144 02 | .934002 02 | .968909 02 | .991888 02 | .101283 03 | .103251 03 | .105141 03 | .106992 03 | .108834 03 |
| 110.0              | .894157 02 | .914710 02 | .938582 02 | .973624 02 | .996660 02 | .101766 03 | .103738 03 | .105632 03 | .107487 03 | .109334 03 |
| 110.5              | .898671 02 | .919278 02 | .943179 02 | .978340 02 | .100143 03 | .102248 03 | .104225 03 | .106124 03 | .107983 03 | .109834 03 |
| 111.0              | .903187 02 | .923846 02 | .947806 02 | .983056 02 | .100628 03 | .102730 03 | .104712 03 | .106615 03 | .108479 03 | .110334 03 |
| 111.5              | .907703 02 | .928415 02 | .952446 02 | .987773 02 | .101098 03 | .103213 03 | .105199 03 | .107107 03 | .108975 03 | .110834 03 |
| 112.0              | .912220 02 | .932946 02 | .957046 02 | .992491 02 | .101575 03 | .103695 03 | .105686 03 | .107598 03 | .109476 03 | .111334 03 |

Percentage Points of the  $\chi^2$ -Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu/Q$ | .925000    | .900000    | .850000    | .800000    | .750000    | .700000    | .650000    | .600000    | .550000    | .500000    |
|---------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 112.5   | .916739 02 | .937557 02 | .970487 02 | .997209 02 | .102053 03 | .104177 03 | .106173 03 | .108090 03 | .109966 03 | .111834 03 |
| 113.0   | .921256 02 | .942129 02 | .975141 02 | .100193 03 | .102520 03 | .104660 03 | .106660 03 | .108581 03 | .110462 03 | .112334 03 |
| 113.5   | .925779 02 | .946702 02 | .979795 02 | .100665 03 | .103008 03 | .105142 03 | .107147 03 | .109073 03 | .110958 03 | .112834 03 |
| 114.0   | .930301 02 | .951276 02 | .984451 02 | .101137 03 | .103485 03 | .105625 03 | .107634 03 | .109564 03 | .111454 03 | .113334 03 |
| 114.5   | .934823 02 | .955851 02 | .989107 02 | .101609 03 | .103963 03 | .106108 03 | .108121 03 | .110056 03 | .111949 03 | .113834 03 |
| 115.0   | .939347 02 | .960427 02 | .993764 02 | .102081 03 | .104440 03 | .106598 03 | .108609 03 | .110547 03 | .112445 03 | .114334 03 |
| 115.5   | .943872 02 | .965004 02 | .998422 02 | .102553 03 | .104918 03 | .107073 03 | .109096 03 | .111039 03 | .112941 03 | .114834 03 |
| 116.0   | .948398 02 | .969582 02 | .100308 03 | .103025 03 | .105396 03 | .107556 03 | .109583 03 | .111531 03 | .113437 03 | .115334 03 |
| 116.5   | .952925 02 | .974160 02 | .100774 03 | .103498 03 | .105874 03 | .108038 03 | .110071 03 | .112022 03 | .113933 03 | .115834 03 |
| 117.0   | .957453 02 | .978740 02 | .101240 03 | .103973 03 | .106352 03 | .108521 03 | .110558 03 | .112514 03 | .114429 03 | .116334 03 |
| 117.5   | .961981 02 | .983320 02 | .101706 03 | .104443 03 | .106829 03 | .109004 03 | .111045 03 | .113006 03 | .114925 03 | .116834 03 |
| 118.0   | .966511 02 | .987902 02 | .102172 03 | .104915 03 | .107307 03 | .109487 03 | .111533 03 | .113498 03 | .115420 03 | .117334 03 |
| 118.5   | .971042 02 | .992484 02 | .102638 03 | .105388 03 | .107785 03 | .109970 03 | .112020 03 | .113989 03 | .115916 03 | .117834 03 |
| 119.0   | .975574 02 | .997067 02 | .103105 03 | .105860 03 | .108263 03 | .110453 03 | .112508 03 | .114481 03 | .116412 03 | .118334 03 |
| 119.5   | .980107 02 | .100165 03 | .103571 03 | .106333 03 | .108742 03 | .110936 03 | .112995 03 | .114973 03 | .116908 03 | .118834 03 |
| 120.0   | .984641 02 | .100624 03 | .104037 03 | .106806 03 | .109220 03 | .111419 03 | .113483 03 | .115465 03 | .117404 03 | .119334 03 |
| 120.5   | .989176 02 | .101082 03 | .104504 03 | .107278 03 | .109698 03 | .111902 03 | .113970 03 | .115956 03 | .117900 03 | .119834 03 |
| 121.0   | .993712 02 | .101541 03 | .104970 03 | .107751 03 | .110176 03 | .112385 03 | .114458 03 | .116448 03 | .118396 03 | .120334 03 |
| 121.5   | .998248 02 | .102000 03 | .105437 03 | .108224 03 | .110654 03 | .112868 03 | .114945 03 | .116940 03 | .118892 03 | .120834 03 |
| 122.0   | .100279 03 | .102458 03 | .105904 03 | .108697 03 | .111133 03 | .113351 03 | .115433 03 | .117432 03 | .119388 03 | .121334 03 |
| 122.5   | .100732 03 | .102917 03 | .106371 03 | .109178 03 | .111611 03 | .113834 03 | .115920 03 | .117924 03 | .119884 03 | .121834 03 |
| 123.0   | .101186 03 | .103376 03 | .106837 03 | .109643 03 | .112089 03 | .114317 03 | .116408 03 | .118416 03 | .120380 03 | .122334 03 |
| 123.5   | .101640 03 | .103835 03 | .107304 03 | .110116 03 | .112568 03 | .114801 03 | .116896 03 | .118908 03 | .120876 03 | .122834 03 |
| 124.0   | .102095 03 | .104295 03 | .107771 03 | .110589 03 | .113046 03 | .115284 03 | .117384 03 | .119399 03 | .121372 03 | .123334 03 |
| 124.5   | .102549 03 | .104754 03 | .108238 03 | .111063 03 | .113525 03 | .115767 03 | .117871 03 | .119891 03 | .121868 03 | .123834 03 |
| 125.0   | .103003 03 | .105213 03 | .108695 03 | .111536 03 | .114004 03 | .116251 03 | .118359 03 | .120383 03 | .122364 03 | .124334 03 |
| 125.5   | .103458 03 | .105673 03 | .109173 03 | .112009 03 | .114482 03 | .116734 03 | .118847 03 | .120875 03 | .122860 03 | .124834 03 |
| 126.0   | .103912 03 | .106132 03 | .109640 03 | .112483 03 | .114961 03 | .117217 03 | .119335 03 | .121367 03 | .123356 03 | .125334 03 |
| 126.5   | .104367 03 | .106592 03 | .110107 03 | .112956 03 | .115440 03 | .117701 03 | .119822 03 | .121859 03 | .123852 03 | .125834 03 |
| 127.0   | .104821 03 | .107051 03 | .110574 03 | .113430 03 | .115918 03 | .118184 03 | .120310 03 | .122351 03 | .124348 03 | .126334 03 |
| 127.5   | .105276 03 | .107511 03 | .111042 03 | .113903 03 | .116397 03 | .118668 03 | .120798 03 | .122843 03 | .124844 03 | .126834 03 |
| 128.0   | .105731 03 | .107971 03 | .111509 03 | .114377 03 | .116876 03 | .119151 03 | .121286 03 | .123335 03 | .125340 03 | .127334 03 |
| 128.5   | .106186 03 | .108431 03 | .111977 03 | .114850 03 | .117355 03 | .119635 03 | .121774 03 | .123827 03 | .125836 03 | .127834 03 |
| 129.0   | .106641 03 | .108891 03 | .112445 03 | .115324 03 | .117834 03 | .120118 03 | .122262 03 | .124320 03 | .126332 03 | .128334 03 |
| 129.5   | .107096 03 | .109351 03 | .112912 03 | .115798 03 | .118313 03 | .120602 03 | .122750 03 | .124812 03 | .126828 03 | .128834 03 |
| 130.0   | .107552 03 | .109811 03 | .113380 03 | .116272 03 | .118792 03 | .121086 03 | .123238 03 | .125304 03 | .127324 03 | .129334 03 |
| 130.5   | .108007 03 | .110271 03 | .113848 03 | .116746 03 | .119271 03 | .121570 03 | .123726 03 | .125796 03 | .127820 03 | .129834 03 |
| 131.0   | .108462 03 | .110732 03 | .114316 03 | .117219 03 | .119750 03 | .122053 03 | .124214 03 | .126288 03 | .128316 03 | .130334 03 |
| 131.5   | .108918 03 | .111192 03 | .114784 03 | .117693 03 | .120229 03 | .122537 03 | .124702 03 | .126780 03 | .128813 03 | .130834 03 |
| 132.0   | .109373 03 | .111652 03 | .115252 03 | .118167 03 | .120708 03 | .123021 03 | .125190 03 | .127272 03 | .129309 03 | .131334 03 |
| 132.5   | .109829 03 | .112113 03 | .115720 03 | .118641 03 | .121187 03 | .123505 03 | .125678 03 | .127765 03 | .129805 03 | .131834 03 |
| 133.0   | .110285 03 | .112573 03 | .116188 03 | .119116 03 | .121667 03 | .123989 03 | .126166 03 | .128257 03 | .130301 03 | .132334 03 |
| 133.5   | .110740 03 | .113034 03 | .116656 03 | .119590 03 | .122146 03 | .124472 03 | .126655 03 | .128749 03 | .130797 03 | .132834 03 |
| 134.0   | .111196 03 | .113495 03 | .117124 03 | .120064 03 | .122625 03 | .124956 03 | .127143 03 | .129243 03 | .131293 03 | .133334 03 |
| 134.5   | .111652 03 | .113956 03 | .117592 03 | .120538 03 | .123105 03 | .125440 03 | .127631 03 | .129733 03 | .131789 03 | .133834 03 |
| 135.0   | .112108 03 | .114417 03 | .118061 03 | .121012 03 | .123584 03 | .125924 03 | .128119 03 | .130226 03 | .132286 03 | .134334 03 |
| 135.5   | .112565 03 | .114877 03 | .118529 03 | .121487 03 | .124063 03 | .126408 03 | .128608 03 | .130718 03 | .132782 03 | .134834 03 |
| 136.0   | .113021 03 | .115338 03 | .118998 03 | .121961 03 | .124543 03 | .126892 03 | .129096 03 | .131210 03 | .133278 03 | .135334 03 |
| 136.5   | .113477 03 | .115800 03 | .119466 03 | .122436 03 | .125022 03 | .127376 03 | .129584 03 | .131703 03 | .133774 03 | .135834 03 |
| 137.0   | .113933 03 | .116261 03 | .119935 03 | .122910 03 | .125502 03 | .127860 03 | .130072 03 | .132195 03 | .134270 03 | .136334 03 |

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu \backslash Q$ | .925000   | .900000   | .850000   | .800000   | .750000   | .700000   | .650000   | .600000   | .550000   | .500000   |
|--------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 137.5              | 114390 03 | 116722 03 | 120404 03 | 123305 03 | 125902 03 | 128345 03 | 130561 03 | 132687 03 | 134766 03 | 136834 03 |
| 138.0              | 114847 03 | 117183 03 | 120872 03 | 123859 03 | 126461 03 | 128929 03 | 131049 03 | 133180 03 | 135263 03 | 137334 03 |
| 138.5              | 115313 03 | 117645 03 | 121341 03 | 124334 03 | 126941 03 | 129313 03 | 131537 03 | 133672 03 | 135759 03 | 137834 03 |
| 139.0              | 115760 03 | 118096 03 | 121810 03 | 124809 03 | 127421 03 | 129797 03 | 132026 03 | 134164 03 | 136255 03 | 138334 03 |
| 139.5              | 116217 03 | 118558 03 | 122279 03 | 125283 03 | 127900 03 | 130281 03 | 132514 03 | 134657 03 | 136751 03 | 138834 03 |
| 140.0              | 116674 03 | 119029 03 | 122748 03 | 125758 03 | 128380 03 | 130766 03 | 133003 03 | 135149 03 | 137248 03 | 139334 03 |
| 140.5              | 117130 03 | 119491 03 | 123217 03 | 126233 03 | 128860 03 | 131250 03 | 133491 03 | 135641 03 | 137744 03 | 139834 03 |
| 141.0              | 117588 03 | 119953 03 | 123686 03 | 126708 03 | 129340 03 | 131734 03 | 133900 03 | 136134 03 | 138240 03 | 140334 03 |
| 141.5              | 118045 03 | 120414 03 | 124155 03 | 127183 03 | 129820 03 | 132219 03 | 134368 03 | 136626 03 | 138736 03 | 140834 03 |
| 142.0              | 118502 03 | 120876 03 | 124624 03 | 127658 03 | 130299 03 | 132703 03 | 134857 03 | 137119 03 | 139233 03 | 141334 03 |
| 142.5              | 118959 03 | 121338 03 | 125093 03 | 128133 03 | 130779 03 | 133187 03 | 135345 03 | 137611 03 | 139729 03 | 141834 03 |
| 143.0              | 119416 03 | 121800 03 | 125562 03 | 128608 03 | 131259 03 | 133672 03 | 135834 03 | 138104 03 | 140225 03 | 142334 03 |
| 143.5              | 119874 03 | 122262 03 | 126032 03 | 129083 03 | 131739 03 | 134156 03 | 136322 03 | 138596 03 | 140721 03 | 142834 03 |
| 144.0              | 120331 03 | 122724 03 | 126501 03 | 129558 03 | 132219 03 | 134641 03 | 136811 03 | 139089 03 | 141218 03 | 143334 03 |
| 144.5              | 120789 03 | 123187 03 | 126970 03 | 130033 03 | 132700 03 | 135125 03 | 137300 03 | 139581 03 | 141714 03 | 143834 03 |
| 145.0              | 121246 03 | 123649 03 | 127440 03 | 130508 03 | 133180 03 | 135610 03 | 137788 03 | 140074 03 | 142210 03 | 144334 03 |
| 145.5              | 121704 03 | 124111 03 | 127909 03 | 130983 03 | 133660 03 | 136095 03 | 138377 03 | 140566 03 | 142707 03 | 144834 03 |
| 146.0              | 122162 03 | 124574 03 | 128379 03 | 131459 03 | 134140 03 | 136579 03 | 138866 03 | 141059 03 | 143203 03 | 145334 03 |
| 146.5              | 122620 03 | 125036 03 | 128849 03 | 131934 03 | 134620 03 | 137064 03 | 139354 03 | 141551 03 | 143699 03 | 145834 03 |
| 147.0              | 123078 03 | 125499 03 | 129318 03 | 132409 03 | 135101 03 | 137548 03 | 139843 03 | 142044 03 | 144195 03 | 146334 03 |
| 147.5              | 123536 03 | 125961 03 | 129788 03 | 132885 03 | 135581 03 | 138033 03 | 140332 03 | 142537 03 | 144692 03 | 146834 03 |
| 148.0              | 123994 03 | 126424 03 | 130258 03 | 133360 03 | 136061 03 | 138518 03 | 140821 03 | 143029 03 | 145188 03 | 147334 03 |
| 148.5              | 124452 03 | 126887 03 | 130728 03 | 133836 03 | 136542 03 | 139003 03 | 141309 03 | 143522 03 | 145684 03 | 147834 03 |
| 149.0              | 124910 03 | 127349 03 | 131198 03 | 134311 03 | 137022 03 | 139487 03 | 141798 03 | 144015 03 | 146181 03 | 148334 03 |
| 149.5              | 125368 03 | 127812 03 | 131667 03 | 134787 03 | 137502 03 | 139972 03 | 142287 03 | 144507 03 | 146677 03 | 148834 03 |
| 150.0              | 125827 03 | 128275 03 | 132137 03 | 135263 03 | 137983 03 | 140457 03 | 142776 03 | 145000 03 | 147174 03 | 149334 03 |
| 150.5              | 126285 03 | 128738 03 | 132608 03 | 135738 03 | 138463 03 | 140942 03 | 143265 03 | 145492 03 | 147670 03 | 149834 03 |
| 151.0              | 126743 03 | 129201 03 | 133078 03 | 136214 03 | 138944 03 | 141427 03 | 143754 03 | 145985 03 | 148156 03 | 150334 03 |
| 151.5              | 127202 03 | 129664 03 | 133548 03 | 136690 03 | 139424 03 | 141911 03 | 144242 03 | 146478 03 | 148663 03 | 150834 03 |
| 152.0              | 127661 03 | 130127 03 | 134018 03 | 137165 03 | 139905 03 | 142396 03 | 144731 03 | 146971 03 | 149159 03 | 151334 03 |
| 152.5              | 128119 03 | 130590 03 | 134488 03 | 137641 03 | 140386 03 | 142881 03 | 145220 03 | 147463 03 | 149655 03 | 151834 03 |
| 153.0              | 128578 03 | 131054 03 | 134958 03 | 138117 03 | 140866 03 | 143366 03 | 145709 03 | 147956 03 | 150152 03 | 152334 03 |
| 153.5              | 129037 03 | 131517 03 | 135429 03 | 138593 03 | 141347 03 | 143851 03 | 146198 03 | 148449 03 | 150648 03 | 152834 03 |
| 154.0              | 129496 03 | 131980 03 | 135899 03 | 139069 03 | 141828 03 | 144336 03 | 146687 03 | 148942 03 | 151145 03 | 153334 03 |
| 154.5              | 129955 03 | 132444 03 | 136370 03 | 139545 03 | 142308 03 | 144821 03 | 147176 03 | 149434 03 | 151641 03 | 153834 03 |
| 155.0              | 130414 03 | 132907 03 | 136840 03 | 140021 03 | 142789 03 | 145306 03 | 147665 03 | 149927 03 | 152137 03 | 154334 03 |
| 155.5              | 130873 03 | 133371 03 | 137311 03 | 140497 03 | 143270 03 | 145791 03 | 148154 03 | 150420 03 | 152634 03 | 154834 03 |
| 156.0              | 131332 03 | 133835 03 | 137781 03 | 140973 03 | 143751 03 | 146277 03 | 148643 03 | 150913 03 | 153130 03 | 155334 03 |
| 156.5              | 131791 03 | 134298 03 | 138252 03 | 141449 03 | 144232 03 | 146762 03 | 149132 03 | 151405 03 | 153627 03 | 155834 03 |
| 157.0              | 132250 03 | 134762 03 | 138722 03 | 141926 03 | 144713 03 | 147247 03 | 149621 03 | 151898 03 | 154123 03 | 156334 03 |
| 157.5              | 132710 03 | 135226 03 | 139193 03 | 142402 03 | 145194 03 | 147732 03 | 150111 03 | 152391 03 | 154620 03 | 156834 03 |
| 158.0              | 133169 03 | 135690 03 | 139664 03 | 142878 03 | 145675 03 | 148217 03 | 150600 03 | 152884 03 | 155116 03 | 157334 03 |
| 158.5              | 133629 03 | 136154 03 | 140135 03 | 143354 03 | 146156 03 | 148702 03 | 151089 03 | 153377 03 | 155613 03 | 157834 03 |
| 159.0              | 134088 03 | 136618 03 | 140606 03 | 143831 03 | 146637 03 | 149188 03 | 151578 03 | 153870 03 | 156109 03 | 158334 03 |
| 159.5              | 134548 03 | 137082 03 | 141077 03 | 144307 03 | 147118 03 | 149673 03 | 152067 03 | 154363 03 | 156605 03 | 158834 03 |
| 160.0              | 135007 03 | 137546 03 | 141547 03 | 144783 03 | 147599 03 | 150158 03 | 152556 03 | 154856 03 | 157102 03 | 159334 03 |
| 160.5              | 135467 03 | 138010 03 | 142018 03 | 145260 03 | 148080 03 | 150644 03 | 153046 03 | 155348 03 | 157598 03 | 159834 03 |
| 161.0              | 135927 03 | 138474 03 | 142490 03 | 145736 03 | 148561 03 | 151129 03 | 153535 03 | 155841 03 | 158095 03 | 160334 03 |
| 161.5              | 136387 03 | 138938 03 | 142961 03 | 146213 03 | 149042 03 | 151614 03 | 154024 03 | 156334 03 | 158591 03 | 160834 03 |
| 162.0              | 136847 03 | 139403 03 | 143432 03 | 146689 03 | 149523 03 | 152100 03 | 154513 03 | 156827 03 | 159088 03 | 161334 03 |

Percentage Points of the  $\chi^2$ -Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu \backslash Q$ | .925000    | .900000    | .850000    | .800000    | .750000    | .700000    | .650000    | .600000    | .550000    | .500000    |
|--------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 162.5              | .137307 03 | .139867 03 | .142903 03 | .147166 03 | .150005 03 | .152585 03 | .155003 03 | .157320 03 | .159584 03 | .161834 03 |
| 163.0              | .137767 02 | .140331 03 | .143374 03 | .147643 03 | .150486 03 | .153071 03 | .155492 03 | .157813 03 | .160081 03 | .162334 03 |
| 163.5              | .138227 02 | .140796 03 | .143845 03 | .148119 03 | .150967 03 | .153556 03 | .155981 03 | .158306 03 | .160577 03 | .162834 03 |
| 164.0              | .138687 02 | .141260 03 | .144317 03 | .148596 03 | .151449 03 | .154041 03 | .156471 03 | .158799 03 | .161074 03 | .163334 03 |
| 164.5              | .139147 03 | .141725 03 | .144788 03 | .149073 03 | .151930 03 | .154524 03 | .156960 03 | .159292 03 | .161570 03 | .163834 03 |
| 165.0              | .139607 03 | .142190 03 | .145259 03 | .149549 03 | .152411 03 | .155012 03 | .157449 03 | .159785 03 | .162067 03 | .164334 03 |
| 165.5              | .140068 02 | .142654 03 | .145731 03 | .150026 03 | .152893 03 | .155498 03 | .157939 03 | .160278 03 | .162563 03 | .164834 03 |
| 166.0              | .140528 03 | .143119 03 | .146203 03 | .150503 03 | .153374 03 | .155984 03 | .158428 03 | .160771 03 | .163060 03 | .165334 03 |
| 166.5              | .140989 03 | .143584 03 | .146674 03 | .150980 03 | .153856 03 | .156469 03 | .158917 03 | .161264 03 | .163557 03 | .165834 03 |
| 167.0              | .141449 03 | .144049 03 | .147145 03 | .151457 03 | .154337 03 | .156955 03 | .159407 03 | .161757 03 | .164053 03 | .166334 03 |
| 167.5              | .141910 03 | .144514 03 | .147617 03 | .151934 03 | .154819 03 | .157440 02 | .159896 03 | .162250 03 | .164550 03 | .166834 03 |
| 168.0              | .142370 02 | .144979 03 | .148089 03 | .152411 03 | .155308 03 | .157926 03 | .160386 03 | .162743 03 | .165046 03 | .167334 03 |
| 168.5              | .142831 03 | .145444 03 | .148560 03 | .152888 03 | .155782 03 | .158412 03 | .160875 03 | .163236 03 | .165543 03 | .167834 03 |
| 169.0              | .143292 03 | .145909 03 | .149032 03 | .153365 03 | .156263 03 | .158897 03 | .161365 03 | .163729 03 | .166039 03 | .168334 03 |
| 169.5              | .143753 03 | .146374 03 | .149504 03 | .153842 03 | .156745 03 | .159383 03 | .161854 03 | .164223 03 | .166536 03 | .168834 03 |
| 170.0              | .144214 03 | .146839 03 | .150076 03 | .154419 03 | .157327 03 | .159969 03 | .162344 03 | .164716 03 | .167033 03 | .169334 03 |
| 170.5              | .144675 03 | .147304 03 | .150548 03 | .154896 03 | .157808 03 | .160455 03 | .162833 03 | .165209 03 | .167529 03 | .169834 03 |
| 171.0              | .145136 03 | .147769 03 | .151020 03 | .155373 03 | .158290 03 | .160940 03 | .163323 03 | .165702 03 | .168026 03 | .170334 03 |
| 171.5              | .145597 03 | .148235 03 | .151498 03 | .155851 03 | .158772 03 | .161426 03 | .163812 03 | .166195 03 | .168522 03 | .170834 03 |
| 172.0              | .146058 03 | .148700 03 | .151963 03 | .156320 03 | .159244 03 | .161902 03 | .164292 03 | .166680 03 | .169019 03 | .171334 03 |
| 172.5              | .146519 03 | .149165 03 | .152435 03 | .156795 03 | .159725 03 | .162388 03 | .164792 03 | .167181 03 | .169516 03 | .171834 03 |
| 173.0              | .146980 03 | .149631 03 | .152908 03 | .157268 03 | .160207 03 | .162878 03 | .165281 03 | .167675 03 | .170012 03 | .172334 03 |
| 173.5              | .147441 03 | .150096 03 | .153378 03 | .157740 03 | .160689 03 | .163360 03 | .165771 03 | .168168 03 | .170509 03 | .172834 03 |
| 174.0              | .147903 03 | .150562 03 | .153849 03 | .158213 03 | .161171 03 | .163852 03 | .166266 03 | .168661 03 | .171005 03 | .173334 03 |
| 174.5              | .148364 03 | .151028 03 | .154319 03 | .158686 03 | .161653 03 | .164344 03 | .166760 03 | .169154 03 | .171502 03 | .173834 03 |
| 175.0              | .148825 03 | .151493 03 | .154789 03 | .159162 03 | .162140 03 | .164842 03 | .167260 03 | .169654 03 | .172000 03 | .174334 03 |
| 175.5              | .149287 03 | .151959 03 | .155260 03 | .159648 03 | .162637 03 | .165350 03 | .167779 03 | .170161 03 | .172495 03 | .174834 03 |
| 176.0              | .149749 03 | .152425 03 | .155734 03 | .160127 03 | .163120 03 | .165842 03 | .168279 03 | .170663 03 | .172992 03 | .175334 03 |
| 176.5              | .150210 02 | .152891 03 | .156203 03 | .160595 03 | .163598 03 | .166320 03 | .168760 03 | .171127 03 | .173489 03 | .175834 03 |
| 177.0              | .150672 03 | .153356 03 | .156683 03 | .161082 03 | .164093 03 | .166825 03 | .169271 03 | .171620 03 | .173985 03 | .176334 03 |
| 177.5              | .151133 03 | .153822 03 | .157158 03 | .161560 03 | .164583 03 | .167325 03 | .169780 03 | .172144 03 | .174520 03 | .176834 03 |
| 178.0              | .151595 03 | .154288 03 | .157630 03 | .162043 03 | .165077 03 | .167830 03 | .170298 03 | .172673 03 | .175059 03 | .177334 03 |
| 178.5              | .152057 03 | .154754 03 | .158099 03 | .162523 03 | .165570 03 | .168342 03 | .170820 03 | .173205 03 | .175593 03 | .177834 03 |
| 179.0              | .152519 03 | .155220 03 | .158570 03 | .163053 03 | .166113 03 | .168903 03 | .171392 03 | .173788 03 | .176183 03 | .178334 03 |
| 179.5              | .152981 03 | .155686 03 | .159043 03 | .163540 03 | .166613 03 | .169423 03 | .171922 03 | .174328 03 | .176733 03 | .178834 03 |
| 180.0              | .153443 02 | .156153 03 | .159519 03 | .164053 03 | .167140 03 | .169970 03 | .172479 03 | .174895 03 | .177310 03 | .179334 03 |
| 180.5              | .153905 03 | .156629 03 | .160003 03 | .164540 03 | .167643 03 | .170493 03 | .173012 03 | .175438 03 | .177863 03 | .179834 03 |
| 181.0              | .154367 03 | .157095 03 | .160480 03 | .165043 03 | .168168 03 | .171038 03 | .173577 03 | .176013 03 | .178448 03 | .180334 03 |
| 181.5              | .154829 03 | .157561 03 | .161059 03 | .165653 03 | .168803 03 | .171693 03 | .174242 03 | .176688 03 | .179133 03 | .181334 03 |
| 182.0              | .155291 03 | .158038 03 | .161553 03 | .166183 03 | .169353 03 | .172273 03 | .174842 03 | .177298 03 | .179753 03 | .181834 03 |
| 182.5              | .155754 03 | .158514 03 | .162053 03 | .166743 03 | .169943 03 | .172893 03 | .175482 03 | .177958 03 | .180423 03 | .182334 03 |
| 183.0              | .156216 03 | .158989 03 | .162553 03 | .167283 03 | .170513 03 | .173493 03 | .176112 03 | .178598 03 | .181073 03 | .183334 03 |
| 183.5              | .156678 03 | .159461 03 | .163059 03 | .167833 03 | .171093 03 | .174113 03 | .176762 03 | .179258 03 | .181743 03 | .183834 03 |
| 184.0              | .157141 03 | .159938 03 | .163563 03 | .168383 03 | .171683 03 | .174743 03 | .177422 03 | .179938 03 | .182413 03 | .184334 03 |
| 184.5              | .157603 03 | .160419 03 | .164083 03 | .168943 03 | .172283 03 | .175383 03 | .178102 03 | .180658 03 | .183143 03 | .185334 03 |
| 185.0              | .158066 03 | .160899 03 | .164603 03 | .169513 03 | .172903 03 | .176043 03 | .178802 03 | .181388 03 | .183903 03 | .186334 03 |
| 185.5              | .158528 03 | .161383 03 | .165123 03 | .170083 03 | .173513 03 | .176703 03 | .179502 03 | .182058 03 | .184593 03 | .186834 03 |
| 186.0              | .158991 02 | .161869 03 | .165643 03 | .170643 03 | .174123 03 | .177353 03 | .180202 03 | .182808 03 | .185343 03 | .187334 03 |
| 186.5              | .159453 03 | .162351 03 | .166163 03 | .171003 03 | .174533 03 | .177823 03 | .180712 03 | .183358 03 | .185943 03 | .188334 03 |
| 187.0              | .159916 03 | .162838 03 | .166693 03 | .171523 03 | .175113 03 | .178453 03 | .181392 03 | .184098 03 | .186723 03 | .189334 03 |

| r\Q   | .925000    | .930000    | .935000    | .940000    | .945000    | .950000    | .955000    | .960000    | .965000    | .970000    | .975000    | .980000    | .985000    | .990000    | .995000    | 1.000000   |
|-------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 187.5 | .160379 03 | .163150 03 | .167514 03 | .171038 03 | .174101 03 | .176882 03 | .179466 03 | .181981 03 | .184416 03 | .186834 03 | .189334 03 | .191834 03 | .194334 03 | .196834 03 | .199334 03 | .201834 03 |
| 188.0 | .160842 03 | .163617 03 | .167980 03 | .171517 03 | .174586 03 | .177369 03 | .179976 03 | .182477 03 | .184913 03 | .187334 03 | .189734 03 | .192134 03 | .194534 03 | .196934 03 | .199334 03 | .201734 03 |
| 188.5 | .161304 03 | .164084 03 | .168461 03 | .172195 03 | .175266 03 | .177855 03 | .180466 03 | .183067 03 | .185666 03 | .188266 03 | .190866 03 | .193466 03 | .196066 03 | .198666 03 | .201266 03 | .203866 03 |
| 189.0 | .161767 03 | .164551 03 | .168934 03 | .172727 03 | .175859 03 | .178420 03 | .180956 03 | .183481 03 | .185996 03 | .188511 03 | .191026 03 | .193541 03 | .196056 03 | .198571 03 | .201086 03 | .203601 03 |
| 189.5 | .162230 03 | .165018 03 | .169407 03 | .173251 03 | .176314 03 | .178828 03 | .181346 03 | .183861 03 | .186376 03 | .188891 03 | .191406 03 | .193921 03 | .196436 03 | .198951 03 | .201466 03 | .203981 03 |
| 190.0 | .162693 03 | .165485 03 | .169871 03 | .173763 03 | .176857 03 | .179315 03 | .181836 03 | .184357 03 | .186878 03 | .189399 03 | .191920 03 | .194441 03 | .196962 03 | .199483 03 | .202004 03 | .204525 03 |
| 190.5 | .163156 03 | .165952 03 | .170334 03 | .174270 03 | .177427 03 | .179841 03 | .182362 03 | .184883 03 | .187404 03 | .189925 03 | .192446 03 | .194967 03 | .197488 03 | .200009 03 | .202530 03 | .205051 03 |
| 191.0 | .163619 03 | .166419 03 | .170828 03 | .174817 03 | .177999 03 | .180428 03 | .182969 03 | .185500 03 | .188041 03 | .190582 03 | .193123 03 | .195664 03 | .198205 03 | .200746 03 | .203287 03 | .205828 03 |
| 191.5 | .164083 03 | .166887 03 | .171301 03 | .175387 03 | .178622 03 | .181077 03 | .183642 03 | .186207 03 | .188772 03 | .191337 03 | .193902 03 | .196467 03 | .199032 03 | .201597 03 | .204162 03 | .206727 03 |
| 192.0 | .164546 03 | .167354 03 | .171575 03 | .175643 03 | .178922 03 | .181411 03 | .183999 03 | .186588 03 | .189177 03 | .191766 03 | .194355 03 | .196944 03 | .199533 03 | .202122 03 | .204711 03 | .207300 03 |
| 192.5 | .165009 03 | .167821 03 | .172248 03 | .176322 03 | .179622 03 | .182137 03 | .184756 03 | .187375 03 | .189994 03 | .192613 03 | .195232 03 | .197851 03 | .200470 03 | .203089 03 | .205708 03 | .208327 03 |
| 193.0 | .165472 03 | .168288 03 | .172722 03 | .176803 03 | .180122 03 | .182641 03 | .185260 03 | .187879 03 | .190498 03 | .193117 03 | .195736 03 | .198355 03 | .200974 03 | .203593 03 | .206212 03 | .208831 03 |
| 193.5 | .165936 03 | .168756 03 | .173195 03 | .177279 03 | .180598 03 | .183117 03 | .185736 03 | .188355 03 | .190974 03 | .193593 03 | .196212 03 | .198831 03 | .201450 03 | .204069 03 | .206688 03 | .209307 03 |
| 194.0 | .166399 03 | .169223 03 | .173659 03 | .177743 03 | .181062 03 | .183581 03 | .186200 03 | .188819 03 | .191438 03 | .194057 03 | .196676 03 | .199295 03 | .201914 03 | .204533 03 | .207152 03 | .209771 03 |
| 194.5 | .166862 03 | .169691 03 | .174143 03 | .178225 03 | .181542 03 | .184061 03 | .186680 03 | .189299 03 | .191918 03 | .194537 03 | .197156 03 | .199775 03 | .202394 03 | .205013 03 | .207632 03 | .210251 03 |
| 195.0 | .167326 03 | .170158 03 | .174616 03 | .178715 03 | .182032 03 | .184551 03 | .187170 03 | .189789 03 | .192408 03 | .195027 03 | .197646 03 | .200265 03 | .202884 03 | .205503 03 | .208122 03 | .210741 03 |
| 195.5 | .167790 03 | .170626 03 | .175089 03 | .179188 03 | .182505 03 | .185024 03 | .187643 03 | .190262 03 | .192881 03 | .195500 03 | .198119 03 | .200738 03 | .203357 03 | .205976 03 | .208595 03 | .211214 03 |
| 196.0 | .168253 03 | .171093 03 | .175554 03 | .179653 03 | .182970 03 | .185489 03 | .188108 03 | .190727 03 | .193346 03 | .195965 03 | .198584 03 | .201203 03 | .203822 03 | .206441 03 | .209060 03 | .211679 03 |
| 196.5 | .168717 03 | .171561 03 | .176038 03 | .180137 03 | .183454 03 | .186073 03 | .188692 03 | .191311 03 | .193930 03 | .196549 03 | .199168 03 | .201787 03 | .204406 03 | .207025 03 | .209644 03 | .212263 03 |
| 197.0 | .169180 03 | .172029 03 | .176511 03 | .180610 03 | .183927 03 | .186546 03 | .189165 03 | .191784 03 | .194403 03 | .197022 03 | .199641 03 | .202260 03 | .204879 03 | .207498 03 | .210117 03 | .212736 03 |
| 197.5 | .169644 03 | .172496 03 | .176985 03 | .181084 03 | .184401 03 | .187020 03 | .189639 03 | .192258 03 | .194877 03 | .197496 03 | .200115 03 | .202734 03 | .205353 03 | .207972 03 | .210591 03 | .213210 03 |
| 198.0 | .170108 03 | .172964 03 | .177459 03 | .181558 03 | .184875 03 | .187494 03 | .190113 03 | .192732 03 | .195351 03 | .197970 03 | .200589 03 | .203208 03 | .205827 03 | .208446 03 | .211065 03 | .213684 03 |
| 198.5 | .170572 03 | .173432 03 | .177933 03 | .182032 03 | .185349 03 | .187968 03 | .190587 03 | .193206 03 | .195825 03 | .198444 03 | .201063 03 | .203682 03 | .206301 03 | .208920 03 | .211539 03 | .214158 03 |
| 199.0 | .171035 03 | .173900 03 | .178407 03 | .182506 03 | .185823 03 | .188442 03 | .191061 03 | .193680 03 | .196299 03 | .198918 03 | .201537 03 | .204156 03 | .206775 03 | .209394 03 | .212013 03 | .214632 03 |
| 199.5 | .171499 03 | .174367 03 | .178881 03 | .182980 03 | .186307 03 | .188926 03 | .191545 03 | .194164 03 | .196783 03 | .199402 03 | .202021 03 | .204640 03 | .207259 03 | .209878 03 | .212497 03 | .215116 03 |
| 200.0 | .171963 03 | .174835 03 | .179355 03 | .183454 03 | .186771 03 | .189390 03 | .192009 03 | .194628 03 | .197247 03 | .199866 03 | .202485 03 | .205104 03 | .207723 03 | .210342 03 | .212961 03 | .215580 03 |
| 200.5 | .172427 03 | .175303 03 | .179829 03 | .183928 03 | .187245 03 | .189864 03 | .192483 03 | .195102 03 | .197721 03 | .200340 03 | .202959 03 | .205578 03 | .208197 03 | .210816 03 | .213435 03 | .216054 03 |
| 201.0 | .172891 03 | .175771 03 | .180303 03 | .184402 03 | .187719 03 | .190338 03 | .192957 03 | .195576 03 | .198195 03 | .200814 03 | .203433 03 | .206052 03 | .208671 03 | .211290 03 | .213909 03 | .216528 03 |
| 201.5 | .173355 03 | .176239 03 | .180777 03 | .184876 03 | .188193 03 | .190812 03 | .193431 03 | .196050 03 | .198669 03 | .201288 03 | .203907 03 | .206526 03 | .209145 03 | .211764 03 | .214383 03 | .217002 03 |
| 202.0 | .173820 03 | .176707 03 | .181251 03 | .185350 03 | .188667 03 | .191286 03 | .193905 03 | .196524 03 | .199143 03 | .201762 03 | .204381 03 | .207000 03 | .209619 03 | .212238 03 | .214857 03 | .217476 03 |
| 202.5 | .174284 03 | .177175 03 | .181726 03 | .185825 03 | .189142 03 | .191761 03 | .194380 03 | .197000 03 | .199619 03 | .202238 03 | .204857 03 | .207476 03 | .210095 03 | .212714 03 | .215333 03 | .217952 03 |
| 203.0 | .174748 03 | .177643 03 | .182200 03 | .186309 03 | .189626 03 | .192245 03 | .194864 03 | .197483 03 | .200102 03 | .202721 03 | .205340 03 | .207959 03 | .210578 03 | .213197 03 | .215816 03 | .218435 03 |
| 203.5 | .175212 03 | .178112 03 | .182674 03 | .186783 03 | .190100 03 | .192719 03 | .195338 03 | .197957 03 | .200576 03 | .203195 03 | .205814 03 | .208433 03 | .211052 03 | .213671 03 | .216290 03 | .218909 03 |
| 204.0 | .175676 03 | .178580 03 | .183148 03 | .187257 03 | .190574 03 | .193193 03 | .195812 03 | .198431 03 | .201050 03 | .203669 03 | .206288 03 | .208907 03 | .211526 03 | .214145 03 | .216764 03 | .219383 03 |
| 204.5 | .176141 03 | .179048 03 | .183623 03 | .187731 03 | .191048 03 | .193667 03 | .196286 03 | .198905 03 | .201524 03 | .204143 03 | .206762 03 | .209381 03 | .212000 03 | .214619 03 | .217238 03 | .219857 03 |
| 205.0 | .176605 03 | .179516 03 | .184097 03 | .188206 03 | .191523 03 | .194142 03 | .196761 03 | .199380 03 | .202000 03 | .204619 03 | .207238 03 | .209857 03 | .212476 03 | .215095 03 | .217714 03 | .220333 03 |
| 205.5 | .177070 03 | .179985 03 | .184571 03 | .188680 03 | .192007 03 | .194626 03 | .197245 03 | .199864 03 | .202483 03 | .205102 03 | .207721 03 | .210340 03 | .212959 03 | .215578 03 | .218197 03 | .220816 03 |
| 206.0 | .177534 03 | .180453 03 | .185046 03 | .189155 03 | .192472 03 | .195091 03 | .197710 03 | .200329 03 | .202948 03 | .205567 03 | .208186 03 | .210805 03 | .213424 03 | .216043 03 | .218662 03 | .221281 03 |
| 206.5 | .177999 03 | .180921 03 | .185520 03 | .189629 03 | .192946 03 | .195565 03 | .198184 03 | .200803 03 | .203422 03 | .206041 03 | .208660 03 | .211279 03 | .213898 03 | .216517 03 | .219136 03 | .221755 03 |
| 207.0 | .178463 03 | .181390 03 | .185995 03 | .190104 03 | .193421 03 | .196040 03 | .198659 03 | .201278 03 | .203897 03 | .206516 03 | .209135 03 | .211754 03 | .214373 03 | .216992 03 | .219611 03 | .222230 03 |
| 207.5 | .178928 03 | .181858 03 | .186469 03 | .190578 03 | .193895 03 | .196514 03 | .199133 03 | .201752 03 | .204371 03 | .206990 03 | .209609 03 | .212228 03 | .214847 03 | .217466 03 | .220085 03 | .222704 03 |
| 208.0 | .179392 03 | .182327 03 | .186944 03 | .191053 03 | .194370 03 | .196989 03 | .199608 03 | .202227 03 | .204846 03 | .207465 03 | .210084 03 | .212703 03 | .215322 03 | .217941 03 | .220560 03 | .223179 03 |
| 208.5 | .179857 03 | .182795 03 | .187418 03 | .191527 03 | .194844 03 | .197463 03 | .200082 03 | .202701 03 | .205320 03 | .207939 03 | .210558 03 | .213177 03 | .215796 03 | .218415 03 | .221034 03 | .223653 03 |
| 209.0 | .180322 03 | .183264 03 | .187883 03 | .191992 03 | .195309 03 | .197928 03 | .200547 03 | .203166 03 | .205785 03 | .208404 03 | .211023 03 | .213642 03 | .216261 03 | .218880 03 | .221499 03 | .224118 03 |
| 209.5 | .180787 03 | .183733 03 | .188368 03 | .192477 03 | .195794 03 | .198413 03 | .201032 03 | .203651 03 | .206270 03 | .208889 03 | .211508 03 | .214127 03 | .216746 03 | .219365 03 | .221984 03 | .224603 03 |
| 210.0 | .181251 03 | .184201 03 | .188842 03 | .192951 03 | .196268 03 | .198887 03 | .201506 03 | .204125 03 | .206744 03 | .209363 03 | .211982 03 | .214601 03 | .217220 03 | .219839 03 | .222458 03 | .225077 03 |
| 210.5 | .181716 03 | .184670 03 | .189317 03 | .193426 03 | .196743 03 | .199362 03 | .201981 03 | .204600 03 | .207219 03 | .209838 03 | .212457 03 | .215076 03 | .217695 03 | .220314 03 | .222933 03 | .225552 03 |
| 211.0 | .182181 03 | .185139 03 | .189792 03 | .193901 03 | .197218 03 | .199837 03 | .202456 03 | .205075 03 | .207694 03 | .210313 03 | .212932 03 | .215551 03 | .218170 03 | .220789 03 | .223408 03 | .226027 03 |
| 211.5 | .182646 03 | .185608 03 | .190266 03 | .194375 03 | .197692 03 | .200311 03 | .202930 03 | .205549 03 | .208168 03 | .210787 03 | .213406 03 | .216025 03 | .218644 03 | .221263 03 | .223882 03 | .226501 03 |
| 212.0 | .183111 03 | .186076 03 | .190731 03 | .194840 03 | .198157 03 | .200776 03 | .203395 03 | .206014 03 | .208633 03 | .211252 03 | .213871 03 | .216490 03 | .219109 03 | .221728 03 | .224347 03 | .226966 03 |

Percentage Points of the  $\chi^2$ -Distribution  
Values of  $\chi^2$  in Terms of  $P$  and  $\nu$

| $\nu \backslash P$ | .925000    | .900000    | .850000    | .800000    | .750000    | .700000    | .650000    | .600000    | .550000    | .500000    |
|--------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 212.5              | .13576 03  | .106545 03 | .191216 03 | .194904 03 | .190256 03 | .204225 03 | .204003 03 | .206663 03 | .209258 03 | .211834 03 |
| 213.0              | .184041 03 | .107814 03 | .191691 03 | .195463 03 | .190739 03 | .201712 03 | .204494 03 | .207157 03 | .209755 03 | .212334 03 |
| 213.5              | .184506 03 | .107483 03 | .192166 03 | .195943 03 | .191223 03 | .202200 03 | .204985 03 | .207651 03 | .210252 03 | .212834 03 |
| 214.0              | .184971 03 | .107152 03 | .192641 03 | .196423 03 | .191707 03 | .202687 03 | .205475 03 | .208145 03 | .210749 03 | .213334 03 |
| 214.5              | .185437 03 | .106821 03 | .193116 03 | .196902 03 | .200198 03 | .203174 03 | .205966 03 | .208639 03 | .211246 03 | .213834 03 |
| 215.0              | .185902 03 | .106490 03 | .193591 03 | .197382 03 | .200674 03 | .203662 03 | .206457 03 | .209132 03 | .211743 03 | .214334 03 |
| 215.5              | .186367 03 | .106159 03 | .194066 03 | .197862 03 | .201156 03 | .204149 03 | .206947 03 | .209626 03 | .212248 03 | .214834 03 |
| 216.0              | .186832 03 | .105828 03 | .194541 03 | .198341 03 | .201642 03 | .204636 03 | .207438 03 | .210120 03 | .212737 03 | .215334 03 |
| 216.5              | .187298 03 | .105497 03 | .195016 03 | .198821 03 | .202125 03 | .205614 03 | .207929 03 | .210614 03 | .213234 03 | .215834 03 |
| 217.0              | .187763 03 | .105166 03 | .195491 03 | .199301 03 | .202609 03 | .206091 03 | .208419 03 | .211108 03 | .213731 03 | .216334 03 |
| 217.5              | .188229 03 | .104835 03 | .195966 03 | .199781 03 | .203093 03 | .206575 03 | .208910 03 | .211602 03 | .214228 03 | .216834 03 |
| 218.0              | .188694 03 | .104504 03 | .196441 03 | .200260 03 | .203577 03 | .207059 03 | .209401 03 | .212096 03 | .214725 03 | .217334 03 |
| 218.5              | .189160 03 | .104173 03 | .196916 03 | .200740 03 | .204060 03 | .207542 03 | .209882 03 | .212580 03 | .215179 03 | .217784 03 |
| 219.0              | .189625 03 | .103842 03 | .197391 03 | .201220 03 | .204544 03 | .208026 03 | .210363 03 | .213064 03 | .215663 03 | .218264 03 |
| 219.5              | .190091 03 | .103511 03 | .197866 03 | .201700 03 | .205028 03 | .208510 03 | .210843 03 | .213548 03 | .216147 03 | .218748 03 |
| 220.0              | .190556 03 | .103180 03 | .198342 03 | .202180 03 | .205512 03 | .209003 03 | .211334 03 | .214042 03 | .216641 03 | .219242 03 |
| 220.5              | .191022 03 | .102849 03 | .198817 03 | .202660 03 | .205996 03 | .209493 03 | .211855 03 | .214565 03 | .217164 03 | .219765 03 |
| 221.0              | .191488 03 | .102518 03 | .199292 03 | .203140 03 | .206480 03 | .209981 03 | .212346 03 | .215059 03 | .217658 03 | .220259 03 |
| 221.5              | .191953 03 | .102187 03 | .199768 03 | .203620 03 | .206964 03 | .210466 03 | .212837 03 | .215553 03 | .218152 03 | .220760 03 |
| 222.0              | .192419 03 | .101856 03 | .200243 03 | .204100 03 | .207448 03 | .210951 03 | .213327 03 | .216047 03 | .218646 03 | .221247 03 |
| 222.5              | .192885 03 | .101525 03 | .200718 03 | .204580 03 | .207932 03 | .211073 03 | .213416 03 | .216141 03 | .218740 03 | .221328 03 |
| 223.0              | .193351 03 | .101194 03 | .201194 03 | .205060 03 | .208416 03 | .211461 03 | .213809 03 | .216541 03 | .219140 03 | .221809 03 |
| 223.5              | .193817 03 | .100863 03 | .201669 03 | .205540 03 | .208900 03 | .211946 03 | .214291 03 | .217029 03 | .219628 03 | .222290 03 |
| 224.0              | .194283 03 | .100532 03 | .202145 03 | .206020 03 | .209384 03 | .212436 03 | .214782 03 | .217529 03 | .220128 03 | .222771 03 |
| 224.5              | .194749 03 | .100201 03 | .202620 03 | .206500 03 | .209868 03 | .212924 03 | .215263 03 | .218015 03 | .220514 03 | .223092 03 |
| 225.0              | .195215 03 | .099870 03 | .203096 03 | .206980 03 | .210352 03 | .213411 03 | .215752 03 | .218505 03 | .221004 03 | .223573 03 |
| 225.5              | .195681 03 | .099539 03 | .203571 03 | .207460 03 | .210836 03 | .213899 03 | .216174 03 | .218929 03 | .221428 03 | .223994 03 |
| 226.0              | .196147 03 | .099208 03 | .204047 03 | .207940 03 | .211320 03 | .214386 03 | .216625 03 | .219381 03 | .221805 03 | .224415 03 |
| 226.5              | .196613 03 | .098877 03 | .204522 03 | .208421 03 | .211804 03 | .214874 03 | .217145 03 | .220093 03 | .222517 03 | .224938 03 |
| 227.0              | .197079 03 | .098546 03 | .204998 03 | .208901 03 | .212288 03 | .215362 03 | .217636 03 | .220587 03 | .223011 03 | .225432 03 |
| 227.5              | .197545 03 | .098215 03 | .205474 03 | .209381 03 | .212773 03 | .215849 03 | .218127 03 | .221032 03 | .223456 03 | .225877 03 |
| 228.0              | .198012 03 | .097884 03 | .205949 03 | .209861 03 | .213257 03 | .216337 03 | .218618 03 | .221523 03 | .223947 03 | .226392 03 |
| 228.5              | .198478 03 | .097553 03 | .206425 03 | .210341 03 | .213741 03 | .216825 03 | .219109 03 | .222028 03 | .224452 03 | .226877 03 |
| 229.0              | .198944 03 | .097222 03 | .206901 03 | .210822 03 | .214225 03 | .217313 03 | .220000 03 | .222905 03 | .225329 03 | .227754 03 |
| 229.5              | .199410 03 | .096891 03 | .207377 03 | .211302 03 | .214709 03 | .217800 03 | .220691 03 | .223606 03 | .226030 03 | .228455 03 |
| 230.0              | .199877 03 | .096560 03 | .207852 03 | .211782 03 | .215194 03 | .218288 03 | .221182 03 | .224107 03 | .226531 03 | .228956 03 |
| 230.5              | .200343 03 | .096229 03 | .208328 03 | .212263 03 | .215678 03 | .218776 03 | .221673 03 | .224608 03 | .227032 03 | .229457 03 |
| 231.0              | .200810 03 | .095898 03 | .208804 03 | .212743 03 | .216162 03 | .219264 03 | .222164 03 | .225109 03 | .227533 03 | .230058 03 |
| 231.5              | .201276 03 | .095567 03 | .209280 03 | .213224 03 | .216646 03 | .219751 03 | .222655 03 | .225600 03 | .228024 03 | .230549 03 |
| 232.0              | .201743 03 | .095236 03 | .209756 03 | .213704 03 | .217131 03 | .220239 03 | .223146 03 | .226091 03 | .228515 03 | .231040 03 |
| 232.5              | .202209 03 | .094905 03 | .210232 03 | .214184 03 | .217615 03 | .220727 03 | .223637 03 | .226582 03 | .229006 03 | .231531 03 |
| 233.0              | .202676 03 | .094574 03 | .210708 03 | .214665 03 | .218099 03 | .221215 03 | .224128 03 | .227073 03 | .229497 03 | .232028 03 |
| 233.5              | .203143 03 | .094243 03 | .211184 03 | .215145 03 | .218584 03 | .221703 03 | .224619 03 | .227574 03 | .230098 03 | .232624 03 |
| 234.0              | .203609 03 | .093912 03 | .211660 03 | .215626 03 | .219068 03 | .222191 03 | .225110 03 | .228065 03 | .230590 03 | .233126 03 |
| 234.5              | .204076 03 | .093581 03 | .212136 03 | .216106 03 | .219553 03 | .222678 03 | .225592 03 | .228547 03 | .231072 03 | .233608 03 |
| 235.0              | .204543 03 | .093250 03 | .212612 03 | .216587 03 | .220037 03 | .223166 03 | .226083 03 | .229038 03 | .231563 03 | .234109 03 |
| 235.5              | .205009 03 | .092919 03 | .213088 03 | .217068 03 | .220521 03 | .223654 03 | .226571 03 | .229526 03 | .232051 03 | .234607 03 |
| 236.0              | .205476 03 | .092588 03 | .213564 03 | .217548 03 | .221006 03 | .224142 03 | .227059 03 | .230014 03 | .232539 03 | .235095 03 |
| 236.5              | .205943 03 | .092257 03 | .214040 03 | .218029 03 | .221490 03 | .224630 03 | .227556 03 | .230511 03 | .233036 03 | .235602 03 |
| 237.0              | .206410 03 | .091926 03 | .214516 03 | .218509 03 | .221975 03 | .225118 03 | .228057 03 | .231012 03 | .233537 03 | .236103 03 |

| $r/p$ | .925000    | .900000    | .850000    | .800000    | .750000    | .700000    | .600000    | .550000    | .500000    |
|-------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 237.5 | .206877 03 | .210032 03 | .214992 03 | .216990 03 | .222459 03 | .225606 03 | .231364 03 | .234110 03 | .236034 03 |
| 238.0 | .207344 03 | .210503 03 | .215469 03 | .219471 03 | .222944 03 | .226094 03 | .231658 03 | .234607 03 | .237334 03 |
| 238.5 | .207811 03 | .210974 03 | .215785 03 | .219951 03 | .223328 03 | .226582 03 | .232152 03 | .235104 03 | .237834 03 |
| 239.0 | .208278 03 | .211444 03 | .216241 03 | .220432 03 | .223913 03 | .227070 03 | .232646 03 | .235601 03 | .238334 03 |
| 239.5 | .208745 03 | .211915 03 | .216697 03 | .220913 03 | .224397 03 | .227558 03 | .233134 03 | .236098 03 | .238834 03 |
| 240.0 | .209212 03 | .212386 03 | .217174 03 | .221394 03 | .224882 03 | .228043 03 | .233619 03 | .236583 03 | .239334 03 |
| 240.5 | .209679 03 | .212856 03 | .217650 03 | .221874 03 | .225367 03 | .228534 03 | .234109 03 | .237073 03 | .239834 03 |
| 241.0 | .210146 03 | .213327 03 | .218126 03 | .222355 03 | .225851 03 | .229022 03 | .234608 03 | .237572 03 | .240334 03 |
| 241.5 | .210613 03 | .213798 03 | .218593 03 | .222836 03 | .226336 03 | .229510 03 | .235106 03 | .238070 03 | .240834 03 |
| 242.0 | .211081 03 | .214269 03 | .219079 03 | .223317 03 | .226820 03 | .229998 03 | .235594 03 | .238558 03 | .241334 03 |
| 242.5 | .211548 03 | .214740 03 | .219555 03 | .223798 03 | .227305 03 | .230486 03 | .236082 03 | .239046 03 | .241834 03 |
| 243.0 | .212015 03 | .215210 03 | .220032 03 | .224279 03 | .227790 03 | .230974 03 | .236570 03 | .239534 03 | .242334 03 |
| 243.5 | .212483 03 | .215681 03 | .220508 03 | .224759 03 | .228274 03 | .231462 03 | .237058 03 | .240022 03 | .242834 03 |
| 244.0 | .212950 03 | .216152 03 | .221085 03 | .225240 03 | .228759 03 | .231950 03 | .237546 03 | .240510 03 | .243334 03 |
| 244.5 | .213417 03 | .216623 03 | .221561 03 | .225721 03 | .229244 03 | .232438 03 | .238034 03 | .241000 03 | .243834 03 |
| 245.0 | .213885 03 | .217094 03 | .222038 03 | .226202 03 | .229729 03 | .232927 03 | .238523 03 | .241489 03 | .244334 03 |
| 245.5 | .214352 03 | .217565 03 | .222615 03 | .226783 03 | .230313 03 | .233515 03 | .239111 03 | .242075 03 | .244834 03 |
| 246.0 | .214820 03 | .218036 03 | .223091 03 | .227264 03 | .230798 03 | .233990 03 | .239586 03 | .242550 03 | .245334 03 |
| 246.5 | .215287 03 | .218507 03 | .223568 03 | .227745 03 | .231283 03 | .234475 03 | .240071 03 | .243045 03 | .245834 03 |
| 247.0 | .215755 03 | .218979 03 | .224044 03 | .228226 03 | .231768 03 | .234962 03 | .240558 03 | .243532 03 | .246334 03 |
| 247.5 | .216222 03 | .219450 03 | .224521 03 | .228707 03 | .232252 03 | .235446 03 | .241042 03 | .244020 03 | .246834 03 |
| 248.0 | .216690 03 | .219921 03 | .224998 03 | .229188 03 | .232737 03 | .235932 03 | .241538 03 | .244516 03 | .247334 03 |
| 248.5 | .217158 03 | .220392 03 | .225474 03 | .229669 03 | .233222 03 | .236416 03 | .241934 03 | .244912 03 | .247834 03 |
| 249.0 | .217625 03 | .220863 03 | .225951 03 | .230151 03 | .233707 03 | .236902 03 | .242430 03 | .245408 03 | .248334 03 |
| 249.5 | .218093 03 | .221335 03 | .226428 03 | .230632 03 | .234192 03 | .237387 03 | .242926 03 | .245904 03 | .248834 03 |
| 250.0 | .218561 03 | .221806 03 | .226905 03 | .231113 03 | .234677 03 | .237872 03 | .243422 03 | .246400 03 | .249334 03 |
| 250.5 | .219029 03 | .222277 03 | .227382 03 | .231624 03 | .235192 03 | .238387 03 | .243918 03 | .246896 03 | .249834 03 |
| 251.0 | .219497 03 | .222749 03 | .227858 03 | .232135 03 | .235707 03 | .238902 03 | .244414 03 | .247392 03 | .250334 03 |
| 251.5 | .219964 03 | .223220 03 | .228335 03 | .232646 03 | .236222 03 | .239417 03 | .244913 03 | .247891 03 | .250834 03 |
| 252.0 | .220432 03 | .223691 03 | .228812 03 | .233158 03 | .236739 03 | .239934 03 | .245430 03 | .248408 03 | .251334 03 |
| 252.5 | .220900 03 | .224163 03 | .229289 03 | .233619 03 | .237201 03 | .240396 03 | .245900 03 | .248878 03 | .251834 03 |
| 253.0 | .221368 03 | .224634 03 | .229766 03 | .234080 03 | .237663 03 | .240858 03 | .246362 03 | .249340 03 | .252334 03 |
| 253.5 | .221836 03 | .225106 03 | .230243 03 | .234581 03 | .238165 03 | .241360 03 | .246864 03 | .249842 03 | .252834 03 |
| 254.0 | .222304 03 | .225577 03 | .230720 03 | .235063 03 | .238647 03 | .241842 03 | .247346 03 | .250324 03 | .253334 03 |
| 254.5 | .222772 03 | .226049 03 | .231197 03 | .235544 03 | .239128 03 | .242323 03 | .247827 03 | .250805 03 | .253834 03 |
| 255.0 | .223240 03 | .226520 03 | .231674 03 | .236025 03 | .239609 03 | .242804 03 | .248308 03 | .251286 03 | .254334 03 |
| 255.5 | .223708 03 | .226992 03 | .232151 03 | .236507 03 | .240091 03 | .243286 03 | .248790 03 | .251768 03 | .254834 03 |
| 256.0 | .224177 03 | .227464 03 | .232628 03 | .236988 03 | .240572 03 | .243767 03 | .249271 03 | .252249 03 | .255334 03 |
| 256.5 | .224645 03 | .227935 03 | .233105 03 | .237469 03 | .241053 03 | .244248 03 | .249752 03 | .252730 03 | .255834 03 |
| 257.0 | .225113 03 | .228407 03 | .233582 03 | .237951 03 | .241535 03 | .244730 03 | .250234 03 | .253212 03 | .256334 03 |
| 257.5 | .225581 03 | .228879 03 | .234059 03 | .238432 03 | .242016 03 | .245211 03 | .250715 03 | .253693 03 | .256834 03 |
| 258.0 | .226049 03 | .229351 03 | .234536 03 | .238914 03 | .242498 03 | .245693 03 | .251197 03 | .254175 03 | .257334 03 |
| 258.5 | .226518 03 | .229822 03 | .235014 03 | .239395 03 | .242979 03 | .246174 03 | .251678 03 | .254656 03 | .257834 03 |
| 259.0 | .226986 03 | .230294 03 | .235491 03 | .239877 03 | .243463 03 | .246658 03 | .252162 03 | .255140 03 | .258334 03 |
| 259.5 | .227454 03 | .230766 03 | .235968 03 | .240360 03 | .243954 03 | .247149 03 | .252646 03 | .255624 03 | .258834 03 |
| 260.0 | .227923 03 | .231238 03 | .236445 03 | .240864 03 | .244458 03 | .247653 03 | .253140 03 | .256118 03 | .259334 03 |
| 260.5 | .228391 03 | .231710 03 | .236922 03 | .241375 03 | .244969 03 | .248164 03 | .253662 03 | .256640 03 | .259834 03 |
| 261.0 | .228860 03 | .232182 03 | .237400 03 | .241890 03 | .245484 03 | .248679 03 | .254182 03 | .257160 03 | .260334 03 |
| 261.5 | .229328 03 | .232653 03 | .237877 03 | .242415 03 | .246009 03 | .249204 03 | .254704 03 | .257682 03 | .260834 03 |
| 262.0 | .229797 03 | .233125 03 | .238354 03 | .242940 03 | .246534 03 | .249729 03 | .255224 03 | .258202 03 | .261334 03 |

Percentage Points of the  $\chi^2$ -Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu \backslash Q$ | .925000    | .900000    | .850000    | .800000    | .750000    | .700000    | .650000    | .600000    | .550000    | .500000    | .500000    |
|--------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 262.5              | .230265 03 | .233597 03 | .238832 03 | .243047 03 | .246704 03 | .250019 03 | .253117 03 | .256080 03 | .258969 03 | .261834 03 | .264634 03 |
| 263.0              | .230734 03 | .234069 03 | .239309 03 | .243529 03 | .247169 03 | .250507 03 | .253600 03 | .256574 03 | .259466 03 | .262334 03 | .265134 03 |
| 263.5              | .231202 03 | .234542 03 | .239786 03 | .244011 03 | .247674 03 | .251096 03 | .254180 03 | .257069 03 | .259964 03 | .262834 03 | .265634 03 |
| 264.0              | .231671 03 | .235014 03 | .240264 03 | .244492 03 | .248168 03 | .251591 03 | .254680 03 | .257563 03 | .260461 03 | .263334 03 | .266134 03 |
| 264.5              | .232140 03 | .235486 03 | .240741 03 | .244974 03 | .248645 03 | .251973 03 | .255063 03 | .257950 03 | .260858 03 | .263734 03 | .266534 03 |
| 265.0              | .232608 03 | .235958 03 | .241219 03 | .245456 03 | .249130 03 | .252461 03 | .255557 03 | .258447 03 | .261365 03 | .264234 03 | .267034 03 |
| 265.5              | .233077 03 | .236430 03 | .241696 03 | .245937 03 | .249616 03 | .252950 03 | .256046 03 | .258937 03 | .261865 03 | .264734 03 | .267534 03 |
| 266.0              | .233546 03 | .236902 03 | .242174 03 | .246419 03 | .250101 03 | .253439 03 | .256536 03 | .259427 03 | .262365 03 | .265234 03 | .268034 03 |
| 266.5              | .234015 03 | .237374 03 | .242651 03 | .246901 03 | .250586 03 | .253927 03 | .257024 03 | .260016 03 | .262947 03 | .265834 03 | .268634 03 |
| 267.0              | .234483 03 | .237847 03 | .243129 03 | .247383 03 | .251072 03 | .254416 03 | .257514 03 | .260506 03 | .263445 03 | .266334 03 | .269134 03 |
| 267.5              | .234952 03 | .238319 03 | .243506 03 | .247764 03 | .251457 03 | .254804 03 | .257903 03 | .260895 03 | .263834 03 | .266734 03 | .269534 03 |
| 268.0              | .235421 03 | .238791 03 | .244004 03 | .248266 03 | .251962 03 | .255313 03 | .258412 03 | .261404 03 | .264343 03 | .267234 03 | .270034 03 |
| 268.5              | .235890 03 | .239263 03 | .244561 03 | .248828 03 | .252528 03 | .255882 03 | .258980 03 | .261972 03 | .264911 03 | .267803 03 | .270603 03 |
| 269.0              | .236359 03 | .239736 03 | .245039 03 | .249310 03 | .253013 03 | .256370 03 | .259468 03 | .262460 03 | .265400 03 | .268293 03 | .271093 03 |
| 269.5              | .236828 03 | .240208 03 | .245517 03 | .249792 03 | .253499 03 | .256859 03 | .259957 03 | .262950 03 | .265890 03 | .268783 03 | .271583 03 |
| 270.0              | .237297 03 | .240680 03 | .245994 03 | .250274 03 | .253984 03 | .257348 03 | .260446 03 | .263440 03 | .266380 03 | .269273 03 | .272073 03 |
| 270.5              | .237766 03 | .241153 03 | .246472 03 | .250755 03 | .254470 03 | .257837 03 | .260935 03 | .263928 03 | .266870 03 | .269763 03 | .272563 03 |
| 271.0              | .238235 03 | .241625 03 | .246950 03 | .251237 03 | .254955 03 | .258325 03 | .261423 03 | .264416 03 | .267358 03 | .270251 03 | .273051 03 |
| 271.5              | .238704 03 | .242098 03 | .247427 03 | .251719 03 | .255441 03 | .258814 03 | .261912 03 | .264905 03 | .267847 03 | .270740 03 | .273540 03 |
| 272.0              | .239173 03 | .242570 03 | .247905 03 | .252201 03 | .255926 03 | .259303 03 | .262401 03 | .265394 03 | .268336 03 | .271229 03 | .274029 03 |
| 272.5              | .239642 03 | .243043 03 | .248383 03 | .252683 03 | .256412 03 | .259791 03 | .262890 03 | .265883 03 | .268825 03 | .271718 03 | .274518 03 |
| 273.0              | .240111 03 | .243515 03 | .248861 03 | .253165 03 | .256897 03 | .260280 03 | .263379 03 | .266372 03 | .269314 03 | .272207 03 | .275007 03 |
| 273.5              | .240580 03 | .243988 03 | .249339 03 | .253647 03 | .257383 03 | .260769 03 | .263868 03 | .266861 03 | .269803 03 | .272696 03 | .275496 03 |
| 274.0              | .241050 03 | .244466 03 | .249818 03 | .254129 03 | .257868 03 | .261258 03 | .264357 03 | .267350 03 | .270292 03 | .273185 03 | .275985 03 |
| 274.5              | .241519 03 | .244933 03 | .250294 03 | .254611 03 | .258354 03 | .261747 03 | .264846 03 | .267839 03 | .270781 03 | .273674 03 | .276474 03 |
| 275.0              | .241988 03 | .245406 03 | .250772 03 | .255093 03 | .258840 03 | .262235 03 | .265334 03 | .268327 03 | .271270 03 | .274163 03 | .276963 03 |
| 275.5              | .242457 03 | .245878 03 | .251250 03 | .255575 03 | .259325 03 | .262724 03 | .265823 03 | .268816 03 | .271759 03 | .274652 03 | .277452 03 |
| 276.0              | .242926 03 | .246351 03 | .251728 03 | .256057 03 | .259811 03 | .263213 03 | .266312 03 | .269305 03 | .272248 03 | .275141 03 | .277941 03 |
| 276.5              | .243396 03 | .246824 03 | .252206 03 | .256539 03 | .260296 03 | .263702 03 | .266801 03 | .269794 03 | .272737 03 | .275630 03 | .278430 03 |
| 277.0              | .243866 03 | .247296 03 | .252684 03 | .257021 03 | .260782 03 | .264191 03 | .267290 03 | .270283 03 | .273226 03 | .276119 03 | .278919 03 |
| 277.5              | .244335 03 | .247769 03 | .253162 03 | .257503 03 | .261268 03 | .264679 03 | .267778 03 | .270771 03 | .273714 03 | .276607 03 | .279407 03 |
| 278.0              | .244804 03 | .248242 03 | .253640 03 | .257986 03 | .261753 03 | .265168 03 | .268267 03 | .271260 03 | .274203 03 | .277096 03 | .279896 03 |
| 278.5              | .245274 03 | .248715 03 | .254118 03 | .258468 03 | .262239 03 | .265657 03 | .268756 03 | .271749 03 | .274692 03 | .277585 03 | .280385 03 |
| 279.0              | .245743 03 | .249188 03 | .254596 03 | .258950 03 | .262725 03 | .266146 03 | .269245 03 | .272238 03 | .275181 03 | .278074 03 | .280874 03 |
| 279.5              | .246213 03 | .249660 03 | .255074 03 | .259432 03 | .263211 03 | .266635 03 | .269734 03 | .272727 03 | .275670 03 | .278563 03 | .281363 03 |
| 280.0              | .246682 03 | .250133 03 | .255552 03 | .259914 03 | .263696 03 | .267124 03 | .270223 03 | .273216 03 | .276159 03 | .279052 03 | .281852 03 |
| 280.5              | .247152 03 | .250606 03 | .256030 03 | .260396 03 | .264182 03 | .267613 03 | .270712 03 | .273705 03 | .276648 03 | .279541 03 | .282341 03 |
| 281.0              | .247622 03 | .251079 03 | .256508 03 | .260879 03 | .264668 03 | .268102 03 | .271201 03 | .274194 03 | .277137 03 | .280030 03 | .282830 03 |
| 281.5              | .248091 03 | .251552 03 | .256986 03 | .261361 03 | .265153 03 | .268591 03 | .271690 03 | .274683 03 | .277626 03 | .280519 03 | .283319 03 |
| 282.0              | .248561 03 | .252025 03 | .257464 03 | .261843 03 | .265639 03 | .269080 03 | .272179 03 | .275172 03 | .278115 03 | .281008 03 | .283808 03 |
| 282.5              | .249031 03 | .252498 03 | .257943 03 | .262325 03 | .266125 03 | .269569 03 | .272668 03 | .275661 03 | .278604 03 | .281497 03 | .284297 03 |
| 283.0              | .249500 03 | .252971 03 | .258421 03 | .262808 03 | .266611 03 | .270057 03 | .273156 03 | .276149 03 | .279092 03 | .281985 03 | .284785 03 |
| 283.5              | .249970 03 | .253444 03 | .258899 03 | .263290 03 | .267097 03 | .270546 03 | .273645 03 | .276638 03 | .279581 03 | .282474 03 | .285274 03 |
| 284.0              | .250440 03 | .253917 03 | .259377 03 | .263772 03 | .267582 03 | .271035 03 | .274134 03 | .277127 03 | .280070 03 | .282963 03 | .285763 03 |
| 284.5              | .250909 03 | .254390 03 | .259855 03 | .264255 03 | .268068 03 | .271524 03 | .274623 03 | .277616 03 | .280559 03 | .283452 03 | .286252 03 |
| 285.0              | .251379 03 | .254864 03 | .260334 03 | .264737 03 | .268554 03 | .272010 03 | .275109 03 | .278102 03 | .281045 03 | .283938 03 | .286738 03 |
| 285.5              | .251849 03 | .255337 03 | .260812 03 | .265219 03 | .269040 03 | .272502 03 | .275601 03 | .278594 03 | .281537 03 | .284430 03 | .287230 03 |
| 286.0              | .252319 03 | .255810 03 | .261290 03 | .265702 03 | .269526 03 | .273091 03 | .276190 03 | .279183 03 | .282126 03 | .285019 03 | .287819 03 |
| 286.5              | .252789 03 | .256283 03 | .261769 03 | .266184 03 | .270012 03 | .273480 03 | .276579 03 | .279572 03 | .282515 03 | .285408 03 | .288208 03 |
| 287.0              | .253259 03 | .256756 03 | .262247 03 | .266666 03 | .270498 03 | .273970 03 | .277069 03 | .280062 03 | .282955 03 | .285848 03 | .288648 03 |

Percentage Points of the  $\chi^2$ -Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu$ | .92500     | .90000     | .85000     | .80000     | .75000     | .70000     | .65000     | .60000     | .55000     | .50000     |
|-------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 287.5 | .253729 03 | .257229 03 | .262725 03 | .267149 03 | .270944 03 | .274459 03 | .277705 03 | .280809 03 | .283335 03 | .286834 03 |
| 288.0 | .254199 03 | .257703 03 | .263204 03 | .267631 03 | .271470 03 | .274998 03 | .278197 03 | .281304 03 | .283832 03 | .286834 03 |
| 288.5 | .254669 03 | .258176 03 | .263682 03 | .268114 03 | .271955 03 | .275483 03 | .278689 03 | .281799 03 | .284327 03 | .287334 03 |
| 289.0 | .255139 03 | .258649 03 | .264160 03 | .268596 03 | .272441 03 | .275969 03 | .279181 03 | .282294 03 | .284827 03 | .287834 03 |
| 289.5 | .255609 03 | .259123 03 | .264639 03 | .269079 03 | .272927 03 | .276455 03 | .279673 03 | .282788 03 | .285324 03 | .288334 03 |
| 290.0 | .256079 03 | .259596 03 | .265117 03 | .269556 03 | .273413 03 | .276941 03 | .280165 03 | .283283 03 | .285824 03 | .288834 03 |
| 290.5 | .256549 03 | .260069 03 | .265596 03 | .270034 03 | .273899 03 | .277427 03 | .280657 03 | .283778 03 | .286322 03 | .289334 03 |
| 291.0 | .257019 03 | .260543 03 | .266074 03 | .270526 03 | .274385 03 | .277912 03 | .281149 03 | .284273 03 | .286817 03 | .289834 03 |
| 291.5 | .257489 03 | .261016 03 | .266553 03 | .271009 03 | .274871 03 | .278398 03 | .281641 03 | .284767 03 | .287314 03 | .290334 03 |
| 292.0 | .257959 03 | .261490 03 | .267031 03 | .271491 03 | .275357 03 | .278886 03 | .282133 03 | .285262 03 | .287811 03 | .291334 03 |
| 292.5 | .258430 03 | .261963 03 | .267510 03 | .271974 03 | .275843 03 | .279350 03 | .282625 03 | .285757 03 | .288309 03 | .291834 03 |
| 293.0 | .258900 03 | .262437 03 | .267988 03 | .272457 03 | .276329 03 | .279839 03 | .283117 03 | .286252 03 | .288806 03 | .292334 03 |
| 293.5 | .259370 03 | .262910 03 | .268467 03 | .272939 03 | .276815 03 | .280328 03 | .283609 03 | .286746 03 | .289304 03 | .292834 03 |
| 294.0 | .259840 03 | .263384 03 | .268948 03 | .273422 03 | .277302 03 | .280817 03 | .284101 03 | .287241 03 | .289801 03 | .293334 03 |
| 294.5 | .260311 03 | .263857 03 | .269424 03 | .273904 03 | .277788 03 | .281306 03 | .284593 03 | .287736 03 | .290298 03 | .293834 03 |
| 295.0 | .260781 03 | .264331 03 | .269903 03 | .274387 03 | .278274 03 | .281795 03 | .285085 03 | .288231 03 | .290796 03 | .294334 03 |
| 295.5 | .261251 03 | .264804 03 | .270381 03 | .274870 03 | .278760 03 | .282285 03 | .285577 03 | .288725 03 | .291293 03 | .294834 03 |
| 296.0 | .261722 03 | .265278 03 | .270860 03 | .275352 03 | .279246 03 | .282774 03 | .286069 03 | .289220 03 | .291793 03 | .295334 03 |
| 296.5 | .262192 03 | .265752 03 | .271339 03 | .275835 03 | .279732 03 | .283263 03 | .286561 03 | .289715 03 | .292288 03 | .295834 03 |
| 297.0 | .262663 03 | .266225 03 | .271817 03 | .276318 03 | .280218 03 | .283752 03 | .287054 03 | .290210 03 | .292785 03 | .296334 03 |
| 297.5 | .263133 03 | .266699 03 | .272296 03 | .276800 03 | .280704 03 | .284241 03 | .287546 03 | .290705 03 | .293283 03 | .296834 03 |
| 298.0 | .263603 03 | .267173 03 | .272775 03 | .277283 03 | .281191 03 | .284731 03 | .288036 03 | .291199 03 | .293780 03 | .297334 03 |
| 298.5 | .264074 03 | .267647 03 | .273254 03 | .277766 03 | .281677 03 | .285220 03 | .288530 03 | .291694 03 | .294278 03 | .297834 03 |
| 299.0 | .264545 03 | .268120 03 | .273732 03 | .278249 03 | .282163 03 | .285709 03 | .289022 03 | .292189 03 | .294775 03 | .298334 03 |
| 299.5 | .265015 03 | .268594 03 | .274211 03 | .278732 03 | .282649 03 | .286198 03 | .289514 03 | .292684 03 | .295273 03 | .298834 03 |
| 300.0 | .265486 03 | .269068 03 | .274690 03 | .279214 03 | .283135 03 | .286688 03 | .290006 03 | .293179 03 | .295773 03 | .299334 03 |
| 300.5 | .265956 03 | .269542 03 | .275169 03 | .279697 03 | .283622 03 | .287177 03 | .290496 03 | .293673 03 | .296276 03 | .299834 03 |
| 301.0 | .266427 03 | .270016 03 | .275648 03 | .280180 03 | .284108 03 | .287666 03 | .290990 03 | .294168 03 | .296765 03 | .300334 03 |
| 301.5 | .266898 03 | .270489 03 | .276127 03 | .280663 03 | .284594 03 | .288156 03 | .291483 03 | .294663 03 | .297262 03 | .300834 03 |
| 302.0 | .267368 03 | .270963 03 | .276606 03 | .281146 03 | .285080 03 | .288645 03 | .291975 03 | .295158 03 | .298260 03 | .301834 03 |
| 302.5 | .267839 03 | .271437 03 | .277084 03 | .281628 03 | .285567 03 | .289134 03 | .292467 03 | .295653 03 | .298757 03 | .302334 03 |
| 303.0 | .268310 03 | .271911 03 | .277563 03 | .282111 03 | .286053 03 | .289624 03 | .292959 03 | .296148 03 | .299255 03 | .302834 03 |
| 303.5 | .268780 03 | .272385 03 | .278042 03 | .282594 03 | .286539 03 | .290113 03 | .293451 03 | .296642 03 | .299752 03 | .303334 03 |
| 304.0 | .269251 03 | .272859 03 | .278521 03 | .283077 03 | .287025 03 | .290602 03 | .293943 03 | .297137 03 | .300250 03 | .303834 03 |
| 304.5 | .269722 03 | .273333 03 | .279000 03 | .283560 03 | .287512 03 | .291092 03 | .294436 03 | .297632 03 | .300747 03 | .304334 03 |
| 305.0 | .270193 03 | .273807 03 | .279479 03 | .284043 03 | .287998 03 | .291591 03 | .294928 03 | .298127 03 | .301244 03 | .304834 03 |
| 305.5 | .270664 03 | .274281 03 | .279958 03 | .284526 03 | .288484 03 | .292070 03 | .295420 03 | .298622 03 | .301742 03 | .305334 03 |
| 306.0 | .271134 03 | .274755 03 | .280437 03 | .285009 03 | .288971 03 | .292560 03 | .295912 03 | .299117 03 | .302239 03 | .305834 03 |
| 306.5 | .271605 03 | .275229 03 | .280916 03 | .285492 03 | .289457 03 | .293049 03 | .296404 03 | .299612 03 | .302737 03 | .306334 03 |
| 307.0 | .272076 03 | .275703 03 | .281395 03 | .285975 03 | .289943 03 | .293539 03 | .296897 03 | .300107 03 | .303234 03 | .306834 03 |
| 307.5 | .272547 03 | .276178 03 | .281874 03 | .286456 03 | .290430 03 | .294028 03 | .297389 03 | .300601 03 | .303732 03 | .307334 03 |
| 308.0 | .273018 03 | .276652 03 | .282353 03 | .286941 03 | .290916 03 | .294517 03 | .297881 03 | .301096 03 | .304229 03 | .307834 03 |
| 308.5 | .273489 03 | .277126 03 | .282833 03 | .287424 03 | .291403 03 | .295007 03 | .298373 03 | .301591 03 | .304727 03 | .308334 03 |
| 309.0 | .273960 03 | .277600 03 | .283312 03 | .287907 03 | .291889 03 | .295496 03 | .298865 03 | .302086 03 | .305224 03 | .308834 03 |
| 309.5 | .274431 03 | .278074 03 | .283791 03 | .288390 03 | .292375 03 | .295986 03 | .299358 03 | .302581 03 | .305722 03 | .309334 03 |
| 310.0 | .274902 03 | .278548 03 | .284270 03 | .288873 03 | .292862 03 | .296475 03 | .299850 03 | .303076 03 | .306219 03 | .309834 03 |
| 310.5 | .275373 03 | .279023 03 | .284749 03 | .289356 03 | .293348 03 | .296965 03 | .300342 03 | .303571 03 | .306717 03 | .310334 03 |
| 311.0 | .275844 03 | .279497 03 | .285228 03 | .289839 03 | .293835 03 | .297454 03 | .300834 03 | .304066 03 | .307214 03 | .310834 03 |
| 311.5 | .276316 03 | .279971 03 | .285708 03 | .290322 03 | .294321 03 | .297944 03 | .301327 03 | .304561 03 | .307712 03 | .311334 03 |
| 312.0 | .276787 03 | .280446 03 | .286187 03 | .290806 03 | .294808 03 | .298433 03 | .301819 03 | .305056 03 | .308209 03 | .311834 03 |

Percentage Points of the  $\chi^2$ -Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu \backslash Q$ | .925000    | .900000    | .850000    | .810000    | .750000    | .700000    | .650000    | .600000    | .550000    | .500000    |
|--------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 312.5              | .272258 03 | .283920 03 | .286666 03 | .291269 03 | .295294 03 | .298923 03 | .302311 03 | .305551 03 | .308706 03 | .311834 03 |
| 313.0              | .277720 03 | .283394 03 | .287145 03 | .291772 03 | .295761 03 | .299412 03 | .302804 03 | .306045 03 | .309204 03 | .312334 03 |
| 313.5              | .278200 03 | .283669 03 | .287625 03 | .292255 03 | .296267 03 | .299902 03 | .303296 03 | .306540 03 | .309701 03 | .312834 03 |
| 314.0              | .278672 03 | .283933 03 | .288104 03 | .292738 03 | .296754 03 | .300391 03 | .303788 03 | .307030 03 | .310199 03 | .313334 03 |
| 314.5              | .279143 03 | .284217 03 | .288583 03 | .293321 03 | .297240 03 | .300881 03 | .304280 03 | .307530 03 | .310696 03 | .313834 03 |
| 315.0              | .279614 03 | .284592 03 | .289062 03 | .293905 03 | .297823 03 | .301470 03 | .304873 03 | .308120 03 | .311294 03 | .314434 03 |
| 315.5              | .280085 03 | .284966 03 | .289542 03 | .294488 03 | .298413 03 | .302068 03 | .305473 03 | .308720 03 | .311901 03 | .315034 03 |
| 316.0              | .280556 03 | .285339 03 | .290021 03 | .294971 03 | .298896 03 | .302551 03 | .305956 03 | .309203 03 | .312384 03 | .315534 03 |
| 316.5              | .281026 03 | .285715 03 | .290401 03 | .295354 03 | .299279 03 | .302934 03 | .306339 03 | .309586 03 | .312767 03 | .315934 03 |
| 317.0              | .281499 03 | .286190 03 | .290980 03 | .295936 03 | .299861 03 | .303516 03 | .306921 03 | .310168 03 | .313349 03 | .316534 03 |
| 317.5              | .281971 03 | .286664 03 | .291459 03 | .296412 03 | .300337 03 | .303992 03 | .307397 03 | .310644 03 | .313825 03 | .317034 03 |
| 318.0              | .282442 03 | .287139 03 | .291939 03 | .296894 03 | .300819 03 | .304474 03 | .307879 03 | .311126 03 | .314307 03 | .317534 03 |
| 318.5              | .282914 03 | .287614 03 | .292418 03 | .297373 03 | .301298 03 | .304953 03 | .308358 03 | .311605 03 | .314786 03 | .318034 03 |
| 319.0              | .283385 03 | .288088 03 | .292898 03 | .297853 03 | .301778 03 | .305433 03 | .308838 03 | .312085 03 | .315266 03 | .318534 03 |
| 319.5              | .283857 03 | .288563 03 | .293377 03 | .298332 03 | .302257 03 | .305912 03 | .309317 03 | .312564 03 | .315745 03 | .319034 03 |
| 320.0              | .284328 03 | .289037 03 | .293857 03 | .298812 03 | .302737 03 | .306392 03 | .309797 03 | .313044 03 | .316225 03 | .319534 03 |
| 320.5              | .284800 03 | .289512 03 | .294336 03 | .299291 03 | .303216 03 | .306871 03 | .310276 03 | .313523 03 | .316704 03 | .319934 03 |
| 321.0              | .285271 03 | .290087 03 | .294916 03 | .299871 03 | .303796 03 | .307451 03 | .310856 03 | .314103 03 | .317284 03 | .320534 03 |
| 321.5              | .285743 03 | .290561 03 | .295395 03 | .300350 03 | .304275 03 | .307930 03 | .311335 03 | .314582 03 | .317763 03 | .321034 03 |
| 322.0              | .286214 03 | .291036 03 | .295875 03 | .300830 03 | .304755 03 | .308410 03 | .311815 03 | .315062 03 | .318243 03 | .321534 03 |
| 322.5              | .286686 03 | .291511 03 | .296354 03 | .301309 03 | .305234 03 | .308889 03 | .312294 03 | .315541 03 | .318722 03 | .322034 03 |
| 323.0              | .287159 03 | .292086 03 | .296933 03 | .301938 03 | .305863 03 | .309518 03 | .312923 03 | .316170 03 | .319351 03 | .322634 03 |
| 323.5              | .287629 03 | .292560 03 | .297418 03 | .302433 03 | .306358 03 | .310013 03 | .313418 03 | .316665 03 | .319846 03 | .323134 03 |
| 324.0              | .288101 03 | .293033 03 | .297893 03 | .302908 03 | .306833 03 | .310488 03 | .313893 03 | .317140 03 | .320321 03 | .323634 03 |
| 324.5              | .288573 03 | .293510 03 | .298373 03 | .303388 03 | .307313 03 | .310968 03 | .314373 03 | .317620 03 | .320801 03 | .324134 03 |
| 325.0              | .289045 03 | .293985 03 | .298852 03 | .303872 03 | .307807 03 | .311462 03 | .314867 03 | .318114 03 | .321295 03 | .324634 03 |
| 325.5              | .289516 03 | .294459 03 | .299329 03 | .304353 03 | .308288 03 | .311943 03 | .315348 03 | .318595 03 | .321776 03 | .325134 03 |
| 326.0              | .289988 03 | .294933 03 | .299807 03 | .304831 03 | .308766 03 | .312421 03 | .315826 03 | .319073 03 | .322254 03 | .325634 03 |
| 326.5              | .290460 03 | .295409 03 | .300283 03 | .305307 03 | .309242 03 | .312897 03 | .316302 03 | .319549 03 | .322730 03 | .326134 03 |
| 327.0              | .290932 03 | .295884 03 | .300757 03 | .305781 03 | .309716 03 | .313371 03 | .316776 03 | .319923 03 | .323104 03 | .326534 03 |
| 327.5              | .291404 03 | .296361 03 | .301234 03 | .306258 03 | .310193 03 | .313848 03 | .317253 03 | .320400 03 | .323581 03 | .327034 03 |
| 328.0              | .291875 03 | .296834 03 | .301707 03 | .306731 03 | .310666 03 | .314321 03 | .317726 03 | .320873 03 | .324054 03 | .327434 03 |
| 328.5              | .292347 03 | .297309 03 | .302182 03 | .307206 03 | .311141 03 | .314796 03 | .318201 03 | .321348 03 | .324529 03 | .327934 03 |
| 329.0              | .292819 03 | .297784 03 | .302657 03 | .307681 03 | .311616 03 | .315271 03 | .318676 03 | .321823 03 | .325004 03 | .328434 03 |
| 329.5              | .293291 03 | .298259 03 | .303132 03 | .308156 03 | .312091 03 | .315746 03 | .319151 03 | .322308 03 | .325489 03 | .328934 03 |
| 330.0              | .293763 03 | .298733 03 | .303606 03 | .308630 03 | .312565 03 | .316220 03 | .319625 03 | .322772 03 | .325953 03 | .329434 03 |
| 330.5              | .294235 03 | .299207 03 | .304080 03 | .309104 03 | .313039 03 | .316694 03 | .320109 03 | .323256 03 | .326437 03 | .330034 03 |
| 331.0              | .294707 03 | .299681 03 | .304554 03 | .309578 03 | .313513 03 | .317168 03 | .320573 03 | .323720 03 | .326901 03 | .330534 03 |
| 331.5              | .295179 03 | .299959 03 | .304832 03 | .309856 03 | .313791 03 | .317446 03 | .320851 03 | .324008 03 | .327189 03 | .330834 03 |
| 332.0              | .295651 03 | .300435 03 | .305308 03 | .310332 03 | .314267 03 | .317922 03 | .321327 03 | .324474 03 | .327655 03 | .331334 03 |
| 332.5              | .296123 03 | .300910 03 | .305783 03 | .310807 03 | .314742 03 | .318407 03 | .321812 03 | .324959 03 | .328140 03 | .331834 03 |
| 333.0              | .296595 03 | .301386 03 | .306259 03 | .311283 03 | .315218 03 | .318883 03 | .322288 03 | .325435 03 | .328616 03 | .332334 03 |
| 333.5              | .297067 03 | .301860 03 | .306733 03 | .311757 03 | .315692 03 | .319357 03 | .322762 03 | .325909 03 | .329090 03 | .332834 03 |
| 334.0              | .297539 03 | .302335 03 | .307208 03 | .312192 03 | .316127 03 | .319792 03 | .323207 03 | .326354 03 | .329535 03 | .333334 03 |
| 334.5              | .298011 03 | .302810 03 | .307683 03 | .312667 03 | .316602 03 | .320267 03 | .323672 03 | .326819 03 | .330000 03 | .333834 03 |
| 335.0              | .298484 03 | .303286 03 | .308159 03 | .313143 03 | .317078 03 | .320743 03 | .324148 03 | .327295 03 | .330476 03 | .334334 03 |
| 335.5              | .298956 03 | .303761 03 | .308634 03 | .313627 03 | .317562 03 | .321227 03 | .324632 03 | .327779 03 | .330960 03 | .334834 03 |
| 336.0              | .299428 03 | .304236 03 | .309109 03 | .314103 03 | .318038 03 | .321703 03 | .325108 03 | .328255 03 | .331436 03 | .335334 03 |
| 336.5              | .299900 03 | .304711 03 | .309584 03 | .314578 03 | .318513 03 | .322178 03 | .325583 03 | .328730 03 | .331911 03 | .335834 03 |
| 337.0              | .300373 03 | .305184 03 | .310057 03 | .315051 03 | .318986 03 | .322651 03 | .326056 03 | .329203 03 | .332384 03 | .336334 03 |

Percentage Points of the  $\chi^2$ -Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu$ | .925000   | .900000   | .850000   | .800000   | .750000   | .700000   | .600000   | .550000   | .500000   |
|-------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 337.5 | 308845 03 | 304662 03 | 310640 03 | 315462 03 | 319632 03 | 323408 03 | 326933 03 | 330302 03 | 333683 03 |
| 338.0 | 308137 03 | 303953 03 | 311129 03 | 315946 03 | 320119 03 | 323898 03 | 327425 03 | 330797 03 | 334081 03 |
| 338.5 | 307489 03 | 303305 03 | 311609 03 | 316430 03 | 320606 03 | 324387 03 | 327918 03 | 331292 03 | 334578 03 |
| 339.0 | 306822 03 | 302638 03 | 312089 03 | 316914 03 | 321093 03 | 324877 03 | 328411 03 | 331707 03 | 335076 03 |
| 339.5 | 306170 03 | 301984 03 | 312569 03 | 317398 03 | 321580 03 | 325367 03 | 328903 03 | 332282 03 | 335573 03 |
| 340.0 | 305520 03 | 301333 03 | 313049 03 | 317801 03 | 322067 03 | 325857 03 | 329386 03 | 332777 03 | 336071 03 |
| 340.5 | 304870 03 | 300683 03 | 313529 03 | 318265 03 | 322554 03 | 326347 03 | 329880 03 | 333272 03 | 336569 03 |
| 341.0 | 304221 03 | 300034 03 | 314009 03 | 318749 03 | 323041 03 | 326837 03 | 330381 03 | 333768 03 | 337066 03 |
| 341.5 | 303572 03 | 299384 03 | 314489 03 | 319233 03 | 323528 03 | 327327 03 | 330874 03 | 334263 03 | 337564 03 |
| 342.0 | 302923 03 | 298735 03 | 314969 03 | 319717 03 | 324015 03 | 327817 03 | 331366 03 | 334758 03 | 338061 03 |
| 342.5 | 302274 03 | 298086 03 | 315450 03 | 320201 03 | 324502 03 | 328307 03 | 331859 03 | 335253 03 | 338559 03 |
| 343.0 | 301625 03 | 297437 03 | 315930 03 | 320687 03 | 324990 03 | 328797 03 | 332352 03 | 335748 03 | 339057 03 |
| 343.5 | 300976 03 | 296788 03 | 316410 03 | 321173 03 | 325477 03 | 329287 03 | 332844 03 | 336243 03 | 339554 03 |
| 344.0 | 300327 03 | 296139 03 | 316890 03 | 321659 03 | 325964 03 | 329777 03 | 333337 03 | 336739 03 | 340052 03 |
| 344.5 | 299678 03 | 295489 03 | 317370 03 | 322147 03 | 326451 03 | 330267 03 | 333830 03 | 337234 03 | 340549 03 |
| 345.0 | 299029 03 | 294839 03 | 317851 03 | 322635 03 | 326938 03 | 330757 03 | 334322 03 | 337729 03 | 341047 03 |
| 345.5 | 298380 03 | 294189 03 | 318331 03 | 323124 03 | 327425 03 | 331247 03 | 334815 03 | 338224 03 | 341545 03 |
| 346.0 | 297731 03 | 293539 03 | 318811 03 | 323612 03 | 327912 03 | 331737 03 | 335307 03 | 338719 03 | 342042 03 |
| 346.5 | 297082 03 | 292889 03 | 319291 03 | 324102 03 | 328400 03 | 332227 03 | 335800 03 | 339214 03 | 342540 03 |
| 347.0 | 296433 03 | 292239 03 | 319772 03 | 324592 03 | 328887 03 | 332717 03 | 336293 03 | 339710 03 | 343037 03 |
| 347.5 | 295784 03 | 291589 03 | 320252 03 | 325084 03 | 329374 03 | 333207 03 | 336786 03 | 340205 03 | 343535 03 |
| 348.0 | 295135 03 | 290939 03 | 320733 03 | 325576 03 | 329861 03 | 333697 03 | 337278 03 | 340700 03 | 344033 03 |
| 348.5 | 294486 03 | 290289 03 | 321213 03 | 326068 03 | 330348 03 | 334187 03 | 337771 03 | 341195 03 | 344530 03 |
| 349.0 | 293837 03 | 289639 03 | 321693 03 | 326560 03 | 330836 03 | 334677 03 | 338264 03 | 341690 03 | 345028 03 |
| 349.5 | 293188 03 | 288989 03 | 322173 03 | 327052 03 | 331323 03 | 335167 03 | 338756 03 | 342186 03 | 345525 03 |
| 350.0 | 292539 03 | 288339 03 | 322654 03 | 327544 03 | 331810 03 | 335657 03 | 339249 03 | 342681 03 | 346023 03 |
| 350.5 | 291890 03 | 287689 03 | 323134 03 | 328036 03 | 332297 03 | 336147 03 | 339742 03 | 343176 03 | 346521 03 |
| 351.0 | 291241 03 | 287039 03 | 323615 03 | 328528 03 | 332785 03 | 336638 03 | 340234 03 | 343671 03 | 347018 03 |
| 351.5 | 290592 03 | 286389 03 | 324095 03 | 329013 03 | 333272 03 | 337128 03 | 340727 03 | 344166 03 | 347516 03 |
| 352.0 | 290454 03 | 285739 03 | 324576 03 | 329497 03 | 333759 03 | 337618 03 | 341220 03 | 344662 03 | 348014 03 |
| 352.5 | 289805 03 | 285089 03 | 325056 03 | 329981 03 | 334246 03 | 338108 03 | 341713 03 | 345157 03 | 348511 03 |
| 353.0 | 289156 03 | 284439 03 | 325536 03 | 330465 03 | 334734 03 | 338598 03 | 342205 03 | 345652 03 | 349009 03 |
| 353.5 | 288507 03 | 283789 03 | 326017 03 | 330950 03 | 335221 03 | 339088 03 | 342698 03 | 346147 03 | 349506 03 |
| 354.0 | 287858 03 | 283139 03 | 326497 03 | 331434 03 | 335708 03 | 339578 03 | 343191 03 | 346643 03 | 350004 03 |
| 354.5 | 287209 03 | 282489 03 | 326978 03 | 331918 03 | 336196 03 | 340068 03 | 343684 03 | 347138 03 | 350502 03 |
| 355.0 | 286560 03 | 281839 03 | 327459 03 | 332402 03 | 336683 03 | 340558 03 | 344176 03 | 347633 03 | 351000 03 |
| 355.5 | 285911 03 | 281189 03 | 327939 03 | 332886 03 | 337170 03 | 341049 03 | 344669 03 | 348128 03 | 351497 03 |
| 356.0 | 285262 03 | 280539 03 | 328420 03 | 333370 03 | 337658 03 | 341539 03 | 345162 03 | 348624 03 | 351995 03 |
| 356.5 | 284613 03 | 279889 03 | 328900 03 | 333855 03 | 338145 03 | 342029 03 | 345655 03 | 349119 03 | 352492 03 |
| 357.0 | 283964 03 | 279239 03 | 329381 03 | 334339 03 | 338632 03 | 342519 03 | 346147 03 | 349614 03 | 352990 03 |
| 357.5 | 283315 03 | 278589 03 | 329861 03 | 334823 03 | 339120 03 | 343009 03 | 346640 03 | 350109 03 | 353488 03 |
| 358.0 | 282666 03 | 277939 03 | 330342 03 | 335307 03 | 339607 03 | 343500 03 | 347133 03 | 350605 03 | 353985 03 |
| 358.5 | 282017 03 | 277289 03 | 330823 03 | 335792 03 | 340094 03 | 343990 03 | 347626 03 | 351100 03 | 354483 03 |
| 359.0 | 281368 03 | 276639 03 | 331303 03 | 336276 03 | 340582 03 | 344480 03 | 348119 03 | 351595 03 | 354981 03 |
| 359.5 | 280719 03 | 275989 03 | 331784 03 | 336760 03 | 341069 03 | 344970 03 | 348611 03 | 352090 03 | 355478 03 |
| 360.0 | 280070 03 | 275339 03 | 332265 03 | 337245 03 | 341557 03 | 345460 03 | 349104 03 | 352586 03 | 355976 03 |
| 360.5 | 279421 03 | 274689 03 | 332745 03 | 337729 03 | 342044 03 | 345951 03 | 349597 03 | 353081 03 | 356474 03 |
| 361.0 | 278772 03 | 274039 03 | 333226 03 | 338213 03 | 342531 03 | 346441 03 | 350090 03 | 353576 03 | 356971 03 |
| 361.5 | 278123 03 | 273389 03 | 333707 03 | 338698 03 | 343019 03 | 346931 03 | 350583 03 | 354071 03 | 357469 03 |
| 362.0 | 277474 03 | 272739 03 | 334187 03 | 339182 03 | 343506 03 | 347421 03 | 351076 03 | 354567 03 | 357967 03 |

| $\nu/2$ | .925000 | .900000 | .850000 | .800000 | .750000 | .700000 | .650000 | .600000 | .550000 | .500000 |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 362.5   | .324403 | .328450 | .334660 | .339666 | .343994 | .347911 | .351568 | .355062 | .358484 | .361834 |
| 363.0   | .324957 | .329026 | .335236 | .340251 | .344601 | .348482 | .352061 | .355557 | .358962 | .362334 |
| 363.5   | .325530 | .329603 | .335813 | .340835 | .345169 | .348992 | .352554 | .356053 | .359459 | .362834 |
| 364.0   | .326123 | .330196 | .336406 | .341428 | .345762 | .349585 | .353147 | .356588 | .359957 | .363334 |
| 364.5   | .326737 | .330810 | .337020 | .342042 | .346376 | .350199 | .353751 | .357182 | .360551 | .363934 |
| 365.0   | .327370 | .331443 | .337653 | .342675 | .347009 | .350832 | .354384 | .357795 | .361156 | .364534 |
| 365.5   | .328023 | .332096 | .338306 | .343328 | .347662 | .351485 | .355037 | .358448 | .361817 | .365200 |
| 366.0   | .328696 | .332769 | .338979 | .343991 | .348325 | .352148 | .355700 | .359111 | .362480 | .365863 |
| 366.5   | .329379 | .333452 | .339662 | .344674 | .349008 | .352831 | .356383 | .359794 | .363163 | .366556 |
| 367.0   | .330073 | .334146 | .340356 | .345378 | .349712 | .353535 | .357087 | .360500 | .363869 | .367262 |
| 367.5   | .330787 | .334860 | .341070 | .346092 | .350426 | .354249 | .357801 | .361214 | .364583 | .367986 |
| 368.0   | .331521 | .335594 | .341804 | .346826 | .351160 | .354983 | .358535 | .361948 | .365317 | .368720 |
| 368.5   | .332275 | .336348 | .342558 | .347580 | .351914 | .355737 | .359289 | .362702 | .366071 | .369474 |
| 369.0   | .333049 | .337122 | .343332 | .348354 | .352688 | .356511 | .360063 | .363476 | .366845 | .370248 |
| 369.5   | .333843 | .337916 | .344126 | .349148 | .353482 | .357305 | .360857 | .364270 | .367639 | .371042 |
| 370.0   | .334657 | .338730 | .344940 | .349962 | .354296 | .358119 | .361671 | .365084 | .368453 | .371856 |
| 370.5   | .335491 | .339564 | .345774 | .350796 | .355130 | .358953 | .362505 | .365918 | .369287 | .372690 |
| 371.0   | .336345 | .340418 | .346628 | .351650 | .355984 | .359807 | .363359 | .366772 | .370141 | .373544 |
| 371.5   | .337219 | .341292 | .347502 | .352524 | .356858 | .360681 | .364233 | .367646 | .371015 | .374418 |
| 372.0   | .338113 | .342186 | .348396 | .353418 | .357752 | .361575 | .365127 | .368540 | .371909 | .375312 |
| 372.5   | .339027 | .343100 | .349310 | .354332 | .358666 | .362489 | .366041 | .369454 | .372823 | .376226 |
| 373.0   | .340000 | .344073 | .350283 | .355305 | .359639 | .363462 | .367014 | .370427 | .373796 | .377200 |
| 373.5   | .341000 | .345073 | .351283 | .356305 | .360639 | .364462 | .368014 | .371427 | .374796 | .378200 |
| 374.0   | .342000 | .346073 | .352283 | .357305 | .361639 | .365462 | .369014 | .372427 | .375796 | .379200 |
| 374.5   | .343000 | .347073 | .353283 | .358305 | .362639 | .366462 | .370014 | .373427 | .376796 | .380200 |
| 375.0   | .344000 | .348073 | .354283 | .359305 | .363639 | .367462 | .371014 | .374427 | .377796 | .381200 |
| 375.5   | .345000 | .349073 | .355283 | .360305 | .364639 | .368462 | .372014 | .375427 | .378796 | .382200 |
| 376.0   | .346000 | .350073 | .356283 | .361305 | .365639 | .369462 | .373014 | .376427 | .379796 | .383200 |
| 376.5   | .347000 | .351073 | .357283 | .362305 | .366639 | .370462 | .374014 | .377427 | .380796 | .384200 |
| 377.0   | .348000 | .352073 | .358283 | .363305 | .367639 | .371462 | .375014 | .378427 | .381796 | .385200 |
| 377.5   | .349000 | .353073 | .359283 | .364305 | .368639 | .372462 | .376014 | .379427 | .382796 | .386200 |
| 378.0   | .350000 | .354073 | .360283 | .365305 | .369639 | .373462 | .377014 | .380427 | .383796 | .387200 |
| 378.5   | .351000 | .355073 | .361283 | .366305 | .370639 | .374462 | .378014 | .381427 | .384796 | .388200 |
| 379.0   | .352000 | .356073 | .362283 | .367305 | .371639 | .375462 | .379014 | .382427 | .385796 | .389200 |
| 379.5   | .353000 | .357073 | .363283 | .368305 | .372639 | .376462 | .380014 | .383427 | .386796 | .390200 |
| 380.0   | .354000 | .358073 | .364283 | .369305 | .373639 | .377462 | .381014 | .384427 | .387796 | .391200 |
| 380.5   | .355000 | .359073 | .365283 | .370305 | .374639 | .378462 | .382014 | .385427 | .388796 | .392200 |
| 381.0   | .356000 | .360073 | .366283 | .371305 | .375639 | .379462 | .383014 | .386427 | .389796 | .393200 |
| 381.5   | .357000 | .361073 | .367283 | .372305 | .376639 | .380462 | .384014 | .387427 | .390796 | .394200 |
| 382.0   | .358000 | .362073 | .368283 | .373305 | .377639 | .381462 | .385014 | .388427 | .391796 | .395200 |
| 382.5   | .359000 | .363073 | .369283 | .374305 | .378639 | .382462 | .386014 | .389427 | .392796 | .396200 |
| 383.0   | .360000 | .364073 | .370283 | .375305 | .379639 | .383462 | .387014 | .390427 | .393796 | .397200 |
| 383.5   | .361000 | .365073 | .371283 | .376305 | .380639 | .384462 | .388014 | .391427 | .394796 | .398200 |
| 384.0   | .362000 | .366073 | .372283 | .377305 | .381639 | .385462 | .389014 | .392427 | .395796 | .399200 |
| 384.5   | .363000 | .367073 | .373283 | .378305 | .382639 | .386462 | .390014 | .393427 | .396796 | .400200 |
| 385.0   | .364000 | .368073 | .374283 | .379305 | .383639 | .387462 | .391014 | .394427 | .397796 | .401200 |
| 385.5   | .365000 | .369073 | .375283 | .380305 | .384639 | .388462 | .392014 | .395427 | .398796 | .402200 |
| 386.0   | .366000 | .370073 | .376283 | .381305 | .385639 | .389462 | .393014 | .396427 | .399796 | .403200 |
| 386.5   | .367000 | .371073 | .377283 | .382305 | .386639 | .390462 | .394014 | .397427 | .400796 | .404200 |
| 387.0   | .368000 | .372073 | .378283 | .383305 | .387639 | .391462 | .395014 | .398427 | .401796 | .405200 |

Percentage Points of the  $\chi^2$ -Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $u$

| $u$   | .925000    | .900000    | .850000    | .800000    | .750000    | .700000    | .650000    | .600000    | .550000    | .500000    |
|-------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 387.5 | .348160 03 | .352279 03 | .358721 03 | .363097 03 | .368377 03 | .372332 03 | .376216 03 | .379930 03 | .38349 03  | .386834 03 |
| 388.0 | .348642 03 | .352756 03 | .359202 03 | .363582 03 | .368865 03 | .372823 03 | .376709 03 | .380326 03 | .383847 03 | .387334 03 |
| 388.5 | .349116 03 | .353233 03 | .359684 03 | .364067 03 | .369353 03 | .373313 03 | .377202 03 | .380821 03 | .384345 03 | .387834 03 |
| 389.0 | .349591 03 | .353710 03 | .360165 03 | .364552 03 | .369844 03 | .373804 03 | .377695 03 | .381317 03 | .384843 03 | .388334 03 |
| 389.5 | .350065 03 | .354187 03 | .360647 03 | .365037 03 | .370329 03 | .374295 03 | .378189 03 | .381812 03 | .385340 03 | .388834 03 |
| 390.0 | .350539 03 | .354664 03 | .361120 03 | .365512 03 | .370807 03 | .374785 03 | .378682 03 | .382308 03 | .385836 03 | .389334 03 |
| 390.5 | .351013 03 | .355141 03 | .361609 03 | .366006 03 | .371305 03 | .375295 03 | .379175 03 | .382803 03 | .386336 03 | .389834 03 |
| 391.0 | .351487 03 | .355618 03 | .362091 03 | .366488 03 | .371793 03 | .375785 03 | .379668 03 | .383299 03 | .386836 03 | .390334 03 |
| 391.5 | .351962 03 | .356095 03 | .362572 03 | .366976 03 | .372281 03 | .376277 03 | .380161 03 | .383794 03 | .387331 03 | .390834 03 |
| 392.0 | .352436 03 | .356572 03 | .363054 03 | .367461 03 | .372769 03 | .376764 03 | .380654 03 | .384290 03 | .387829 03 | .391334 03 |
| 392.5 | .352910 03 | .357049 03 | .363535 03 | .367946 03 | .373257 03 | .377250 03 | .381147 03 | .384785 03 | .388327 03 | .391834 03 |
| 393.0 | .353385 03 | .357526 03 | .364017 03 | .368431 03 | .373744 03 | .377739 03 | .381640 03 | .385281 03 | .388825 03 | .392334 03 |
| 393.5 | .353859 03 | .358003 03 | .364490 03 | .368906 03 | .374232 03 | .378227 03 | .382133 03 | .385776 03 | .389322 03 | .392834 03 |
| 394.0 | .354333 03 | .358481 03 | .364980 03 | .369398 03 | .374720 03 | .378715 03 | .382626 03 | .386271 03 | .389820 03 | .393334 03 |
| 394.5 | .354808 03 | .358959 03 | .365461 03 | .369880 03 | .375208 03 | .379193 03 | .383120 03 | .386767 03 | .390318 03 | .393834 03 |
| 395.0 | .355282 03 | .359435 03 | .365943 03 | .370363 03 | .375696 03 | .379681 03 | .383613 03 | .387262 03 | .390816 03 | .394334 03 |
| 395.5 | .355756 03 | .359912 03 | .366424 03 | .370844 03 | .376184 03 | .380169 03 | .384106 03 | .387758 03 | .391313 03 | .394834 03 |
| 396.0 | .356231 03 | .360389 03 | .366906 03 | .371326 03 | .376672 03 | .380657 03 | .384599 03 | .388253 03 | .391811 03 | .395334 03 |
| 396.5 | .356705 03 | .360866 03 | .367388 03 | .371808 03 | .377160 03 | .381146 03 | .385092 03 | .388749 03 | .392309 03 | .395834 03 |
| 397.0 | .357180 03 | .361344 03 | .367869 03 | .372289 03 | .377640 03 | .381626 03 | .385585 03 | .389244 03 | .392807 03 | .396334 03 |
| 397.5 | .357654 03 | .361821 03 | .368351 03 | .372771 03 | .378136 03 | .382125 03 | .386079 03 | .389740 03 | .393304 03 | .396834 03 |
| 398.0 | .358128 03 | .362298 03 | .368832 03 | .373252 03 | .378624 03 | .382616 03 | .386572 03 | .390235 03 | .393802 03 | .397334 03 |
| 398.5 | .358603 03 | .362776 03 | .369314 03 | .373736 03 | .379113 03 | .383106 03 | .387065 03 | .390731 03 | .394300 03 | .397834 03 |
| 399.0 | .359077 03 | .363253 03 | .369796 03 | .374218 03 | .379601 03 | .383604 03 | .387578 03 | .391246 03 | .394819 03 | .398334 03 |
| 399.5 | .359552 03 | .363730 03 | .370277 03 | .374699 03 | .380089 03 | .384102 03 | .388085 03 | .391752 03 | .395295 03 | .398834 03 |
| 400.0 | .360026 03 | .364207 03 | .370759 03 | .375181 03 | .380577 03 | .384600 03 | .388594 03 | .392261 03 | .395793 03 | .399334 03 |
| 400.5 | .360501 03 | .364685 03 | .371242 03 | .375665 03 | .381065 03 | .385189 03 | .389136 03 | .392803 03 | .396291 03 | .399834 03 |
| 401.0 | .360976 03 | .365162 03 | .371722 03 | .376145 03 | .381553 03 | .385689 03 | .389603 03 | .393269 03 | .396789 03 | .400334 03 |
| 401.5 | .361450 03 | .365639 03 | .372204 03 | .376627 03 | .382041 03 | .386171 03 | .390024 03 | .393704 03 | .397287 03 | .400834 03 |
| 402.0 | .361925 03 | .366117 03 | .372866 03 | .377289 03 | .382703 03 | .386861 03 | .390751 03 | .394420 03 | .397984 03 | .401534 03 |
| 402.5 | .362399 03 | .366594 03 | .373467 03 | .377890 03 | .383307 03 | .387512 03 | .391310 03 | .394995 03 | .398582 03 | .402134 03 |
| 403.0 | .362874 03 | .367072 03 | .374164 03 | .378587 03 | .384005 03 | .388214 03 | .392014 03 | .395695 03 | .399280 03 | .402834 03 |
| 403.5 | .363349 03 | .367549 03 | .374641 03 | .379064 03 | .384483 03 | .388694 03 | .392496 03 | .396182 03 | .399776 03 | .403334 03 |
| 404.0 | .363823 03 | .368027 03 | .375119 03 | .379542 03 | .384961 03 | .389173 03 | .392976 03 | .396677 03 | .400273 03 | .403834 03 |
| 404.5 | .364298 03 | .368504 03 | .375596 03 | .380019 03 | .385438 03 | .389650 03 | .393454 03 | .397157 03 | .400753 03 | .404334 03 |
| 405.0 | .364773 03 | .368981 03 | .376073 03 | .380496 03 | .385915 03 | .390128 03 | .393934 03 | .397638 03 | .401234 03 | .404834 03 |
| 405.5 | .365247 03 | .369459 03 | .376551 03 | .380974 03 | .386393 03 | .390606 03 | .394414 03 | .398119 03 | .401716 03 | .405334 03 |
| 406.0 | .365722 03 | .369936 03 | .377028 03 | .381451 03 | .386869 03 | .391082 03 | .394891 03 | .398598 03 | .402196 03 | .405834 03 |
| 406.5 | .366197 03 | .370414 03 | .377506 03 | .381929 03 | .387347 03 | .391560 03 | .395369 03 | .399076 03 | .402674 03 | .406334 03 |
| 407.0 | .366671 03 | .370891 03 | .377983 03 | .382406 03 | .387824 03 | .392037 03 | .395846 03 | .399553 03 | .403151 03 | .406834 03 |
| 407.5 | .367146 03 | .371369 03 | .378461 03 | .382884 03 | .388302 03 | .392515 03 | .396324 03 | .400031 03 | .403629 03 | .407334 03 |
| 408.0 | .367621 03 | .371846 03 | .378938 03 | .383361 03 | .388779 03 | .392992 03 | .396801 03 | .400508 03 | .404106 03 | .407834 03 |
| 408.5 | .368096 03 | .372321 03 | .379413 03 | .383836 03 | .389254 03 | .393467 03 | .397276 03 | .400983 03 | .404581 03 | .408334 03 |
| 409.0 | .368571 03 | .372796 03 | .379888 03 | .384311 03 | .389729 03 | .393942 03 | .397751 03 | .401458 03 | .405056 03 | .408834 03 |
| 409.5 | .369046 03 | .373271 03 | .380363 03 | .384786 03 | .390204 03 | .394417 03 | .398226 03 | .401933 03 | .405531 03 | .409334 03 |
| 410.0 | .369521 03 | .373746 03 | .380838 03 | .385261 03 | .390679 03 | .394892 03 | .398701 03 | .402408 03 | .406006 03 | .409834 03 |
| 410.5 | .369996 03 | .374221 03 | .381313 03 | .385736 03 | .391154 03 | .395367 03 | .399176 03 | .402883 03 | .406481 03 | .410334 03 |
| 411.0 | .370470 03 | .374695 03 | .381787 03 | .386210 03 | .391628 03 | .395841 03 | .399650 03 | .403357 03 | .406955 03 | .410834 03 |
| 411.5 | .370945 03 | .375170 03 | .382262 03 | .386685 03 | .392103 03 | .396316 03 | .399925 03 | .403632 03 | .407230 03 | .411134 03 |
| 412.0 | .371420 03 | .375645 03 | .382737 03 | .387160 03 | .392578 03 | .396791 03 | .400400 03 | .404107 03 | .407705 03 | .411634 03 |

Percentage Points of the  $\chi^2$ -Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu \backslash Q$ | .925000    | .900000    | .850000    | .800000    | .750000    | .700000    | .650000    | .600000    | .550000    | .500000    |
|--------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 412.5              | .371895 02 | .376145 03 | .382804 03 | .388152 03 | .392781 03 | .396968 03 | .400875 03 | .404606 03 | .408238 03 | .411874 03 |
| 413.0              | .372370 02 | .376623 03 | .383286 03 | .388638 03 | .393269 03 | .397458 03 | .401369 03 | .405102 03 | .408736 03 | .412374 03 |
| 413.5              | .372845 03 | .377100 03 | .383768 03 | .389123 03 | .393755 03 | .397945 03 | .401852 03 | .405597 03 | .409234 03 | .412874 03 |
| 414.0              | .373320 03 | .377578 03 | .384250 03 | .389608 03 | .394245 03 | .398435 03 | .402342 03 | .406097 03 | .409732 03 | .413374 03 |
| 414.5              | .373795 03 | .378056 03 | .384732 03 | .390094 03 | .394736 03 | .398926 03 | .402848 03 | .406589 03 | .410229 03 | .413874 03 |
| 415.0              | .374270 03 | .378534 03 | .385214 03 | .390579 03 | .395222 03 | .399413 03 | .403345 03 | .407084 03 | .410727 03 | .414374 03 |
| 415.5              | .374745 03 | .379011 03 | .385696 03 | .391065 03 | .395710 03 | .399903 03 | .403835 03 | .407580 03 | .411225 03 | .414874 03 |
| 416.0              | .375220 03 | .379489 03 | .386178 03 | .391550 03 | .396199 03 | .400393 03 | .404328 03 | .408075 03 | .411723 03 | .415374 03 |
| 416.5              | .375695 03 | .379967 03 | .386660 03 | .392035 03 | .396687 03 | .400885 03 | .404822 03 | .408571 03 | .412221 03 | .415874 03 |
| 417.0              | .376170 02 | .380445 03 | .387142 03 | .392521 03 | .397175 03 | .401366 03 | .405315 03 | .409067 03 | .412718 03 | .416374 03 |
| 417.5              | .376645 02 | .380922 03 | .387624 03 | .393006 03 | .397663 03 | .401857 03 | .405808 03 | .409562 03 | .413216 03 | .416874 03 |
| 418.0              | .377120 02 | .381400 03 | .388106 03 | .393492 03 | .398152 03 | .402346 03 | .406302 03 | .410058 03 | .413714 03 | .417374 03 |
| 418.5              | .377595 02 | .381878 03 | .388588 03 | .393977 03 | .398648 03 | .402842 03 | .406795 03 | .410553 03 | .414212 03 | .417874 03 |
| 419.0              | .378070 03 | .382356 03 | .389070 03 | .394463 03 | .399128 03 | .403320 03 | .407288 03 | .411049 03 | .414710 03 | .418374 03 |
| 419.5              | .378545 03 | .382834 03 | .389552 03 | .394948 03 | .399617 03 | .403809 03 | .407782 03 | .411545 03 | .415208 03 | .418874 03 |
| 420.0              | .379020 03 | .383312 03 | .390034 03 | .395433 03 | .400105 03 | .404302 03 | .408275 03 | .412040 03 | .415705 03 | .419374 03 |
| 420.5              | .379495 03 | .383790 03 | .390516 03 | .395919 03 | .400593 03 | .404793 03 | .408768 03 | .412536 03 | .416203 03 | .419874 03 |
| 421.0              | .379971 03 | .384267 03 | .390999 03 | .396404 03 | .401082 03 | .405284 03 | .409262 03 | .413032 03 | .416701 03 | .420374 03 |
| 421.5              | .380446 03 | .384745 03 | .391481 03 | .396890 03 | .401578 03 | .405785 03 | .409755 03 | .413527 03 | .417199 03 | .420874 03 |
| 422.0              | .380921 03 | .385223 03 | .391963 03 | .397375 03 | .402059 03 | .406266 03 | .410248 03 | .414023 03 | .417697 03 | .421374 03 |
| 422.5              | .381396 02 | .385701 03 | .392445 03 | .397861 03 | .402547 03 | .406757 03 | .410742 03 | .414519 03 | .418195 03 | .421874 03 |
| 423.0              | .381871 03 | .386179 03 | .392927 03 | .398346 03 | .403035 03 | .407248 03 | .411235 03 | .415014 03 | .418692 03 | .422374 03 |
| 423.5              | .382347 03 | .386657 03 | .393399 03 | .398832 03 | .403524 03 | .407739 03 | .411728 03 | .415510 03 | .419190 03 | .422874 03 |
| 424.0              | .382822 03 | .387135 03 | .393877 03 | .399317 03 | .404012 03 | .408226 03 | .412222 03 | .416005 03 | .419688 03 | .423374 03 |
| 424.5              | .383297 03 | .387613 03 | .394355 03 | .399803 03 | .404501 03 | .408715 03 | .412715 03 | .416501 03 | .420186 03 | .423874 03 |
| 425.0              | .383773 03 | .388091 03 | .394833 03 | .400289 03 | .404989 03 | .409204 03 | .413209 03 | .416997 03 | .420684 03 | .424374 03 |
| 425.5              | .384248 03 | .388569 03 | .395311 03 | .400774 03 | .405477 03 | .409692 03 | .413702 03 | .417482 03 | .421162 03 | .424874 03 |
| 426.0              | .384723 03 | .389047 03 | .395790 03 | .401260 03 | .405966 03 | .410224 03 | .414195 03 | .417988 03 | .421679 03 | .425374 03 |
| 426.5              | .385198 03 | .389525 03 | .396268 03 | .401745 03 | .406454 03 | .410715 03 | .414689 03 | .418484 03 | .422177 03 | .425874 03 |
| 427.0              | .385674 03 | .390003 03 | .396745 03 | .402231 03 | .406943 03 | .411206 03 | .415182 03 | .418979 03 | .422675 03 | .426374 03 |
| 427.5              | .386149 03 | .390481 03 | .397227 03 | .402716 03 | .407431 03 | .411697 03 | .415676 03 | .419475 03 | .423173 03 | .426874 03 |
| 428.0              | .386625 03 | .390959 03 | .397709 03 | .403202 03 | .407920 03 | .412188 03 | .416169 03 | .419971 03 | .423671 03 | .427374 03 |
| 428.5              | .387100 03 | .391437 03 | .398182 03 | .403688 03 | .408408 03 | .412679 03 | .416662 03 | .420466 03 | .424169 03 | .427874 03 |
| 429.0              | .387575 03 | .391916 03 | .398664 03 | .404173 03 | .408897 03 | .413170 03 | .417156 03 | .420962 03 | .424667 03 | .428374 03 |
| 429.5              | .388051 03 | .392394 03 | .399146 03 | .404659 03 | .409385 03 | .413661 03 | .417649 03 | .421458 03 | .425164 03 | .428874 03 |
| 430.0              | .388526 03 | .392872 03 | .399629 03 | .405145 03 | .409874 03 | .414152 03 | .418143 03 | .421953 03 | .425662 03 | .429374 03 |
| 430.5              | .389002 03 | .393350 03 | .400111 03 | .405630 03 | .410362 03 | .414643 03 | .418636 03 | .422449 03 | .426160 03 | .429874 03 |
| 431.0              | .389477 03 | .393828 03 | .400643 03 | .406166 03 | .410901 03 | .415184 03 | .419180 03 | .422994 03 | .426708 03 | .430424 03 |
| 431.5              | .389953 03 | .394306 03 | .401126 03 | .406652 03 | .411399 03 | .415685 03 | .419693 03 | .423504 03 | .427218 03 | .430934 03 |
| 432.0              | .390428 03 | .394784 03 | .401608 03 | .407142 03 | .411898 03 | .416186 03 | .420201 03 | .423936 03 | .427654 03 | .431374 03 |
| 432.5              | .390904 03 | .395263 03 | .402090 03 | .407633 03 | .412406 03 | .416697 03 | .420716 03 | .424462 03 | .428182 03 | .431904 03 |
| 433.0              | .391379 03 | .395741 03 | .402573 03 | .408129 03 | .412918 03 | .417218 03 | .421243 03 | .425002 03 | .428718 03 | .432444 03 |
| 433.5              | .391855 03 | .396219 03 | .403055 03 | .408624 03 | .413423 03 | .417733 03 | .421769 03 | .425530 03 | .429252 03 | .432984 03 |
| 434.0              | .392330 03 | .396697 03 | .403537 03 | .409118 03 | .413932 03 | .418253 03 | .422300 03 | .426072 03 | .429798 03 | .433534 03 |
| 434.5              | .392806 03 | .397175 03 | .404020 03 | .409613 03 | .414440 03 | .418773 03 | .422832 03 | .426615 03 | .430344 03 | .434084 03 |
| 435.0              | .393281 03 | .397654 03 | .404502 03 | .410109 03 | .414950 03 | .419293 03 | .423372 03 | .427170 03 | .430912 03 | .434664 03 |
| 435.5              | .393757 03 | .398132 03 | .404985 03 | .410603 03 | .415457 03 | .419809 03 | .423910 03 | .427728 03 | .431484 03 | .435244 03 |
| 436.0              | .394233 03 | .398610 03 | .405467 03 | .411097 03 | .415963 03 | .420327 03 | .424448 03 | .428282 03 | .432052 03 | .435824 03 |
| 436.5              | .394708 02 | .399089 03 | .405950 03 | .411595 03 | .416472 03 | .420848 03 | .424984 03 | .428838 03 | .432622 03 | .436404 03 |
| 437.0              | .395184 03 | .399567 03 | .406432 03 | .412094 03 | .416983 03 | .421371 03 | .425525 03 | .429396 03 | .433192 03 | .436984 03 |

Percentage Points of the  $\chi^2$ -Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu \backslash Q$ | .925000    | .900000    | .850000    | .800000    | .750000    | .700000    | .650000    | .600000    | .550000    | .500000    |
|--------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 437.5              | .395659 03 | .408045 03 | .406914 03 | .412430 03 | .417202 03 | .421510 03 | .425544 03 | .429389 03 | .433130 03 | .436834 03 |
| 438.0              | .396135 03 | .408524 03 | .407397 03 | .412916 03 | .417698 03 | .422009 03 | .426038 03 | .429885 03 | .433628 03 | .437334 03 |
| 438.5              | .396611 03 | .409000 03 | .407879 03 | .413402 03 | .418179 03 | .422500 03 | .426531 03 | .430380 03 | .434126 03 | .437834 03 |
| 439.0              | .397086 03 | .409475 03 | .408356 03 | .413880 03 | .418667 03 | .422992 03 | .427025 03 | .430876 03 | .434624 03 | .438334 03 |
| 439.5              | .397562 03 | .409951 03 | .408834 03 | .414357 03 | .419156 03 | .423483 03 | .427518 03 | .431372 03 | .435122 03 | .438834 03 |
| 440.0              | .398038 03 | .410427 03 | .409312 03 | .414839 03 | .419645 03 | .423974 03 | .428012 03 | .431867 03 | .435620 03 | .439334 03 |
| 440.5              | .398514 03 | .410903 03 | .409789 03 | .415355 03 | .420162 03 | .424495 03 | .428535 03 | .432393 03 | .436147 03 | .439863 03 |
| 441.0              | .398989 03 | .411379 03 | .410267 03 | .415731 03 | .420539 03 | .424876 03 | .428919 03 | .432780 03 | .436536 03 | .440254 03 |
| 441.5              | .399465 03 | .411855 03 | .410745 03 | .416105 03 | .420914 03 | .425255 03 | .429301 03 | .433167 03 | .436925 03 | .440644 03 |
| 442.0              | .399941 03 | .412331 03 | .411223 03 | .416475 03 | .421284 03 | .425629 03 | .429678 03 | .433548 03 | .437308 03 | .441030 03 |
| 442.5              | .400417 03 | .412807 03 | .411701 03 | .417059 03 | .421868 03 | .426216 03 | .430268 03 | .434142 03 | .437896 03 | .441683 03 |
| 443.0              | .400892 03 | .413282 03 | .412178 03 | .417537 03 | .422346 03 | .426697 03 | .430753 03 | .434632 03 | .438390 03 | .442044 03 |
| 443.5              | .401368 03 | .413757 03 | .412655 03 | .418015 03 | .422824 03 | .427178 03 | .431238 03 | .435121 03 | .438874 03 | .442522 03 |
| 444.0              | .401844 03 | .414232 03 | .413132 03 | .418493 03 | .423302 03 | .427658 03 | .431721 03 | .435608 03 | .439366 03 | .443034 03 |
| 444.5              | .402320 03 | .414707 03 | .413608 03 | .419070 03 | .423879 03 | .428237 03 | .432303 03 | .436194 03 | .439956 03 | .443624 03 |
| 445.0              | .402796 03 | .415182 03 | .414084 03 | .419547 03 | .424356 03 | .428716 03 | .432785 03 | .436680 03 | .440446 03 | .444058 03 |
| 445.5              | .403272 03 | .415657 03 | .414560 03 | .420011 03 | .424820 03 | .429182 03 | .433254 03 | .437153 03 | .440924 03 | .444558 03 |
| 446.0              | .403748 03 | .416132 03 | .415036 03 | .420482 03 | .425291 03 | .429655 03 | .433730 03 | .437633 03 | .441408 03 | .445044 03 |
| 446.5              | .404223 03 | .416607 03 | .415512 03 | .420953 03 | .425762 03 | .430128 03 | .434206 03 | .438113 03 | .441904 03 | .445552 03 |
| 447.0              | .404699 03 | .417082 03 | .415988 03 | .421424 03 | .426233 03 | .430600 03 | .434681 03 | .438592 03 | .442388 03 | .446028 03 |
| 447.5              | .405175 03 | .417557 03 | .416464 03 | .421895 03 | .426704 03 | .431072 03 | .435157 03 | .439072 03 | .442872 03 | .446534 03 |
| 448.0              | .405651 03 | .418032 03 | .416940 03 | .422366 03 | .427175 03 | .431544 03 | .435632 03 | .439551 03 | .443354 03 | .447074 03 |
| 448.5              | .406127 03 | .418507 03 | .417416 03 | .422837 03 | .427646 03 | .432016 03 | .436107 03 | .440030 03 | .443838 03 | .447564 03 |
| 449.0              | .406603 03 | .418982 03 | .417892 03 | .423308 03 | .428117 03 | .432488 03 | .436582 03 | .440509 03 | .444322 03 | .448044 03 |
| 449.5              | .407079 03 | .419457 03 | .418368 03 | .423779 03 | .428588 03 | .432960 03 | .437057 03 | .440988 03 | .444806 03 | .448534 03 |
| 450.0              | .407555 03 | .419932 03 | .418844 03 | .424250 03 | .429059 03 | .433432 03 | .437533 03 | .441468 03 | .445290 03 | .449028 03 |
| 450.5              | .408031 03 | .420407 03 | .419320 03 | .424721 03 | .429530 03 | .433904 03 | .438008 03 | .441947 03 | .445774 03 | .449524 03 |
| 451.0              | .408507 03 | .420882 03 | .419796 03 | .425192 03 | .430001 03 | .434376 03 | .438483 03 | .442426 03 | .446258 03 | .450018 03 |
| 451.5              | .408983 03 | .421357 03 | .420272 03 | .425663 03 | .430472 03 | .434848 03 | .438959 03 | .442906 03 | .446743 03 | .450504 03 |
| 452.0              | .409459 03 | .421832 03 | .420748 03 | .426138 03 | .430949 03 | .435326 03 | .439441 03 | .443392 03 | .447234 03 | .451000 03 |
| 452.5              | .409935 03 | .422307 03 | .421224 03 | .426613 03 | .431520 03 | .435908 03 | .440027 03 | .444082 03 | .447929 03 | .451506 03 |
| 453.0              | .410411 03 | .422782 03 | .421700 03 | .427095 03 | .431912 03 | .436302 03 | .440425 03 | .444484 03 | .448336 03 | .452022 03 |
| 453.5              | .410887 03 | .423257 03 | .422176 03 | .427580 03 | .432397 03 | .436788 03 | .440915 03 | .444978 03 | .448834 03 | .452548 03 |
| 454.0              | .411363 03 | .423732 03 | .422652 03 | .428083 03 | .432900 03 | .437293 03 | .441424 03 | .445489 03 | .449350 03 | .453076 03 |
| 454.5              | .411840 03 | .424207 03 | .423128 03 | .428559 03 | .433376 03 | .437771 03 | .441916 03 | .445985 03 | .449850 03 | .453584 03 |
| 455.0              | .412315 03 | .424682 03 | .423604 03 | .429035 03 | .433852 03 | .438248 03 | .442400 03 | .446474 03 | .450343 03 | .454072 03 |
| 455.5              | .412792 03 | .425157 03 | .424080 03 | .429511 03 | .434328 03 | .438725 03 | .442882 03 | .446961 03 | .450834 03 | .454568 03 |
| 456.0              | .413268 03 | .425632 03 | .424556 03 | .429982 03 | .434805 03 | .439203 03 | .443364 03 | .447448 03 | .451326 03 | .455074 03 |
| 456.5              | .413744 03 | .426107 03 | .425032 03 | .430463 03 | .435286 03 | .439685 03 | .443851 03 | .447940 03 | .451822 03 | .455584 03 |
| 457.0              | .414220 03 | .426582 03 | .425508 03 | .431000 03 | .435823 03 | .440223 03 | .444394 03 | .448500 03 | .452400 03 | .456172 03 |
| 457.5              | .414696 03 | .427057 03 | .425984 03 | .431491 03 | .436314 03 | .440715 03 | .444891 03 | .449002 03 | .452906 03 | .456694 03 |
| 458.0              | .415173 03 | .427532 03 | .426460 03 | .432002 03 | .436825 03 | .441227 03 | .445408 03 | .449524 03 | .453434 03 | .457232 03 |
| 458.5              | .415649 03 | .428007 03 | .426936 03 | .432477 03 | .437299 03 | .441703 03 | .445889 03 | .450010 03 | .453924 03 | .457736 03 |
| 459.0              | .416125 03 | .428482 03 | .427412 03 | .432948 03 | .437770 03 | .442175 03 | .446366 03 | .450492 03 | .454412 03 | .458234 03 |
| 459.5              | .416601 03 | .428957 03 | .427888 03 | .433423 03 | .438245 03 | .442652 03 | .446848 03 | .450978 03 | .454904 03 | .458734 03 |
| 460.0              | .417077 03 | .429432 03 | .428364 03 | .433898 03 | .438720 03 | .443128 03 | .447329 03 | .451464 03 | .455396 03 | .459234 03 |
| 460.5              | .417553 03 | .429907 03 | .428840 03 | .434373 03 | .439195 03 | .443604 03 | .447809 03 | .451950 03 | .455888 03 | .459734 03 |
| 461.0              | .418030 03 | .430382 03 | .429316 03 | .434857 03 | .439679 03 | .444088 03 | .448298 03 | .452444 03 | .456388 03 | .460244 03 |
| 461.5              | .418506 03 | .430857 03 | .429792 03 | .435332 03 | .440155 03 | .444566 03 | .448779 03 | .452924 03 | .456874 03 | .460734 03 |
| 462.0              | .418983 03 | .431332 03 | .430268 03 | .435817 03 | .440620 03 | .445033 03 | .449250 03 | .453400 03 | .457356 03 | .461244 03 |

Percentage Points of the  $\chi^2$ -Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu$ | .92500  | .90000  | .85000  | .80000  | .75000  | .70000  | .65000  | .60000  | .55000  | .50000  |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 462.5 | .419459 | .423976 | .431050 | .436728 | .441639 | .446081 | .450223 | .454177 | .458025 | .461834 |
| 463.0 | .419935 | .424455 | .431533 | .437210 | .442120 | .446572 | .450717 | .454673 | .458523 | .462334 |
| 463.5 | .420412 | .424934 | .432016 | .437693 | .442603 | .447055 | .451200 | .455169 | .459021 | .462834 |
| 464.0 | .420888 | .425413 | .432499 | .438187 | .443106 | .447558 | .451704 | .455665 | .459519 | .463334 |
| 464.5 | .421364 | .425892 | .432982 | .438673 | .443595 | .448046 | .452198 | .456161 | .460017 | .463834 |
| 465.0 | .421841 | .426374 | .433465 | .439159 | .444084 | .448538 | .452691 | .456657 | .460513 | .464334 |
| 465.5 | .422317 | .426850 | .433948 | .439645 | .444573 | .449029 | .453185 | .457152 | .461013 | .464834 |
| 466.0 | .422794 | .427329 | .434431 | .440131 | .445062 | .449520 | .453679 | .457648 | .461511 | .465334 |
| 466.5 | .423270 | .427808 | .434914 | .440618 | .445550 | .450012 | .454172 | .458144 | .462009 | .465834 |
| 467.0 | .423746 | .428287 | .435397 | .441104 | .446039 | .450503 | .454666 | .458640 | .462507 | .466334 |
| 467.5 | .424223 | .428766 | .435880 | .441590 | .446528 | .450995 | .455160 | .459136 | .463005 | .466834 |
| 468.0 | .424699 | .429245 | .436363 | .442076 | .447017 | .451486 | .455654 | .459632 | .463503 | .467334 |
| 468.5 | .425176 | .429724 | .436846 | .442562 | .447506 | .451977 | .456147 | .460128 | .464001 | .467834 |
| 469.0 | .425652 | .430203 | .437329 | .443049 | .447995 | .452469 | .456641 | .460623 | .464499 | .468334 |
| 469.5 | .426129 | .430682 | .437812 | .443535 | .448484 | .452960 | .457135 | .461119 | .464997 | .468834 |
| 470.0 | .426605 | .431161 | .438295 | .444021 | .448973 | .453452 | .457628 | .461615 | .465495 | .469334 |
| 470.5 | .427082 | .431641 | .438778 | .444507 | .449462 | .453943 | .458122 | .462111 | .465992 | .469834 |
| 471.0 | .427558 | .432120 | .439262 | .444994 | .449951 | .454435 | .458616 | .462607 | .466490 | .470334 |
| 471.5 | .428035 | .432599 | .439745 | .445480 | .450440 | .454926 | .459109 | .463103 | .466988 | .470834 |
| 472.0 | .428511 | .433078 | .440228 | .445966 | .450929 | .455410 | .459603 | .463599 | .467486 | .471334 |
| 472.5 | .428988 | .433557 | .440711 | .446453 | .451416 | .455909 | .460097 | .464095 | .467984 | .471834 |
| 473.0 | .429465 | .434036 | .441194 | .446939 | .451907 | .456401 | .460591 | .464590 | .468482 | .472334 |
| 473.5 | .429941 | .434515 | .441677 | .447425 | .452396 | .456892 | .461084 | .465086 | .468980 | .472834 |
| 474.0 | .430418 | .434995 | .442160 | .447912 | .452885 | .457383 | .461578 | .465582 | .469478 | .473334 |
| 474.5 | .430894 | .435473 | .442643 | .448398 | .453374 | .457875 | .462073 | .466076 | .469976 | .473834 |
| 475.0 | .431371 | .435953 | .443127 | .448884 | .453863 | .458366 | .462566 | .466574 | .470474 | .474333 |
| 475.5 | .431848 | .436432 | .443603 | .449371 | .454353 | .458858 | .463053 | .467060 | .470972 | .474833 |
| 476.0 | .432324 | .436911 | .444093 | .449867 | .454842 | .459349 | .463553 | .467566 | .471470 | .475333 |
| 476.5 | .432801 | .437391 | .444576 | .450353 | .455331 | .459841 | .464047 | .468062 | .471968 | .475833 |
| 477.0 | .433278 | .437870 | .445059 | .450830 | .455820 | .460332 | .464541 | .468558 | .472466 | .476333 |
| 477.5 | .433754 | .438349 | .445543 | .451316 | .456309 | .460824 | .465034 | .469053 | .472964 | .476833 |
| 478.0 | .434231 | .438828 | .446026 | .451802 | .456798 | .461315 | .465528 | .469549 | .473462 | .477333 |
| 478.5 | .434708 | .439308 | .446509 | .452289 | .457287 | .461807 | .466022 | .470045 | .473960 | .477833 |
| 479.0 | .435184 | .439787 | .446992 | .452775 | .457776 | .462298 | .466516 | .470541 | .474458 | .478333 |
| 479.5 | .435661 | .440266 | .447476 | .453262 | .458265 | .462790 | .467009 | .471037 | .474956 | .478833 |
| 480.0 | .436138 | .440745 | .447959 | .453748 | .458754 | .463282 | .467503 | .471533 | .475454 | .479333 |
| 480.5 | .436615 | .441225 | .448442 | .454234 | .459243 | .463773 | .467997 | .472029 | .475952 | .479833 |
| 481.0 | .437091 | .441704 | .448925 | .454721 | .459733 | .464265 | .468491 | .472525 | .476450 | .480333 |
| 481.5 | .437568 | .442183 | .449409 | .455207 | .460222 | .464756 | .468985 | .473021 | .476948 | .480833 |
| 482.0 | .438045 | .442663 | .449892 | .455694 | .460711 | .465248 | .469478 | .473517 | .477446 | .481333 |
| 482.5 | .438522 | .443142 | .450375 | .456180 | .461200 | .465739 | .469972 | .474012 | .477944 | .481833 |
| 483.0 | .438999 | .443621 | .450859 | .456667 | .461689 | .466231 | .470466 | .474508 | .478442 | .482333 |
| 483.5 | .439475 | .444101 | .451422 | .457233 | .462258 | .466792 | .471036 | .475080 | .478940 | .482833 |
| 484.0 | .439952 | .444580 | .451875 | .457693 | .462726 | .467274 | .471524 | .475576 | .479437 | .483333 |
| 484.5 | .440429 | .445060 | .452339 | .458166 | .463215 | .467770 | .472033 | .476096 | .479935 | .483833 |
| 485.0 | .440906 | .445539 | .452792 | .458621 | .463684 | .468254 | .472533 | .476602 | .480433 | .484333 |
| 485.5 | .441383 | .446018 | .453275 | .459109 | .464185 | .468773 | .473065 | .477144 | .480931 | .484833 |
| 486.0 | .441860 | .446498 | .453759 | .459595 | .464724 | .469329 | .473635 | .477714 | .481529 | .485333 |
| 486.5 | .442337 | .446977 | .454242 | .460082 | .465258 | .469873 | .474189 | .478278 | .482027 | .485833 |
| 487.0 | .442814 | .447457 | .454725 | .460572 | .465793 | .470416 | .474746 | .478833 | .482525 | .486333 |

Percentage Points of the  $\chi^2$ -Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu \backslash Q$ | .925000    | .900000    | .850000    | .800000    | .750000    | .700000    | .650000    | .600000    | .550000    | .500000    |
|--------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 487.5              | .443291 03 | .447936 03 | .455209 03 | .461045 03 | .466052 03 | .470655 03 | .474910 03 | .478972 03 | .482923 03 | .486833 03 |
| 488.0              | .443768 03 | .448416 03 | .455692 03 | .461531 03 | .466581 03 | .471147 03 | .475404 03 | .479468 03 | .483421 03 | .487333 03 |
| 488.5              | .444244 03 | .448895 03 | .456176 03 | .462010 03 | .467070 03 | .471638 03 | .475898 03 | .479964 03 | .483919 03 | .487833 03 |
| 489.0              | .444721 03 | .449375 03 | .456659 03 | .462504 03 | .467569 03 | .472130 03 | .476392 03 | .480460 03 | .484417 03 | .488333 03 |
| 489.5              | .445198 03 | .449854 03 | .457142 03 | .462991 03 | .468048 03 | .472621 03 | .476886 03 | .480956 03 | .484915 03 | .488833 03 |
| 490.0              | .445675 03 | .450334 03 | .457626 03 | .463478 03 | .468538 03 | .473113 03 | .477379 03 | .481451 03 | .485413 03 | .489333 03 |
| 490.5              | .446152 03 | .450813 03 | .458109 03 | .463964 03 | .469027 03 | .473605 03 | .477873 03 | .481947 03 | .485911 03 | .489833 03 |
| 491.0              | .446629 03 | .451293 03 | .458593 03 | .464451 03 | .469516 03 | .474096 03 | .478367 03 | .482443 03 | .486409 03 | .490333 03 |
| 491.5              | .447106 03 | .451772 03 | .459076 03 | .464937 03 | .470005 03 | .474583 03 | .478861 03 | .482939 03 | .486907 03 | .490833 03 |
| 492.0              | .447584 03 | .452252 03 | .459560 03 | .465424 03 | .470494 03 | .475079 03 | .479355 03 | .483435 03 | .487405 03 | .491333 03 |
| 492.5              | .448061 03 | .452731 03 | .460043 03 | .465910 03 | .470984 03 | .475571 03 | .479849 03 | .483931 03 | .487903 03 | .491833 03 |
| 493.0              | .448538 03 | .453211 03 | .460527 03 | .466397 03 | .471473 03 | .476063 03 | .480342 03 | .484427 03 | .488401 03 | .492333 03 |
| 493.5              | .449015 03 | .453691 03 | .461010 03 | .466884 03 | .471962 03 | .476554 03 | .480836 03 | .484923 03 | .488899 03 | .492833 03 |
| 494.0              | .449492 03 | .454170 03 | .461494 03 | .467370 03 | .472451 03 | .477046 03 | .481330 03 | .485419 03 | .489397 03 | .493333 03 |
| 494.5              | .449969 03 | .454650 03 | .461977 03 | .467857 03 | .472941 03 | .477538 03 | .481824 03 | .485915 03 | .489895 03 | .493833 03 |
| 495.0              | .450446 03 | .455129 03 | .462461 03 | .468343 03 | .473430 03 | .478029 03 | .482318 03 | .486411 03 | .490393 03 | .494333 03 |
| 495.5              | .450923 03 | .455609 03 | .462944 03 | .468833 03 | .473919 03 | .478521 03 | .482812 03 | .486907 03 | .490891 03 | .494833 03 |
| 496.0              | .451400 03 | .456089 03 | .463428 03 | .469317 03 | .474409 03 | .479013 03 | .483306 03 | .487403 03 | .491389 03 | .495333 03 |
| 496.5              | .451877 03 | .456568 03 | .463911 03 | .469800 03 | .474898 03 | .479504 03 | .483800 03 | .487899 03 | .491887 03 | .495833 03 |
| 497.0              | .452355 03 | .457048 03 | .464395 03 | .470290 03 | .475387 03 | .479996 03 | .484293 03 | .488395 03 | .492385 03 | .496333 03 |
| 497.5              | .452832 03 | .457528 03 | .464878 03 | .470777 03 | .475876 03 | .480480 03 | .484787 03 | .488891 03 | .492883 03 | .496833 03 |
| 498.0              | .453309 03 | .458007 03 | .465362 03 | .471263 03 | .476366 03 | .480979 03 | .485281 03 | .489387 03 | .493381 03 | .497333 03 |
| 498.5              | .453786 03 | .458487 03 | .465845 03 | .471750 03 | .476855 03 | .481471 03 | .485775 03 | .489883 03 | .493879 03 | .497833 03 |
| 499.0              | .454263 03 | .458967 03 | .466329 03 | .472236 03 | .477344 03 | .481963 03 | .486269 03 | .490379 03 | .494377 03 | .498333 03 |
| 499.5              | .454740 03 | .459446 03 | .466813 03 | .472723 03 | .477834 03 | .482454 03 | .486763 03 | .490879 03 | .494875 03 | .498833 03 |
| 500.0              | .455218 03 | .459926 03 | .467296 03 | .473210 03 | .478323 03 | .482946 03 | .487257 03 | .491371 03 | .495373 03 | .499333 03 |
| 500.5              | .455695 03 | .460406 03 | .467780 03 | .473697 03 | .478812 03 | .483430 03 | .487751 03 | .491867 03 | .495871 03 | .499833 03 |
| 501.0              | .456172 03 | .460886 03 | .468263 03 | .474183 03 | .479302 03 | .483930 03 | .488245 03 | .492363 03 | .496369 03 | .500333 03 |
| 501.5              | .456649 03 | .461365 03 | .468747 03 | .474670 03 | .479791 03 | .484421 03 | .488739 03 | .492859 03 | .496867 03 | .500833 03 |
| 502.0              | .457127 03 | .461843 03 | .469231 03 | .475157 03 | .480280 03 | .484913 03 | .489232 03 | .493355 03 | .497365 03 | .501333 03 |
| 502.5              | .457604 03 | .462325 03 | .469714 03 | .475643 03 | .480770 03 | .485405 03 | .489726 03 | .493851 03 | .497863 03 | .501833 03 |
| 503.0              | .458081 03 | .462805 03 | .470198 03 | .476130 03 | .481259 03 | .485896 03 | .490220 03 | .494347 03 | .498361 03 | .502333 03 |
| 503.5              | .458559 03 | .463284 03 | .470682 03 | .476617 03 | .481748 03 | .486388 03 | .490714 03 | .494843 03 | .498859 03 | .502833 03 |
| 504.0              | .459036 03 | .463764 03 | .471165 03 | .477104 03 | .482236 03 | .486880 03 | .491208 03 | .495339 03 | .499357 03 | .503333 03 |
| 504.5              | .459513 03 | .464244 03 | .471649 03 | .477590 03 | .482727 03 | .487372 03 | .491702 03 | .495835 03 | .499855 03 | .503833 03 |
| 505.0              | .460000 03 | .464724 03 | .472133 03 | .478077 03 | .483217 03 | .487863 03 | .492196 03 | .496331 03 | .500354 03 | .504333 03 |
| 505.5              | .460488 03 | .465204 03 | .472616 03 | .478564 03 | .483706 03 | .488355 03 | .492690 03 | .496827 03 | .500852 03 | .504833 03 |
| 506.0              | .460975 03 | .465684 03 | .473100 03 | .479051 03 | .484195 03 | .488847 03 | .493184 03 | .497323 03 | .501350 03 | .505333 03 |
| 506.5              | .461463 03 | .466163 03 | .473584 03 | .479537 03 | .484685 03 | .489339 03 | .493678 03 | .497819 03 | .501848 03 | .505833 03 |
| 507.0              | .461950 03 | .466643 03 | .474067 03 | .480024 03 | .485174 03 | .489830 03 | .494172 03 | .498315 03 | .502346 03 | .506333 03 |
| 507.5              | .462437 03 | .467123 03 | .474551 03 | .480511 03 | .485664 03 | .490322 03 | .494666 03 | .498811 03 | .502844 03 | .506833 03 |
| 508.0              | .462925 03 | .467603 03 | .475035 03 | .481098 03 | .486253 03 | .490916 03 | .495260 03 | .499407 03 | .503402 03 | .507333 03 |
| 508.5              | .463413 03 | .468083 03 | .475519 03 | .481584 03 | .486742 03 | .491406 03 | .495754 03 | .499903 03 | .503898 03 | .507833 03 |
| 509.0              | .463900 03 | .468563 03 | .476002 03 | .482071 03 | .487232 03 | .491898 03 | .496248 03 | .500399 03 | .504398 03 | .508333 03 |
| 509.5              | .464388 03 | .469043 03 | .476546 03 | .482618 03 | .487783 03 | .492453 03 | .496804 03 | .500955 03 | .504956 03 | .508833 03 |
| 510.0              | .464876 03 | .469523 03 | .477027 03 | .483103 03 | .488273 03 | .492948 03 | .497304 03 | .501455 03 | .505456 03 | .509333 03 |
| 510.5              | .465364 03 | .470003 03 | .477507 03 | .483588 03 | .488763 03 | .493438 03 | .497794 03 | .501945 03 | .505946 03 | .509833 03 |
| 511.0              | .465852 03 | .470482 03 | .477987 03 | .484073 03 | .489253 03 | .493928 03 | .498284 03 | .502435 03 | .506436 03 | .510333 03 |
| 511.5              | .466340 03 | .470962 03 | .478471 03 | .484563 03 | .489748 03 | .494423 03 | .498779 03 | .502930 03 | .506931 03 | .510833 03 |
| 512.0              | .466828 03 | .471442 03 | .478959 03 | .485056 03 | .490248 03 | .494923 03 | .499279 03 | .503430 03 | .507431 03 | .511333 03 |

Percentage Points of the  $\chi^2$ -Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $r$

| $r/Q$ | .475000 | .450000 | .400000 | .350000 | .300000 | .250000 | .200000 | .150000 | .100000 | .075000  |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|
| 1.0   | 5.10321 | 5.70652 | 7.08326 | .873457 | .107419 | .132330 | .164237 | .207225 | .270554 | .317805  |
| 1.1   | 6.03337 | 6.69665 | 8.19731 | .997603 | .121244 | .147643 | .181190 | .226048 | .291647 | .339504  |
| 1.2   | 6.98204 | 7.70163 | 9.31818 | .112210 | .134950 | .162731 | .197798 | .244392 | .312101 | .361267  |
| 1.3   | 7.94480 | 8.71749 | 10.4430 | .124596 | .148538 | .177611 | .214300 | .262318 | .332003 | .382399  |
| 1.4   | 8.91844 | 9.74142 | 11.5700 | .136939 | .162013 | .192301 | .230129 | .279875 | .351426 | .402984  |
| 1.5   | 9.90057 | 10.7714 | 12.6978 | .149233 | .175379 | .206818 | .245932 | .297107 | .370426 | .423089  |
| 1.6   | 10.8894 | 11.8058 | 13.8254 | .161478 | .188631 | .221176 | .251474 | .289052 | .344269 | .400000  |
| 1.7   | 11.8836 | 12.8437 | 14.9524 | .173672 | .201611 | .235388 | .274836 | .330725 | .407343 | .462069  |
| 1.8   | 12.8821 | 13.8841 | 16.0783 | .185817 | .214108 | .249466 | .292015 | .347167 | .425332 | .481029  |
| 1.9   | 13.8840 | 14.9264 | 17.2028 | .197914 | .227821 | .263420 | .307028 | .363394 | .443049 | .499681  |
| 2.0   | 14.8886 | 15.9702 | 18.3258 | .209961 | .240795 | .277259 | .321088 | .379424 | .460517 | .518853  |
| 2.1   | 15.8959 | 17.0149 | 19.4471 | .221970 | .253634 | .290992 | .336606 | .395274 | .477758 | .536170  |
| 2.2   | 16.9049 | 18.0604 | 20.5667 | .233933 | .266403 | .304627 | .351195 | .412950 | .494791 | .554051  |
| 2.3   | 17.9155 | 19.1063 | 21.6846 | .245855 | .279107 | .318169 | .365062 | .426489 | .511630 | .571716  |
| 2.4   | 18.9274 | 20.1526 | 22.8007 | .257739 | .291749 | .331626 | .380018 | .441877 | .528292 | .589181  |
| 2.5   | 19.9404 | 21.1990 | 23.9150 | .269584 | .304333 | .345002 | .392668 | .457133 | .544788 | .606459  |
| 2.6   | 20.9543 | 22.2454 | 25.0277 | .281395 | .316862 | .358303 | .406200 | .472265 | .561130 | .623565  |
| 2.7   | 21.9689 | 23.2918 | 26.1366 | .293171 | .329348 | .371532 | .420481 | .487282 | .577327 | .640508  |
| 2.8   | 22.9841 | 24.3381 | 27.2479 | .304915 | .341768 | .384695 | .434655 | .502189 | .593389 | .657300  |
| 2.9   | 23.9999 | 25.3842 | 28.3556 | .316628 | .354150 | .397795 | .450347 | .516995 | .609324 | .673949  |
| 3.0   | 25.0161 | 26.4301 | 29.4617 | .328311 | .366447 | .410834 | .464163 | .531705 | .625139 | .690464  |
| 3.1   | 26.0327 | 27.4757 | 30.5662 | .339966 | .378783 | .423618 | .477906 | .546323 | .640841 | .706853  |
| 3.2   | 27.0495 | 28.5210 | 31.6694 | .351594 | .391038 | .436747 | .491580 | .560856 | .656377 | .723122  |
| 3.3   | 28.0666 | 29.5660 | 32.7710 | .363197 | .403256 | .449625 | .505188 | .575307 | .671931 | .739270  |
| 3.4   | 29.0839 | 30.6107 | 33.8713 | .374774 | .415437 | .462455 | .518735 | .589681 | .687329 | .755326  |
| 3.5   | 30.1013 | 31.6550 | 34.9703 | .386327 | .427583 | .475238 | .532222 | .603980 | .702636 | .771272  |
| 3.6   | 31.1188 | 32.6990 | 36.0679 | .397658 | .439696 | .487977 | .545653 | .618210 | .717856 | .787121  |
| 3.7   | 32.1365 | 33.7426 | 37.1643 | .409367 | .451777 | .500673 | .559030 | .632373 | .732994 | .802877  |
| 3.8   | 33.1542 | 34.7859 | 38.2595 | .420854 | .463828 | .513329 | .572356 | .646472 | .748052 | .818544  |
| 3.9   | 34.1719 | 35.8288 | 39.3534 | .432321 | .475850 | .525947 | .585632 | .660509 | .763034 | .834127  |
| 4.0   | 35.1897 | 36.8713 | 40.4463 | .443769 | .487943 | .538527 | .598862 | .674488 | .777944 | .849628  |
| 4.1   | 36.2075 | 37.9135 | 41.5380 | .455198 | .499810 | .551071 | .612046 | .688411 | .792785 | .865052  |
| 4.2   | 37.2252 | 38.9554 | 42.6285 | .466604 | .511750 | .563581 | .625186 | .702280 | .807559 | .880402  |
| 4.3   | 38.2430 | 39.9968 | 43.7182 | .478001 | .523666 | .576058 | .638285 | .716097 | .822268 | .895679  |
| 4.4   | 39.2607 | 41.0380 | 44.8068 | .489377 | .535557 | .589518 | .651343 | .729865 | .836917 | .910888  |
| 4.5   | 40.2784 | 42.0784 | 45.8944 | .500737 | .547425 | .600918 | .662363 | .743584 | .851506 | .926831  |
| 4.6   | 41.2961 | 43.1192 | 46.9811 | .512081 | .559271 | .613303 | .673745 | .757257 | .866038 | .941110  |
| 4.7   | 42.3137 | 44.1593 | 48.0668 | .523409 | .571095 | .625660 | .690292 | .770886 | .880515 | .956127  |
| 4.8   | 43.3312 | 45.1990 | 49.1516 | .534723 | .582877 | .637989 | .703264 | .784472 | .894940 | .971085  |
| 4.9   | 44.3487 | 46.2385 | 50.2356 | .546022 | .594680 | .650291 | .716082 | .798016 | .909312 | .985986  |
| 5.0   | 45.3661 | 47.2776 | 51.3187 | .557307 | .606443 | .662568 | .728928 | .811520 | .923636 | 1.000802 |

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $p$

| $p/Q$ | .475000    | .450000    | .400000    | .350000    | .300000    | .250000    | .200000    | .150000    | .100000    | .075000    |
|-------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 5.1   | .463835 01 | .463164 01 | .524009 01 | .568579 01 | .616107 01 | .674020 01 | .741742 01 | .824985 01 | .937911 01 | .101562 02 |
| 5.2   | .474007 01 | .493548 01 | .534024 01 | .579837 01 | .629912 01 | .687047 01 | .754526 01 | .838413 01 | .952140 01 | .103036 02 |
| 5.3   | .484179 01 | .503930 01 | .545631 01 | .591083 01 | .641620 01 | .699251 01 | .767250 01 | .851804 01 | .966324 01 | .104505 02 |
| 5.4   | .494351 01 | .514309 01 | .556430 01 | .602317 01 | .653310 01 | .711433 01 | .780006 01 | .865160 01 | .980465 01 | .105969 02 |
| 5.5   | .504521 01 | .524684 01 | .567222 01 | .613538 01 | .664984 01 | .723592 01 | .792704 01 | .878482 01 | .994563 01 | .107429 02 |
| 5.6   | .514691 01 | .535057 01 | .578006 01 | .624748 01 | .676611 01 | .735730 01 | .805375 01 | .891770 01 | .100662 02 | .108884 02 |
| 5.7   | .524860 01 | .545427 01 | .588764 01 | .635946 01 | .688282 01 | .747640 01 | .816120 01 | .903026 01 | .102264 02 | .110334 02 |
| 5.8   | .535028 01 | .555794 01 | .599554 01 | .647134 01 | .699907 01 | .759945 01 | .830640 01 | .918251 01 | .103662 02 | .111700 02 |
| 5.9   | .545195 01 | .566158 01 | .610318 01 | .658310 01 | .711518 01 | .772022 01 | .843235 01 | .931446 01 | .105056 02 | .113222 02 |
| 6.0   | .555362 01 | .576520 01 | .621076 01 | .669476 01 | .723114 01 | .784000 01 | .855608 01 | .944610 01 | .106460 02 | .114659 02 |
| 6.1   | .565528 01 | .586879 01 | .631827 01 | .680632 01 | .734695 01 | .796120 01 | .868354 01 | .957746 01 | .107833 02 | .116093 02 |
| 6.2   | .575692 01 | .597235 01 | .642571 01 | .691778 01 | .746263 01 | .808142 01 | .880879 01 | .970854 01 | .109217 02 | .117523 02 |
| 6.3   | .585856 01 | .607589 01 | .653310 01 | .702914 01 | .757837 01 | .820146 01 | .893381 01 | .983935 01 | .110597 02 | .118949 02 |
| 6.4   | .596019 01 | .617940 01 | .664043 01 | .714040 01 | .769358 01 | .832132 01 | .905862 01 | .996969 01 | .111974 02 | .120372 02 |
| 6.5   | .606182 01 | .628289 01 | .674769 01 | .725158 01 | .780886 01 | .844102 01 | .918323 01 | .101002 02 | .113347 02 | .121791 02 |
| 6.6   | .616343 01 | .638635 01 | .685491 01 | .736266 01 | .792401 01 | .856056 01 | .930762 01 | .102302 02 | .114718 02 | .123206 02 |
| 6.7   | .626504 01 | .648979 01 | .696206 01 | .747365 01 | .803934 01 | .867954 01 | .943102 01 | .103600 02 | .116085 02 | .124618 02 |
| 6.8   | .636664 01 | .659321 01 | .706916 01 | .758456 01 | .815396 01 | .879916 01 | .955582 01 | .104895 02 | .117450 02 | .126027 02 |
| 6.9   | .646823 01 | .669660 01 | .717621 01 | .769538 01 | .826875 01 | .891323 01 | .967963 01 | .106188 02 | .118812 02 | .127432 02 |
| 7.0   | .656981 01 | .679937 01 | .728321 01 | .780612 01 | .838343 01 | .903715 01 | .980325 01 | .107479 02 | .120170 02 | .128834 02 |
| 7.1   | .667138 01 | .690332 01 | .739015 01 | .791678 01 | .849800 01 | .915592 01 | .992669 01 | .108767 02 | .121526 02 | .130233 02 |
| 7.2   | .677295 01 | .700664 01 | .749705 01 | .802736 01 | .861246 01 | .927455 01 | .100500 02 | .110054 02 | .122480 02 | .131630 02 |
| 7.3   | .687451 01 | .710995 01 | .760389 01 | .813787 01 | .872681 01 | .939305 01 | .101730 02 | .111330 02 | .124230 02 | .133023 02 |
| 7.4   | .697606 01 | .721323 01 | .771069 01 | .824830 01 | .884106 01 | .951141 01 | .102960 02 | .112620 02 | .125578 02 | .134413 02 |
| 7.5   | .707760 01 | .731649 01 | .781744 01 | .835865 01 | .895520 01 | .962963 01 | .104167 02 | .113900 02 | .126924 02 | .135801 02 |
| 7.6   | .717914 01 | .741974 01 | .792415 01 | .846893 01 | .906924 01 | .974773 01 | .105417 02 | .115178 02 | .128267 02 | .137185 02 |
| 7.7   | .728066 01 | .752296 01 | .803081 01 | .857914 01 | .918319 01 | .986569 01 | .106637 02 | .116454 02 | .129608 02 | .138567 02 |
| 7.8   | .738218 01 | .762616 01 | .813742 01 | .868928 01 | .929704 01 | .998353 01 | .107860 02 | .117728 02 | .130946 02 | .139947 02 |
| 7.9   | .748370 01 | .772934 01 | .824400 01 | .879935 01 | .941680 01 | .101013 02 | .109081 02 | .119000 02 | .132282 02 | .141323 02 |
| 8.0   | .758520 01 | .783251 01 | .835053 01 | .890936 01 | .952446 01 | .102109 02 | .110301 02 | .120271 02 | .133616 02 | .142697 02 |
| 8.1   | .768670 01 | .793565 01 | .845701 01 | .901930 01 | .963803 01 | .103363 02 | .111519 02 | .121539 02 | .134947 02 | .144069 02 |
| 8.2   | .778813 01 | .803878 01 | .856346 01 | .912917 01 | .975151 01 | .104537 02 | .112736 02 | .122806 02 | .136276 02 | .145438 02 |
| 8.3   | .788967 01 | .814189 01 | .866987 01 | .923899 01 | .986491 01 | .105710 02 | .113951 02 | .124071 02 | .137603 02 | .146805 02 |
| 8.4   | .799114 01 | .824498 01 | .877623 01 | .934874 01 | .997822 01 | .106881 02 | .115165 02 | .125334 02 | .138929 02 | .148170 02 |
| 8.5   | .809261 01 | .834805 01 | .888256 01 | .945843 01 | .100914 02 | .108051 02 | .116376 02 | .126596 02 | .140251 02 | .149532 02 |
| 8.6   | .819407 01 | .845111 01 | .898885 01 | .956805 01 | .102046 02 | .109221 02 | .117589 02 | .127856 02 | .141572 02 | .150892 02 |
| 8.7   | .829553 01 | .855415 01 | .909510 01 | .967763 01 | .103177 02 | .110389 02 | .118799 02 | .129115 02 | .142891 02 | .152249 02 |
| 8.8   | .839698 01 | .865717 01 | .920132 01 | .978714 01 | .104306 02 | .111556 02 | .120008 02 | .130371 02 | .144208 02 | .153605 02 |
| 8.9   | .849842 01 | .876018 01 | .930750 01 | .989660 01 | .105435 02 | .112722 02 | .121215 02 | .131627 02 | .145523 02 | .154958 02 |
| 9.0   | .859985 01 | .886317 01 | .941364 01 | .100060 02 | .106554 02 | .113889 02 | .122421 02 | .132880 02 | .146837 02 | .156309 02 |
| 9.1   | .870126 01 | .896614 01 | .951975 01 | .101153 02 | .107651 02 | .115052 02 | .123626 02 | .134133 02 | .148148 02 | .157659 02 |
| 9.2   | .880270 01 | .906910 01 | .962582 01 | .102246 02 | .108848 02 | .116215 02 | .124830 02 | .135383 02 | .149457 02 | .159006 02 |
| 9.3   | .890411 01 | .917204 01 | .973186 01 | .103339 02 | .109944 02 | .117377 02 | .126033 02 | .136633 02 | .150755 02 | .160351 02 |
| 9.4   | .900552 01 | .927497 01 | .983787 01 | .104431 02 | .111059 02 | .118539 02 | .127233 02 | .137861 02 | .152071 02 | .161694 02 |
| 9.5   | .910692 01 | .937788 01 | .994384 01 | .105522 02 | .112194 02 | .119699 02 | .128435 02 | .139127 02 | .153375 02 | .163035 02 |
| 9.6   | .920832 01 | .948077 01 | .100498 02 | .106613 02 | .113348 02 | .120859 02 | .129634 02 | .140372 02 | .154678 02 | .164375 02 |
| 9.7   | .930971 01 | .958366 01 | .101557 02 | .107703 02 | .114444 02 | .122018 02 | .130832 02 | .141616 02 | .155979 02 | .165712 02 |
| 9.8   | .941109 01 | .968652 01 | .102616 02 | .108793 02 | .115564 02 | .123175 02 | .132029 02 | .142858 02 | .157278 02 | .167048 02 |
| 9.9   | .951247 01 | .979338 01 | .103674 02 | .109882 02 | .116686 02 | .124332 02 | .133225 02 | .144100 02 | .158576 02 | .168382 02 |
| 10.0  | .961384 01 | .989222 01 | .104732 02 | .110971 02 | .117807 02 | .125489 02 | .134420 02 | .145339 02 | .159872 02 | .169714 02 |

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu \backslash Q$ | .475000   | .450000   | .430000   | .350000   | .300000   | .250000   | .150000   | .100000   | .075000   |
|--------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 10.1               | 971520 02 | 999534 01 | 105790 02 | 112060 02 | 118928 02 | 126644 02 | 146570 02 | 161166 02 | 171844 02 |
| 10.2               | 981656 01 | 100979 02 | 106848 02 | 113148 02 | 120040 02 | 127790 02 | 147815 02 | 162459 02 | 172373 02 |
| 10.3               | 991792 01 | 102007 02 | 107965 02 | 114235 02 | 121167 02 | 128952 02 | 149051 02 | 163751 02 | 173699 02 |
| 10.4               | 100193 02 | 103034 02 | 108962 02 | 115323 02 | 122286 02 | 130105 02 | 150286 02 | 165041 02 | 175025 02 |
| 10.5               | 101206 02 | 104062 02 | 110019 02 | 116409 02 | 123804 02 | 131257 02 | 151520 02 | 166329 02 | 176340 02 |
| 10.6               | 102219 02 | 105090 02 | 111075 02 | 117409 02 | 124522 02 | 132409 02 | 152752 02 | 167616 02 | 177670 02 |
| 10.7               | 103233 02 | 106117 02 | 112131 02 | 118561 02 | 125639 02 | 133559 02 | 153904 02 | 168902 02 | 178990 02 |
| 10.8               | 104246 02 | 107144 02 | 113187 02 | 119667 02 | 126755 02 | 134709 02 | 155214 02 | 170186 02 | 180309 02 |
| 10.9               | 105259 02 | 108172 02 | 114243 02 | 120752 02 | 127871 02 | 135858 02 | 156443 02 | 171469 02 | 181626 02 |
| 11.0               | 106272 02 | 109199 02 | 115298 02 | 121836 02 | 128937 02 | 137007 02 | 157671 02 | 172750 02 | 182942 02 |
| 11.1               | 107285 02 | 110226 02 | 116353 02 | 122920 02 | 130101 02 | 138155 02 | 158898 02 | 174030 02 | 184256 02 |
| 11.2               | 108298 02 | 111253 02 | 117408 02 | 124004 02 | 131216 02 | 139362 02 | 160124 02 | 175309 02 | 185569 02 |
| 11.3               | 109311 02 | 112279 02 | 118463 02 | 125088 02 | 132329 02 | 140448 02 | 161340 02 | 176586 02 | 186880 02 |
| 11.4               | 110324 02 | 113306 02 | 119517 02 | 126171 02 | 133443 02 | 141594 02 | 162572 02 | 177863 02 | 188190 02 |
| 11.5               | 111337 02 | 114332 02 | 120571 02 | 127253 02 | 134555 02 | 142739 02 | 163795 02 | 179137 02 | 189499 02 |
| 11.6               | 112350 02 | 115359 02 | 121625 02 | 128336 02 | 135667 02 | 143883 02 | 165016 02 | 180411 02 | 190805 02 |
| 11.7               | 113363 02 | 116385 02 | 122679 02 | 129417 02 | 136779 02 | 145027 02 | 166237 02 | 181684 02 | 192111 02 |
| 11.8               | 114376 02 | 117411 02 | 123732 02 | 130499 02 | 137890 02 | 146170 02 | 167457 02 | 182955 02 | 193415 02 |
| 11.9               | 115388 02 | 118437 02 | 124785 02 | 131580 02 | 139001 02 | 147312 02 | 168675 02 | 184225 02 | 194718 02 |
| 12.0               | 116401 02 | 119463 02 | 125838 02 | 132661 02 | 140111 02 | 148454 02 | 169893 02 | 185493 02 | 196020 02 |
| 12.1               | 117413 02 | 120489 02 | 126891 02 | 133741 02 | 141221 02 | 149595 02 | 171110 02 | 186761 02 | 197320 02 |
| 12.2               | 118426 02 | 121515 02 | 127944 02 | 134822 02 | 142330 02 | 150736 02 | 172326 02 | 188028 02 | 198619 02 |
| 12.3               | 119439 02 | 122540 02 | 128996 02 | 135901 02 | 143439 02 | 151876 02 | 173541 02 | 189293 02 | 199917 02 |
| 12.4               | 120451 02 | 123566 02 | 130048 02 | 136981 02 | 144547 02 | 153015 02 | 174755 02 | 190557 02 | 201213 02 |
| 12.5               | 121463 02 | 124591 02 | 131100 02 | 138060 02 | 145655 02 | 154154 02 | 175968 02 | 191820 02 | 202508 02 |
| 12.6               | 122476 02 | 125617 02 | 132151 02 | 139139 02 | 146762 02 | 155292 02 | 177180 02 | 193082 02 | 203802 02 |
| 12.7               | 123488 02 | 126642 02 | 133203 02 | 140217 02 | 147869 02 | 156430 02 | 178391 02 | 194343 02 | 205095 02 |
| 12.8               | 124500 02 | 127667 02 | 134254 02 | 141295 02 | 148976 02 | 157567 02 | 179601 02 | 195603 02 | 206386 02 |
| 12.9               | 125513 02 | 128692 02 | 135305 02 | 142373 02 | 150082 02 | 158703 02 | 180811 02 | 196862 02 | 207676 02 |
| 13.0               | 126525 02 | 129717 02 | 136356 02 | 143451 02 | 151187 02 | 159839 02 | 182020 02 | 198119 02 | 208966 02 |
| 13.2               | 128549 02 | 131767 02 | 138457 02 | 145605 02 | 153397 02 | 162109 02 | 184435 02 | 200632 02 | 211540 02 |
| 13.4               | 130573 02 | 133816 02 | 140557 02 | 147758 02 | 155606 02 | 164377 02 | 186846 02 | 203140 02 | 214111 02 |
| 13.6               | 132597 02 | 135865 02 | 142656 02 | 149909 02 | 157812 02 | 166643 02 | 189255 02 | 205644 02 | 216676 02 |
| 13.8               | 134621 02 | 137913 02 | 144755 02 | 152060 02 | 160017 02 | 168907 02 | 191660 02 | 208145 02 | 219238 02 |
| 14.0               | 136644 02 | 139961 02 | 146853 02 | 154209 02 | 162221 02 | 171169 02 | 194662 02 | 210641 02 | 221795 02 |
| 14.2               | 138668 02 | 142009 02 | 148950 02 | 156357 02 | 164423 02 | 173429 02 | 196462 02 | 213134 02 | 224340 02 |
| 14.4               | 140691 02 | 144056 02 | 150847 02 | 158505 02 | 166624 02 | 175687 02 | 198858 02 | 215624 02 | 226890 02 |
| 14.6               | 142714 02 | 146104 02 | 153143 02 | 160651 02 | 168823 02 | 177944 02 | 201251 02 | 218110 02 | 229443 02 |
| 14.8               | 144737 02 | 148150 02 | 155238 02 | 162796 02 | 171021 02 | 180198 02 | 203642 02 | 220592 02 | 231984 02 |
| 15.0               | 146760 02 | 150137 02 | 157332 02 | 164940 02 | 173217 02 | 182451 02 | 205030 02 | 223071 02 | 234522 02 |
| 15.2               | 148782 02 | 152243 02 | 159426 02 | 167023 02 | 175412 02 | 184702 02 | 208415 02 | 225547 02 | 237056 02 |
| 15.4               | 150805 02 | 154289 02 | 161519 02 | 169225 02 | 177606 02 | 186951 02 | 210798 02 | 228020 02 | 239586 02 |
| 15.6               | 152827 02 | 156335 02 | 163612 02 | 171367 02 | 179798 02 | 189190 02 | 213178 02 | 230489 02 | 242112 02 |
| 15.8               | 154849 02 | 158380 02 | 165704 02 | 173507 02 | 181889 02 | 191444 02 | 215555 02 | 232955 02 | 244635 02 |
| 16.0               | 156872 02 | 160425 02 | 167795 02 | 175646 02 | 184179 02 | 193689 02 | 217931 02 | 235418 02 | 247155 02 |
| 16.2               | 158894 02 | 162470 02 | 169886 02 | 177785 02 | 186368 02 | 195931 02 | 220302 02 | 237878 02 | 249672 02 |
| 16.4               | 160915 02 | 164514 02 | 171976 02 | 179922 02 | 188558 02 | 198544 02 | 222673 02 | 240336 02 | 252185 02 |
| 16.6               | 162937 02 | 166558 02 | 174066 02 | 182059 02 | 190741 02 | 200954 02 | 225041 02 | 242790 02 | 254695 02 |
| 16.8               | 164959 02 | 168602 02 | 176155 02 | 184195 02 | 192826 02 | 202650 02 | 227407 02 | 245242 02 | 257201 02 |
| 17.0               | 166980 02 | 170646 02 | 178244 02 | 186330 02 | 195110 02 | 204837 02 | 229770 02 | 247690 02 | 259705 02 |

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu \backslash Q$ | .475000    | .450000    | .400000    | .350000    | .300000    | .250000    | .200000    | .150000    | .100000    | .075000    |
|--------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 17.20              | .169002 02 | .172689 02 | .180332 02 | .188464 02 | .197253 02 | .207122 02 | .218439 02 | .232131 02 | .250136 02 | .262225 02 |
| 17.40              | .171023 02 | .174732 02 | .182419 02 | .190598 02 | .199475 02 | .209356 02 | .220731 02 | .234490 02 | .252580 02 | .264703 02 |
| 17.60              | .173044 02 | .176775 02 | .184506 02 | .192730 02 | .201655 02 | .211588 02 | .223021 02 | .236847 02 | .255020 02 | .267197 02 |
| 17.80              | .175065 02 | .178818 02 | .186593 02 | .194862 02 | .203635 02 | .213519 02 | .225009 02 | .239202 02 | .257459 02 | .269689 02 |
| 18.00              | .177086 02 | .180860 02 | .188679 02 | .196993 02 | .205814 02 | .215649 02 | .227195 02 | .241555 02 | .259894 02 | .272178 02 |
| 18.20              | .179107 02 | .182902 02 | .190765 02 | .199123 02 | .207991 02 | .217877 02 | .229480 02 | .243905 02 | .262327 02 | .274664 02 |
| 18.40              | .181127 02 | .184944 02 | .192850 02 | .201253 02 | .210168 02 | .219604 02 | .231264 02 | .246254 02 | .264758 02 | .277147 02 |
| 18.60              | .183148 02 | .186986 02 | .194934 02 | .203382 02 | .212343 02 | .221820 02 | .233445 02 | .248601 02 | .267186 02 | .279628 02 |
| 18.80              | .185168 02 | .189027 02 | .197018 02 | .205510 02 | .214478 02 | .223955 02 | .235676 02 | .250946 02 | .269612 02 | .282106 02 |
| 19.00              | .187189 02 | .191069 02 | .199102 02 | .207638 02 | .216631 02 | .226175 02 | .238004 02 | .253289 02 | .272036 02 | .284581 02 |
| 19.20              | .189209 02 | .193110 02 | .201185 02 | .209764 02 | .219064 02 | .229400 02 | .241281 02 | .255630 02 | .274457 02 | .287054 02 |
| 19.40              | .191229 02 | .195151 02 | .203268 02 | .211890 02 | .221236 02 | .231621 02 | .243557 02 | .257969 02 | .276876 02 | .289524 02 |
| 19.60              | .193249 02 | .197191 02 | .205350 02 | .214016 02 | .223406 02 | .233841 02 | .246031 02 | .260306 02 | .279293 02 | .291992 02 |
| 19.80              | .195269 02 | .199232 02 | .207432 02 | .216141 02 | .225576 02 | .236059 02 | .248404 02 | .262642 02 | .281707 02 | .294457 02 |
| 20.00              | .197289 02 | .201272 02 | .209514 02 | .218265 02 | .227745 02 | .238277 02 | .250375 02 | .264976 02 | .284120 02 | .296920 02 |
| 20.20              | .199309 02 | .203312 02 | .211595 02 | .220388 02 | .229914 02 | .240493 02 | .252645 02 | .267308 02 | .286530 02 | .299381 02 |
| 20.40              | .201328 02 | .205352 02 | .213675 02 | .222511 02 | .232081 02 | .242709 02 | .254913 02 | .269638 02 | .288938 02 | .301839 02 |
| 20.60              | .203348 02 | .207391 02 | .215756 02 | .224633 02 | .234247 02 | .244923 02 | .257181 02 | .271967 02 | .291345 02 | .304295 02 |
| 20.80              | .205367 02 | .209431 02 | .217836 02 | .226755 02 | .236413 02 | .247136 02 | .259446 02 | .274295 02 | .293749 02 | .306748 02 |
| 21.00              | .207387 02 | .211470 02 | .219915 02 | .228876 02 | .238578 02 | .249348 02 | .261711 02 | .276620 02 | .296151 02 | .309200 02 |
| 21.20              | .209406 02 | .213509 02 | .221994 02 | .230997 02 | .240742 02 | .251559 02 | .263974 02 | .278944 02 | .298551 02 | .311649 02 |
| 21.40              | .211425 02 | .215548 02 | .224073 02 | .233116 02 | .242805 02 | .253769 02 | .266236 02 | .281266 02 | .300949 02 | .314096 02 |
| 21.60              | .213444 02 | .217586 02 | .226151 02 | .235236 02 | .244968 02 | .255978 02 | .268497 02 | .283507 02 | .303336 02 | .316541 02 |
| 21.80              | .215463 02 | .219625 02 | .228229 02 | .237354 02 | .247029 02 | .258086 02 | .270756 02 | .285807 02 | .305740 02 | .318984 02 |
| 22.00              | .217482 02 | .221663 02 | .230307 02 | .239473 02 | .249290 02 | .260393 02 | .273015 02 | .288225 02 | .308133 02 | .321424 02 |
| 22.20              | .219501 02 | .223701 02 | .232384 02 | .241590 02 | .251550 02 | .262599 02 | .275272 02 | .290541 02 | .310524 02 | .323863 02 |
| 22.40              | .221520 02 | .225739 02 | .234461 02 | .243707 02 | .253710 02 | .264804 02 | .277527 02 | .292856 02 | .312913 02 | .326300 02 |
| 22.60              | .223539 02 | .227777 02 | .236537 02 | .245824 02 | .255868 02 | .267008 02 | .279782 02 | .295169 02 | .315300 02 | .328734 02 |
| 22.80              | .225557 02 | .229815 02 | .238613 02 | .247940 02 | .258026 02 | .269211 02 | .282036 02 | .297481 02 | .317685 02 | .331167 02 |
| 23.00              | .227576 02 | .231852 02 | .240689 02 | .250055 02 | .260184 02 | .271413 02 | .284288 02 | .299792 02 | .320069 02 | .333597 02 |
| 23.20              | .229594 02 | .233889 02 | .242765 02 | .252170 02 | .262340 02 | .273615 02 | .286539 02 | .302101 02 | .322451 02 | .336026 02 |
| 23.40              | .231613 02 | .235927 02 | .244840 02 | .254285 02 | .264496 02 | .275815 02 | .288769 02 | .304409 02 | .324831 02 | .338453 02 |
| 23.60              | .233631 02 | .237963 02 | .246915 02 | .256399 02 | .266651 02 | .278015 02 | .291038 02 | .306716 02 | .327210 02 | .340878 02 |
| 23.80              | .235649 02 | .240000 02 | .248989 02 | .258512 02 | .268806 02 | .280214 02 | .293286 02 | .309021 02 | .329587 02 | .343301 02 |
| 24.00              | .237667 02 | .242037 02 | .251063 02 | .260625 02 | .270960 02 | .282412 02 | .295533 02 | .311325 02 | .331962 02 | .345723 02 |
| 24.20              | .239685 02 | .244073 02 | .253133 02 | .262738 02 | .273113 02 | .284609 02 | .297779 02 | .313627 02 | .334336 02 | .348142 02 |
| 24.40              | .241703 02 | .246110 02 | .255211 02 | .264850 02 | .275265 02 | .286805 02 | .300024 02 | .315928 02 | .336708 02 | .350580 02 |
| 24.60              | .243721 02 | .248136 02 | .257284 02 | .266961 02 | .277417 02 | .289000 02 | .302268 02 | .318229 02 | .339079 02 | .352976 02 |
| 24.80              | .245739 02 | .250162 02 | .259357 02 | .269072 02 | .279459 02 | .291195 02 | .304510 02 | .320527 02 | .341448 02 | .355390 02 |
| 25.00              | .247757 02 | .252210 02 | .261430 02 | .271183 02 | .281719 02 | .293389 02 | .306752 02 | .322825 02 | .343816 02 | .357803 02 |
| 25.20              | .249775 02 | .254254 02 | .263502 02 | .273293 02 | .283869 02 | .295581 02 | .308993 02 | .325121 02 | .346182 02 | .360214 02 |
| 25.40              | .251792 02 | .256289 02 | .265574 02 | .275403 02 | .286019 02 | .297774 02 | .311233 02 | .327446 02 | .348547 02 | .362623 02 |
| 25.60              | .253810 02 | .258325 02 | .267646 02 | .277512 02 | .288167 02 | .299965 02 | .313471 02 | .329710 02 | .350910 02 | .365031 02 |
| 25.80              | .255827 02 | .260360 02 | .269718 02 | .279621 02 | .290316 02 | .302156 02 | .315709 02 | .332003 02 | .353271 02 | .367437 02 |
| 26.00              | .257845 02 | .262395 02 | .271789 02 | .281730 02 | .292463 02 | .304346 02 | .317946 02 | .334295 02 | .355632 02 | .369841 02 |
| 26.20              | .259866 02 | .264439 02 | .273877 02 | .283865 02 | .294635 02 | .306517 02 | .320741 02 | .337158 02 | .358580 02 | .372885 02 |
| 26.40              | .261888 02 | .266483 02 | .275966 02 | .285999 02 | .296833 02 | .308719 02 | .323334 02 | .340019 02 | .361526 02 | .375885 02 |
| 26.60              | .263910 02 | .268520 02 | .278033 02 | .288112 02 | .298999 02 | .310932 02 | .325902 02 | .342878 02 | .364470 02 | .378444 02 |
| 26.80              | .265931 02 | .270561 02 | .279999 02 | .289999 02 | .301051 02 | .313019 02 | .328226 02 | .345276 02 | .366742 02 | .380180 02 |
| 27.00              | .267952 02 | .272601 02 | .281999 02 | .291999 02 | .303101 02 | .315101 02 | .330451 02 | .347412 02 | .368652 02 | .381840 02 |
| 27.20              | .269973 02 | .274641 02 | .283999 02 | .293999 02 | .305151 02 | .317151 02 | .332551 02 | .349512 02 | .370352 02 | .383404 02 |

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $p$

| $p \backslash Q$ | .475000    | .450000    | .400000    | .350000    | .300000    | .250000    | .200000    | .150000    | .100000    | .075000    |
|------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 27.50            | .272973 02 | .277655 02 | .287314 02 | .297530 02 | .308552 02 | .320747 02 | .334694 02 | .351446 02 | .373290 02 | .387825 02 |
| 27.75            | .275495 02 | .281138 02 | .289900 02 | .300161 02 | .311231 02 | .323476 02 | .337460 02 | .354299 02 | .376159 02 | .390614 02 |
| 28.00            | .278016 02 | .283740 02 | .292486 02 | .302791 02 | .313909 02 | .326205 02 | .340266 02 | .357150 02 | .379019 02 | .393481 02 |
| 28.25            | .280537 02 | .286262 02 | .295072 02 | .305421 02 | .316586 02 | .328933 02 | .343050 02 | .359999 02 | .381879 02 | .396346 02 |
| 28.50            | .283057 02 | .288782 02 | .297657 02 | .308051 02 | .319262 02 | .331659 02 | .345832 02 | .362847 02 | .384721 02 | .399188 02 |
| 28.75            | .285578 02 | .291303 02 | .300241 02 | .310679 02 | .321937 02 | .334385 02 | .348614 02 | .365694 02 | .387569 02 | .402036 02 |
| 29.00            | .288099 02 | .293824 02 | .302825 02 | .313308 02 | .324612 02 | .337109 02 | .351394 02 | .368538 02 | .390413 02 | .404880 02 |
| 29.25            | .290619 02 | .296344 02 | .305409 02 | .315935 02 | .327285 02 | .339833 02 | .354172 02 | .371382 02 | .393257 02 | .407724 02 |
| 29.50            | .293140 02 | .298865 02 | .307993 02 | .318562 02 | .329959 02 | .342555 02 | .356950 02 | .374223 02 | .396121 02 | .409588 02 |
| 29.75            | .295660 02 | .301385 02 | .310576 02 | .321189 02 | .332631 02 | .345277 02 | .359727 02 | .377064 02 | .399042 02 | .411677 02 |
| 30.00            | .298181 02 | .303906 02 | .313159 02 | .323815 02 | .335302 02 | .347997 02 | .362502 02 | .379903 02 | .401880 02 | .414649 02 |
| 30.25            | .300701 02 | .306426 02 | .315741 02 | .326440 02 | .337973 02 | .350717 02 | .365276 02 | .382740 02 | .404777 02 | .417619 02 |
| 30.50            | .303221 02 | .308946 02 | .318323 02 | .329065 02 | .340643 02 | .353436 02 | .368049 02 | .385576 02 | .408492 02 | .421355 02 |
| 30.75            | .305741 02 | .311466 02 | .320905 02 | .331699 02 | .343313 02 | .356154 02 | .370821 02 | .388410 02 | .411217 02 | .424079 02 |
| 31.00            | .308261 02 | .313986 02 | .323486 02 | .334314 02 | .345981 02 | .358871 02 | .373591 02 | .391244 02 | .414027 02 | .426789 02 |
| 31.25            | .310781 02 | .316506 02 | .326067 02 | .336937 02 | .348649 02 | .361587 02 | .376361 02 | .394076 02 | .416827 02 | .429540 02 |
| 31.50            | .313301 02 | .319026 02 | .328648 02 | .339560 02 | .351317 02 | .364302 02 | .379129 02 | .396906 02 | .420036 02 | .432789 02 |
| 31.75            | .315820 02 | .321545 02 | .331229 02 | .342182 02 | .353983 02 | .367016 02 | .381897 02 | .399735 02 | .422942 02 | .435695 02 |
| 32.00            | .318340 02 | .324065 02 | .333809 02 | .344804 02 | .356649 02 | .369730 02 | .384663 02 | .402563 02 | .425647 02 | .438400 02 |
| 32.25            | .320860 02 | .326585 02 | .336380 02 | .347426 02 | .359315 02 | .372442 02 | .387428 02 | .405389 02 | .428471 02 | .441224 02 |
| 32.50            | .323379 02 | .329104 02 | .338968 02 | .350047 02 | .361979 02 | .375154 02 | .390193 02 | .408215 02 | .431253 02 | .444006 02 |
| 32.75            | .325899 02 | .331624 02 | .341547 02 | .352667 02 | .364643 02 | .377865 02 | .392956 02 | .411039 02 | .434053 02 | .446806 02 |
| 33.00            | .328418 02 | .334143 02 | .344126 02 | .355287 02 | .367263 02 | .380485 02 | .395576 02 | .413659 02 | .436673 02 | .449426 02 |
| 33.25            | .330937 02 | .336662 02 | .346645 02 | .357807 02 | .369783 02 | .383005 02 | .398096 02 | .416179 02 | .439193 02 | .451946 02 |
| 33.50            | .333457 02 | .339182 02 | .349165 02 | .360327 02 | .372303 02 | .385525 02 | .400616 02 | .418699 02 | .441713 02 | .454466 02 |
| 33.75            | .335976 02 | .341701 02 | .351684 02 | .362846 02 | .374822 02 | .388044 02 | .403135 02 | .421218 02 | .444232 02 | .456985 02 |
| 34.00            | .338495 02 | .344220 02 | .354203 02 | .365365 02 | .377341 02 | .390563 02 | .405654 02 | .423737 02 | .446751 02 | .459504 02 |
| 34.25            | .341014 02 | .346739 02 | .356722 02 | .367884 02 | .379860 02 | .393082 02 | .408173 02 | .426256 02 | .449270 02 | .462023 02 |
| 34.50            | .343533 02 | .349258 02 | .359241 02 | .370403 02 | .382379 02 | .395601 02 | .410692 02 | .428775 02 | .451789 02 | .464542 02 |
| 34.75            | .346052 02 | .351777 02 | .361760 02 | .372922 02 | .384908 02 | .398130 02 | .413221 02 | .431304 02 | .454318 02 | .467071 02 |
| 35.00            | .348571 02 | .354296 02 | .364279 02 | .375441 02 | .387417 02 | .399539 02 | .414630 02 | .432713 02 | .455727 02 | .468480 02 |
| 35.25            | .351090 02 | .356815 02 | .366798 02 | .377960 02 | .389936 02 | .402058 02 | .417149 02 | .435232 02 | .458246 02 | .471009 02 |
| 35.50            | .353609 02 | .359334 02 | .369317 02 | .380479 02 | .392455 02 | .404577 02 | .419668 02 | .437751 02 | .460765 02 | .473518 02 |
| 35.75            | .356128 02 | .361853 02 | .371836 02 | .383008 02 | .394984 02 | .407106 02 | .422197 02 | .440280 02 | .463294 02 | .476047 02 |
| 36.00            | .358647 02 | .364372 02 | .374355 02 | .385517 02 | .397493 02 | .409615 02 | .424706 02 | .442789 02 | .465803 02 | .478556 02 |
| 36.25            | .361166 02 | .366891 02 | .376874 02 | .388036 02 | .399912 02 | .412034 02 | .427125 02 | .445208 02 | .468222 02 | .481075 02 |
| 36.50            | .363685 02 | .369410 02 | .379393 02 | .390555 02 | .402431 02 | .414553 02 | .429644 02 | .447727 02 | .470741 02 | .483494 02 |
| 36.75            | .366204 02 | .371929 02 | .381912 02 | .393074 02 | .404950 02 | .417072 02 | .432163 02 | .450246 02 | .473260 02 | .486013 02 |
| 37.00            | .368723 02 | .374448 02 | .384431 02 | .395593 02 | .407469 02 | .419591 02 | .434682 02 | .452765 02 | .475779 02 | .488532 02 |
| 37.25            | .371242 02 | .376967 02 | .386950 02 | .398112 02 | .410088 02 | .422210 02 | .437301 02 | .455384 02 | .478398 02 | .491151 02 |
| 37.50            | .373761 02 | .379486 02 | .389469 02 | .400631 02 | .412507 02 | .424629 02 | .439720 02 | .457803 02 | .480817 02 | .493570 02 |
| 37.75            | .376280 02 | .382005 02 | .391988 02 | .403150 02 | .415026 02 | .427148 02 | .442239 02 | .460322 02 | .483336 02 | .496089 02 |
| 38.00            | .378799 02 | .384524 02 | .394507 02 | .405669 02 | .417545 02 | .429667 02 | .444758 02 | .462841 02 | .485855 02 | .498608 02 |
| 38.25            | .381318 02 | .387043 02 | .397026 02 | .408188 02 | .420064 02 | .432186 02 | .447277 02 | .465360 02 | .488374 02 | .501127 02 |
| 38.50            | .383837 02 | .389562 02 | .399545 02 | .410707 02 | .422583 02 | .434705 02 | .449796 02 | .467879 02 | .490893 02 | .503646 02 |
| 38.75            | .386356 02 | .392081 02 | .402064 02 | .413226 02 | .425102 02 | .437224 02 | .452315 02 | .470398 02 | .493412 02 | .506165 02 |
| 39.00            | .388875 02 | .394599 02 | .404582 02 | .415744 02 | .427620 02 | .439742 02 | .454833 02 | .472916 02 | .495930 02 | .508683 02 |
| 39.25            | .391394 02 | .397119 02 | .407102 02 | .418264 02 | .430140 02 | .442262 02 | .457353 02 | .475436 02 | .498450 02 | .511203 02 |
| 39.50            | .393913 02 | .399638 02 | .409621 02 | .420783 02 | .432659 02 | .444781 02 | .459872 02 | .477955 02 | .500969 02 | .513722 02 |
| 39.75            | .396432 02 | .402157 02 | .412140 02 | .423302 02 | .435178 02 | .447300 02 | .462391 02 | .480474 02 | .503488 02 | .516241 02 |
| 40.00            | .398951 02 | .404676 02 | .414659 02 | .425821 02 | .437697 02 | .449819 02 | .464910 02 | .482993 02 | .505907 02 | .518660 02 |

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\lambda$

| $\lambda/Q$ | .453360 | .460000 | .466640 | .473280 | .479920 | .486560 | .493200 | .499840 | .506480 | .513120 | .519760 | .526400 | .533040 | .539680 | .546320 | .552960 | .559600 | .566240 | .572880 | .579520 | .586160 | .592800 | .599440 | .606080 | .612720 | .619360 | .626000 | .632640 | .639280 | .645920 | .652560 | .659200 | .665840 | .672480 | .679120 | .685760 | .692400 | .699040 | .705680 | .712320 | .718960 | .725600 | .732240 | .738880 | .745520 | .752160 | .758800 | .765440 | .772080 | .778720 | .785360 | .792000 | .798640 | .805280 | .811920 | .818560 | .825200 | .831840 | .838480 | .845120 | .851760 | .858400 | .865040 | .871680 | .878320 | .884960 | .891600 | .898240 | .904880 | .911520 | .918160 | .924800 | .931440 | .938080 | .944720 | .951360 | .958000 | .964640 | .971280 | .977920 | .984560 | .991200 | .997840 | 1.004480 | 1.011120 | 1.017760 | 1.024400 | 1.031040 | 1.037680 | 1.044320 | 1.050960 | 1.057600 | 1.064240 | 1.070880 | 1.077520 | 1.084160 | 1.090800 | 1.097440 | 1.104080 | 1.110720 | 1.117360 | 1.124000 | 1.130640 | 1.137280 | 1.143920 | 1.150560 | 1.157200 | 1.163840 | 1.170480 | 1.177120 | 1.183760 | 1.190400 | 1.197040 | 1.203680 | 1.210320 | 1.216960 | 1.223600 | 1.230240 | 1.236880 | 1.243520 | 1.250160 | 1.256800 | 1.263440 | 1.270080 | 1.276720 | 1.283360 | 1.290000 | 1.296640 | 1.303280 | 1.309920 | 1.316560 | 1.323200 | 1.329840 | 1.336480 | 1.343120 | 1.349760 | 1.356400 | 1.363040 | 1.369680 | 1.376320 | 1.382960 | 1.389600 | 1.396240 | 1.402880 | 1.409520 | 1.416160 | 1.422800 | 1.429440 | 1.436080 | 1.442720 | 1.449360 | 1.456000 | 1.462640 | 1.469280 | 1.475920 | 1.482560 | 1.489200 | 1.495840 | 1.502480 | 1.509120 | 1.515760 | 1.522400 | 1.529040 | 1.535680 | 1.542320 | 1.548960 | 1.555600 | 1.562240 | 1.568880 | 1.575520 | 1.582160 | 1.588800 | 1.595440 | 1.602080 | 1.608720 | 1.615360 | 1.622000 | 1.628640 | 1.635280 | 1.641920 | 1.648560 | 1.655200 | 1.661840 | 1.668480 | 1.675120 | 1.681760 | 1.688400 | 1.695040 | 1.701680 | 1.708320 | 1.714960 | 1.721600 | 1.728240 | 1.734880 | 1.741520 | 1.748160 | 1.754800 | 1.761440 | 1.768080 | 1.774720 | 1.781360 | 1.788000 | 1.794640 | 1.801280 | 1.807920 | 1.814560 | 1.821200 | 1.827840 | 1.834480 | 1.841120 | 1.847760 | 1.854400 | 1.861040 | 1.867680 | 1.874320 | 1.880960 | 1.887600 | 1.894240 | 1.900880 | 1.907520 | 1.914160 | 1.920800 | 1.927440 | 1.934080 | 1.940720 | 1.947360 | 1.954000 | 1.960640 | 1.967280 | 1.973920 | 1.980560 | 1.987200 | 1.993840 | 2.000480 | 2.007120 | 2.013760 | 2.020400 | 2.027040 | 2.033680 | 2.040320 | 2.046960 | 2.053600 | 2.060240 | 2.066880 | 2.073520 | 2.080160 | 2.086800 | 2.093440 | 2.100080 | 2.106720 | 2.113360 | 2.120000 | 2.126640 | 2.133280 | 2.139920 | 2.146560 | 2.153200 | 2.159840 | 2.166480 | 2.173120 | 2.179760 | 2.186400 | 2.193040 | 2.199680 | 2.206320 | 2.212960 | 2.219600 | 2.226240 | 2.232880 | 2.239520 | 2.246160 | 2.252800 | 2.259440 | 2.266080 | 2.272720 | 2.279360 | 2.286000 | 2.292640 | 2.299280 | 2.305920 | 2.312560 | 2.319200 | 2.325840 | 2.332480 | 2.339120 | 2.345760 | 2.352400 | 2.359040 | 2.365680 | 2.372320 | 2.378960 | 2.385600 | 2.392240 | 2.398880 | 2.405520 | 2.412160 | 2.418800 | 2.425440 | 2.432080 | 2.438720 | 2.445360 | 2.452000 | 2.458640 | 2.465280 | 2.471920 | 2.478560 | 2.485200 | 2.491840 | 2.498480 | 2.505120 | 2.511760 | 2.518400 | 2.525040 | 2.531680 | 2.538320 | 2.544960 | 2.551600 | 2.558240 | 2.564880 | 2.571520 | 2.578160 | 2.584800 | 2.591440 | 2.598080 | 2.604720 | 2.611360 | 2.618000 | 2.624640 | 2.631280 | 2.637920 | 2.644560 | 2.651200 | 2.657840 | 2.664480 | 2.671120 | 2.677760 | 2.684400 | 2.691040 | 2.697680 | 2.704320 | 2.710960 | 2.717600 | 2.724240 | 2.730880 | 2.737520 | 2.744160 | 2.750800 | 2.757440 | 2.764080 | 2.770720 | 2.777360 | 2.784000 | 2.790640 | 2.797280 | 2.803920 | 2.810560 | 2.817200 | 2.823840 | 2.830480 | 2.837120 | 2.843760 | 2.850400 | 2.857040 | 2.863680 | 2.870320 | 2.876960 | 2.883600 | 2.890240 | 2.896880 | 2.903520 | 2.910160 | 2.916800 | 2.923440 | 2.930080 | 2.936720 | 2.943360 | 2.950000 | 2.956640 | 2.963280 | 2.969920 | 2.976560 | 2.983200 | 2.989840 | 2.996480 | 3.003120 | 3.009760 | 3.016400 | 3.023040 | 3.029680 | 3.036320 | 3.042960 | 3.049600 | 3.056240 | 3.062880 | 3.069520 | 3.076160 | 3.082800 | 3.089440 | 3.096080 | 3.102720 | 3.109360 | 3.116000 | 3.122640 | 3.129280 | 3.135920 | 3.142560 | 3.149200 | 3.155840 | 3.162480 | 3.169120 | 3.175760 | 3.182400 | 3.189040 | 3.195680 | 3.202320 | 3.208960 | 3.215600 | 3.222240 | 3.228880 | 3.235520 | 3.242160 | 3.248800 | 3.255440 | 3.262080 | 3.268720 | 3.275360 | 3.282000 | 3.288640 | 3.295280 | 3.301920 | 3.308560 | 3.315200 | 3.321840 | 3.328480 | 3.335120 | 3.341760 | 3.348400 | 3.355040 | 3.361680 | 3.368320 | 3.374960 | 3.381600 | 3.388240 | 3.394880 | 3.401520 | 3.408160 | 3.414800 | 3.421440 | 3.428080 | 3.434720 | 3.441360 | 3.448000 | 3.454640 | 3.461280 | 3.467920 | 3.474560 | 3.481200 | 3.487840 | 3.494480 | 3.501120 | 3.507760 | 3.514400 | 3.521040 | 3.527680 | 3.534320 | 3.540960 | 3.547600 | 3.554240 | 3.560880 | 3.567520 | 3.574160 | 3.580800 | 3.587440 | 3.594080 | 3.600720 | 3.607360 | 3.614000 | 3.620640 | 3.627280 | 3.633920 | 3.640560 | 3.647200 | 3.653840 | 3.660480 | 3.667120 | 3.673760 | 3.680400 | 3.687040 | 3.693680 | 3.700320 | 3.706960 | 3.713600 | 3.720240 | 3.726880 | 3.733520 | 3.740160 | 3.746800 | 3.753440 | 3.760080 | 3.766720 | 3.773360 | 3.780000 | 3.786640 | 3.793280 | 3.799920 | 3.806560 | 3.813200 | 3.819840 | 3.826480 | 3.833120 | 3.839760 | 3.846400 | 3.853040 | 3.859680 | 3.866320 | 3.872960 | 3.879600 | 3.886240 | 3.892880 | 3.899520 | 3.906160 | 3.912800 | 3.919440 | 3.926080 | 3.932720 | 3.939360 | 3.946000 | 3.952640 | 3.959280 | 3.965920 | 3.972560 | 3.979200 | 3.985840 | 3.992480 | 3.999120 | 4.005760 | 4.012400 | 4.019040 | 4.025680 | 4.032320 | 4.038960 | 4.045600 | 4.052240 | 4.058880 | 4.065520 | 4.072160 | 4.078800 | 4.085440 | 4.092080 | 4.098720 | 4.105360 | 4.112000 | 4.118640 | 4.125280 | 4.131920 | 4.138560 | 4.145200 | 4.151840 | 4.158480 | 4.165120 | 4.171760 | 4.178400 | 4.185040 | 4.191680 | 4.198320 | 4.204960 | 4.211600 | 4.218240 | 4.224880 | 4.231520 | 4.238160 | 4.244800 | 4.251440 | 4.258080 | 4.264720 | 4.271360 | 4.278000 | 4.284640 | 4.291280 | 4.297920 | 4.304560 | 4.311200 | 4.317840 | 4.324480 | 4.331120 | 4.337760 | 4.344400 | 4.351040 | 4.357680 | 4.364320 | 4.370960 | 4.377600 | 4.384240 | 4.390880 | 4.397520 | 4.404160 | 4.410800 | 4.417440 | 4.424080 | 4.430720 | 4.437360 | 4.444000 | 4.450640 | 4.457280 | 4.463920 | 4.470560 | 4.477200 | 4.483840 | 4.490480 | 4.497120 | 4.503760 | 4.510400 | 4.517040 | 4.523680 | 4.530320 | 4.536960 | 4.543600 | 4.550240 | 4.556880 | 4.563520 | 4.570160 | 4.576800 | 4.583440 | 4.590080 | 4.596720 | 4.603360 | 4.610000 | 4.616640 | 4.623280 | 4.629920 | 4.636560 | 4.643200 | 4.649840 | 4.656480 | 4.663120 | 4.669760 | 4.676400 | 4.683040 | 4.689680 | 4.696320 | 4.702960 | 4.709600 | 4.716240 | 4.722880 | 4.729520 | 4.736160 | 4.742800 | 4.749440 | 4.756080 | 4.762720 | 4.769360 | 4.776000 | 4.782640 | 4.789280 | 4.795920 | 4.802560 | 4.809200 | 4.815840 | 4.822480 | 4.829120 | 4.835760 | 4.842400 | 4.849040 | 4.855680 | 4.862320 | 4.868960 | 4.875600 | 4.882240 | 4.888880 | 4.895520 | 4.902160 | 4.908800 | 4.915440 | 4.922080 | 4.928720 | 4.935360 | 4.942000 | 4.948640 | 4.955280 | 4.961920 | 4.968560 | 4.975200 | 4.981840 | 4.988480 | 4.995120 | 5.001760 | 5.008400 | 5.015040 | 5.021680 | 5.028320 | 5.034960 | 5.041600 | 5.048240 | 5.054880 | 5.061520 | 5.068160 | 5.074800 | 5.081440 | 5.088080 | 5.094720 | 5.101360 | 5.108000 | 5.114640 | 5.121280 | 5.127920 | 5.134560 | 5.141200 | 5.147840 | 5.154480 | 5.161120 | 5.167760 | 5.174400 | 5.181040 | 5.187680 | 5.194320 | 5.200960 | 5.207600 | 5.214240 | 5.220880 | 5.227520 | 5.234160 | 5.240800 | 5.247440 | 5.254080 | 5.260720 | 5.267360 | 5.274000 | 5.280640 | 5.287280 | 5.293920 | 5.300560 | 5.307200 | 5.313840 | 5.320480 | 5.327120 | 5.333760 | 5.340400 | 5.347040 | 5.353680 | 5.360320 | 5.366960 | 5.373600 | 5.380240 | 5.386880 | 5.393520 | 5.400160 | 5.406800 | 5.413440 | 5.420080 | 5.426720 | 5.433360 | 5.440000 | 5.446640 | 5.453280 | 5.459920 | 5.466560 | 5.473200 | 5.479840 | 5.486480 | 5.493120 | 5.499760 | 5.506400 | 5.513040 | 5.519680 | 5.526320 | 5.532960 | 5.539600 | 5.546240 | 5.552880 | 5.559520 | 5.566160 | 5.572800 | 5.579440 | 5.586080 | 5.592720 | 5.599360 | 5.606000 | 5.612640 | 5.619280 | 5.625920 | 5.632560 | 5.639200 | 5.645840 | 5.652480 | 5.659120 | 5.665760 | 5.672400 | 5.679040 | 5.685680 | 5.692320 | 5.698960 | 5.705600 | 5.712240 | 5.718880 | 5.725520 | 5.732160 | 5.738800 | 5.745440 | 5.752080 | 5.758720 | 5.765360 | 5.772000 | 5.778640 | 5.785280 | 5.791920 | 5.798560 | 5.805200 | 5.811840 | 5.818480 | 5.825120 | 5.831760 | 5.838400 | 5.845040 | 5.851680 | 5.858320 | 5.864960 | 5.871600 | 5.878240 | 5.884880 | 5.891520 | 5.898160 | 5.904800 | 5.911440 | 5.918080 | 5.924720 | 5.931360 | 5.938000 | 5.944640 | 5.951280 | 5.957920 | 5.964560 | 5.971200 | 5.977840 | 5.984480 | 5.991120 | 5.997760 | 6.004400 | 6.011040 | 6.017680 | 6.024320 | 6.030960 | 6.037600 | 6.044240 | 6.050880 | 6.057520 | 6.064160 | 6.070800 | 6.077440 | 6.084080 | 6.090720 | 6.097360 | 6.104000 | 6.110640 | 6.117280 | 6.123920 | 6.130560 | 6.137200 | 6.143840 | 6.150480 | 6.157120 | 6.163760 | 6.170400 | 6.177040 | 6.183680 | 6.190320 | 6.196960 | 6.203600 | 6.210240 | 6.216880 | 6.223520 | 6.230160 | 6.236800 | 6.243440 | 6.250080 | 6.256720 | 6.263360 | 6.270000 | 6.276640 | 6.283280 | 6.289920 | 6.296560 | 6.303200 | 6.309840 | 6.316480 | 6.323120 | 6.329760 | 6.336400 | 6.343040 | 6.349680 | 6.356320 | 6.362960 | 6.369600 | 6.376240 | 6.382880 | 6.389520 | 6.396160 | 6.402800 | 6.409440 | 6.416080 | 6.422720 | 6.429360 | 6.436000 | 6.442640 | 6.449280 | 6.455920 | 6.462560 | 6.469200 | 6.475840 | 6.482480 | 6.489120 | 6.495760 | 6.502400 | 6.509040 | 6.515680 | 6.522320 | 6.528960 | 6.535600 | 6.542240 | 6.548880 | 6.555520 | 6.562160 | 6.568800 | 6.575440 | 6.582080 | 6.588720 | 6.595360 | 6.602000 | 6.608640 | 6.615280 | 6.621920 | 6.628560 | 6.635200 | 6.641840 | 6.648480 | 6.655120 | 6.661760 | 6.668400 | 6.675040 | 6.681680 | 6.688320 | 6.694960 | 6.701600 | 6.708240 | 6.714880 | 6.721520 | 6.728160 | 6.734800 | 6.741440 | 6.748080 | 6.754720 | 6.761360 | 6.768000 | 6.774640 | 6.781280 | 6.787920 | 6.794560 |
|-------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|--------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Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu$ | 0.75000    | 0.50000    | 0.25000    | 0.10000     | 0.05000     | 0.02500     | 0.01000     | 0.00500     | 0.00100     |
|-------|------------|------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 62.5  | .625337 02 | .632113 02 | .641924 02 | .652037 02  | .662152 02  | .671656 02  | .680456 02  | .688456 02  | .695637 02  |
| 63.0  | .630308 02 | .637076 02 | .646887 02 | .656999 02  | .667114 02  | .676618 02  | .685418 02  | .693418 02  | .700600 02  |
| 63.5  | .635279 02 | .642047 02 | .651858 02 | .661970 02  | .672085 02  | .681589 02  | .690389 02  | .698389 02  | .705571 02  |
| 64.0  | .640250 02 | .647018 02 | .656829 02 | .666941 02  | .677056 02  | .686560 02  | .695360 02  | .703360 02  | .710542 02  |
| 64.5  | .645221 02 | .651989 02 | .661799 02 | .671911 02  | .682026 02  | .691530 02  | .700330 02  | .708330 02  | .715512 02  |
| 65.0  | .650192 02 | .656960 02 | .666770 02 | .676882 02  | .686997 02  | .696501 02  | .705301 02  | .713301 02  | .720483 02  |
| 65.5  | .655163 02 | .661931 02 | .671741 02 | .681853 02  | .691968 02  | .701472 02  | .710272 02  | .718272 02  | .725454 02  |
| 66.0  | .660134 02 | .666902 02 | .676712 02 | .686824 02  | .696939 02  | .706443 02  | .715243 02  | .723243 02  | .730425 02  |
| 66.5  | .665105 02 | .671873 02 | .681683 02 | .691795 02  | .701910 02  | .711414 02  | .720214 02  | .728214 02  | .735396 02  |
| 67.0  | .670076 02 | .676844 02 | .686654 02 | .696766 02  | .706881 02  | .716385 02  | .725185 02  | .733185 02  | .740367 02  |
| 67.5  | .675047 02 | .681815 02 | .691625 02 | .701737 02  | .711852 02  | .721356 02  | .730156 02  | .738156 02  | .745338 02  |
| 68.0  | .680018 02 | .686786 02 | .696596 02 | .706708 02  | .716823 02  | .726327 02  | .735127 02  | .743127 02  | .750309 02  |
| 68.5  | .684989 02 | .691757 02 | .701567 02 | .711679 02  | .721794 02  | .731298 02  | .740098 02  | .748098 02  | .755280 02  |
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| 100.0 | .998162 02 | .999930 02 | .999740 02 | 1.009844 02 | 1.019348 02 | 1.028348 02 | 1.036348 02 | 1.044348 02 | 1.052338 02 |

Percentage Points of the  $\chi^2$  - Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu$ | .475000    | .450000    | .400000    | .350000    | .300000    | .250000    | .200000    | .150000    | .100000    | .075000    |
|-------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 87.5  | .87627 02  | .884937 02 | .902137 02 | .920083 02 | .939250 02 | .960229 02 | .983952 02 | .101209 03 | .104824 03 | .107150 03 |
| 88.0  | .881551 02 | .890216 02 | .907363 02 | .925229 02 | .944448 02 | .965484 02 | .989271 02 | .101740 03 | .105372 03 | .107752 03 |
| 88.5  | .886824 02 | .895489 02 | .912636 02 | .930502 02 | .949721 02 | .970739 02 | .994526 02 | .102287 03 | .105921 03 | .108307 03 |
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| 90.5  | .907916 02 | .916581 02 | .933728 02 | .951594 02 | .970819 02 | .991751 02 | .101585 03 | .104443 03 | .108113 03 | .110523 03 |
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| 116.5 | .115062 02 | .116727 02 | .117198 03 | .119198 03 | .121639 03 | .123862 03 | .126375 03 | .129338 03 | .132781 03 | .135224 03 |
| 117.0 | .115505 02 | .117170 02 | .117641 03 | .119641 03 | .122082 03 | .124305 03 | .126818 03 | .129781 03 | .133224 03 | .135667 03 |
| 117.5 | .115948 02 | .117613 02 | .118084 03 | .120084 03 | .122525 03 | .124748 03 | .127261 03 | .130224 03 | .133667 03 | .136110 03 |
| 118.0 | .116391 02 | .118056 02 | .118527 03 | .120527 03 | .122968 03 | .125191 03 | .127704 03 | .130667 03 | .134110 03 | .136553 03 |
| 118.5 | .116834 02 | .118500 02 | .118971 03 | .120971 03 | .123412 03 | .125635 03 | .128148 03 | .131111 03 | .134554 03 | .137007 03 |
| 119.0 | .117277 02 | .118942 02 | .119413 03 | .121413 03 | .123854 03 | .126077 03 | .128590 03 | .131553 03 | .135006 03 | .137449 03 |
| 119.5 | .117720 02 | .119385 02 | .119856 03 | .121856 03 | .124297 03 | .126520 03 | .129033 03 | .131996 03 | .135439 03 | .137882 03 |
| 120.0 | .118163 02 | .119828 02 | .120299 03 | .122299 03 | .124740 03 | .126963 03 | .129476 03 | .132439 03 | .135882 03 | .138325 03 |
| 120.5 | .118606 02 | .120271 02 | .120742 03 | .122742 03 | .125183 03 | .127406 03 | .130019 03 | .132982 03 | .136425 03 | .138868 03 |
| 121.0 | .119049 02 | .120714 02 | .121185 03 | .123185 03 | .125626 03 | .127849 03 | .130362 03 | .133325 03 | .136768 03 | .139211 03 |
| 121.5 | .119492 02 | .121157 02 | .121628 03 | .123628 03 | .126069 03 | .128292 03 | .130805 03 | .133768 03 | .137211 03 | .139654 03 |
| 122.0 | .119935 02 | .121600 02 | .122071 03 | .124071 03 | .126512 03 | .128735 03 | .131248 03 | .134211 03 | .137654 03 | .140097 03 |
| 122.5 | .120378 02 | .122043 02 | .122514 03 | .124514 03 | .126955 03 | .129178 03 | .131691 03 | .134654 03 | .138097 03 | .140540 03 |
| 123.0 | .120821 02 | .122486 02 | .122957 03 | .124957 03 | .127398 03 | .129621 03 | .132134 03 | .135097 03 | .138540 03 | .140983 03 |
| 123.5 | .121264 02 | .122929 02 | .123400 03 | .125400 03 | .127841 03 | .130064 03 | .132577 03 | .135540 03 | .138983 03 | .141426 03 |
| 124.0 | .121707 02 | .123372 02 | .123843 03 | .125843 03 | .128284 03 | .130507 03 | .133020 03 | .135983 03 | .139426 03 | .141869 03 |
| 124.5 | .122150 02 | .123815 02 | .124286 03 | .126286 03 | .128727 03 | .130950 03 | .133463 03 | .136426 03 | .139869 03 | .142312 03 |
| 125.0 | .122593 02 | .124258 02 | .124729 03 | .126729 03 | .129170 03 | .131391 03 | .133904 03 | .136867 03 | .140312 03 | .142755 03 |
| 125.5 | .123036 02 | .124701 02 | .125172 03 | .127172 03 | .129613 03 | .131836 03 | .134349 03 | .137312 03 | .140755 03 | .143198 03 |
| 126.0 | .123479 02 | .125144 02 | .125615 03 | .127615 03 | .130056 03 | .132279 03 | .134792 03 | .137755 03 | .141198 03 | .143641 03 |
| 126.5 | .123922 02 | .125587 02 | .126058 03 | .128058 03 | .130497 03 |            |            |            |            |            |

Percentage Points of the  $\chi^2$  - Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu$ | .47500     | .45000     | .40000     | .35000     | .30000     | .25000     | .20000     | .15000     | .10000     | .075000    |
|-------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 112.5 | .112774 03 | .112723 03 | .112664 03 | .112603 03 | .112542 03 | .122222 03 | .124891 03 | .128051 03 | .132101 03 | .134755 03 |
| 113.0 | .112776 03 | .112727 03 | .112668 03 | .112606 03 | .112544 03 | .122227 03 | .124900 03 | .128061 03 | .132111 03 | .134755 03 |
| 113.5 | .112778 03 | .112729 03 | .112670 03 | .112608 03 | .112546 03 | .122232 03 | .124905 03 | .128066 03 | .132116 03 | .134755 03 |
| 114.0 | .112780 03 | .112731 03 | .112672 03 | .112610 03 | .112548 03 | .122237 03 | .124910 03 | .128071 03 | .132121 03 | .134755 03 |
| 114.5 | .112782 03 | .112733 03 | .112674 03 | .112612 03 | .112550 03 | .122242 03 | .124915 03 | .128076 03 | .132126 03 | .134755 03 |
| 115.0 | .112784 03 | .112735 03 | .112676 03 | .112614 03 | .112552 03 | .122247 03 | .124920 03 | .128081 03 | .132131 03 | .134755 03 |
| 115.5 | .112786 03 | .112737 03 | .112678 03 | .112616 03 | .112554 03 | .122252 03 | .124925 03 | .128086 03 | .132136 03 | .134755 03 |
| 116.0 | .112788 03 | .112739 03 | .112680 03 | .112618 03 | .112556 03 | .122257 03 | .124930 03 | .128091 03 | .132141 03 | .134755 03 |
| 116.5 | .112790 03 | .112741 03 | .112682 03 | .112620 03 | .112558 03 | .122262 03 | .124935 03 | .128096 03 | .132146 03 | .134755 03 |
| 117.0 | .112792 03 | .112743 03 | .112684 03 | .112622 03 | .112560 03 | .122267 03 | .124940 03 | .128101 03 | .132151 03 | .134755 03 |
| 117.5 | .112794 03 | .112745 03 | .112686 03 | .112624 03 | .112562 03 | .122272 03 | .124945 03 | .128106 03 | .132156 03 | .134755 03 |
| 118.0 | .112796 03 | .112747 03 | .112688 03 | .112626 03 | .112564 03 | .122277 03 | .124950 03 | .128111 03 | .132161 03 | .134755 03 |
| 118.5 | .112798 03 | .112749 03 | .112690 03 | .112628 03 | .112566 03 | .122282 03 | .124955 03 | .128116 03 | .132166 03 | .134755 03 |
| 119.0 | .112800 03 | .112751 03 | .112692 03 | .112630 03 | .112568 03 | .122287 03 | .124960 03 | .128121 03 | .132171 03 | .134755 03 |
| 119.5 | .112802 03 | .112753 03 | .112694 03 | .112632 03 | .112570 03 | .122292 03 | .124965 03 | .128126 03 | .132176 03 | .134755 03 |
| 120.0 | .112804 03 | .112755 03 | .112696 03 | .112634 03 | .112572 03 | .122297 03 | .124970 03 | .128131 03 | .132181 03 | .134755 03 |
| 120.5 | .112806 03 | .112757 03 | .112698 03 | .112636 03 | .112574 03 | .122302 03 | .124975 03 | .128136 03 | .132186 03 | .134755 03 |
| 121.0 | .112808 03 | .112759 03 | .112700 03 | .112638 03 | .112576 03 | .122307 03 | .124980 03 | .128141 03 | .132191 03 | .134755 03 |
| 121.5 | .112810 03 | .112761 03 | .112702 03 | .112640 03 | .112578 03 | .122312 03 | .124985 03 | .128146 03 | .132196 03 | .134755 03 |
| 122.0 | .112812 03 | .112763 03 | .112704 03 | .112642 03 | .112580 03 | .122317 03 | .124990 03 | .128151 03 | .132201 03 | .134755 03 |
| 122.5 | .112814 03 | .112765 03 | .112706 03 | .112644 03 | .112582 03 | .122322 03 | .124995 03 | .128156 03 | .132206 03 | .134755 03 |
| 123.0 | .112816 03 | .112767 03 | .112708 03 | .112646 03 | .112584 03 | .122327 03 | .124999 03 | .128161 03 | .132211 03 | .134755 03 |
| 123.5 | .112818 03 | .112769 03 | .112710 03 | .112648 03 | .112586 03 | .122332 03 | .125004 03 | .128166 03 | .132216 03 | .134755 03 |
| 124.0 | .112820 03 | .112771 03 | .112712 03 | .112650 03 | .112588 03 | .122337 03 | .125009 03 | .128171 03 | .132221 03 | .134755 03 |
| 124.5 | .112822 03 | .112773 03 | .112714 03 | .112652 03 | .112590 03 | .122342 03 | .125014 03 | .128176 03 | .132226 03 | .134755 03 |
| 125.0 | .112824 03 | .112775 03 | .112716 03 | .112654 03 | .112592 03 | .122347 03 | .125019 03 | .128181 03 | .132231 03 | .134755 03 |
| 125.5 | .112826 03 | .112777 03 | .112718 03 | .112656 03 | .112594 03 | .122352 03 | .125024 03 | .128186 03 | .132236 03 | .134755 03 |
| 126.0 | .112828 03 | .112779 03 | .112720 03 | .112658 03 | .112596 03 | .122357 03 | .125029 03 | .128191 03 | .132241 03 | .134755 03 |
| 126.5 | .112830 03 | .112781 03 | .112722 03 | .112660 03 | .112598 03 | .122362 03 | .125034 03 | .128196 03 | .132246 03 | .134755 03 |
| 127.0 | .112832 03 | .112783 03 | .112724 03 | .112662 03 | .112600 03 | .122367 03 | .125039 03 | .128201 03 | .132251 03 | .134755 03 |
| 127.5 | .112834 03 | .112785 03 | .112726 03 | .112664 03 | .112602 03 | .122372 03 | .125044 03 | .128206 03 | .132256 03 | .134755 03 |
| 128.0 | .112836 03 | .112787 03 | .112728 03 | .112666 03 | .112604 03 | .122377 03 | .125049 03 | .128211 03 | .132261 03 | .134755 03 |
| 128.5 | .112838 03 | .112789 03 | .112730 03 | .112668 03 | .112606 03 | .122382 03 | .125054 03 | .128216 03 | .132266 03 | .134755 03 |
| 129.0 | .112840 03 | .112791 03 | .112732 03 | .112670 03 | .112608 03 | .122387 03 | .125059 03 | .128221 03 | .132271 03 | .134755 03 |
| 129.5 | .112842 03 | .112793 03 | .112734 03 | .112672 03 | .112610 03 | .122392 03 | .125064 03 | .128226 03 | .132276 03 | .134755 03 |
| 130.0 | .112844 03 | .112795 03 | .112736 03 | .112674 03 | .112612 03 | .122397 03 | .125069 03 | .128231 03 | .132281 03 | .134755 03 |
| 130.5 | .112846 03 | .112797 03 | .112738 03 | .112676 03 | .112614 03 | .122402 03 | .125074 03 | .128236 03 | .132286 03 | .134755 03 |
| 131.0 | .112848 03 | .112799 03 | .112740 03 | .112678 03 | .112616 03 | .122407 03 | .125079 03 | .128241 03 | .132291 03 | .134755 03 |
| 131.5 | .112850 03 | .112801 03 | .112742 03 | .112680 03 | .112618 03 | .122412 03 | .125084 03 | .128246 03 | .132296 03 | .134755 03 |
| 132.0 | .112852 03 | .112803 03 | .112744 03 | .112682 03 | .112620 03 | .122417 03 | .125089 03 | .128251 03 | .132301 03 | .134755 03 |
| 132.5 | .112854 03 | .112805 03 | .112746 03 | .112684 03 | .112622 03 | .122422 03 | .125094 03 | .128256 03 | .132306 03 | .134755 03 |
| 133.0 | .112856 03 | .112807 03 | .112748 03 | .112686 03 | .112624 03 | .122427 03 | .125099 03 | .128261 03 | .132311 03 | .134755 03 |
| 133.5 | .112858 03 | .112809 03 | .112750 03 | .112688 03 | .112626 03 | .122432 03 | .125104 03 | .128266 03 | .132316 03 | .134755 03 |
| 134.0 | .112860 03 | .112811 03 | .112752 03 | .112690 03 | .112628 03 | .122437 03 | .125109 03 | .128271 03 | .132321 03 | .134755 03 |
| 134.5 | .112862 03 | .112813 03 | .112754 03 | .112692 03 | .112630 03 | .122442 03 | .125114 03 | .128276 03 | .132326 03 | .134755 03 |
| 135.0 | .112864 03 | .112815 03 | .112756 03 | .112694 03 | .112632 03 | .122447 03 | .125119 03 | .128281 03 | .132331 03 | .134755 03 |
| 135.5 | .112866 03 | .112817 03 | .112758 03 | .112696 03 | .112634 03 | .122452 03 | .125124 03 | .128286 03 | .132336 03 | .134755 03 |
| 136.0 | .112868 03 | .112819 03 | .112760 03 | .112698 03 | .112636 03 | .122457 03 | .125129 03 | .128291 03 | .132341 03 | .134755 03 |
| 136.5 | .112870 03 | .112821 03 | .112762 03 | .112700 03 | .112638 03 | .122462 03 | .125134 03 | .128296 03 | .132346 03 | .134755 03 |
| 137.0 | .112872 03 | .112823 03 | .112764 03 | .112702 03 | .112640 03 | .122467 03 | .125139 03 | .128301 03 | .132351 03 | .134755 03 |

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $v$

| $v \backslash Q$ | .475000    | .493300    | .400000    | .350000    | .300000    | .250000    | .200000    | .150000    | .100000    | .075000    |
|------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 137.5            | .137873 03 | .139322 03 | .141066 03 | .143365 03 | .145690 03 | .148293 03 | .151227 03 | .154696 03 | .159134 03 | .162039 03 |
| 138.0            | .138375 03 | .139826 03 | .141574 03 | .143873 03 | .146206 03 | .148813 03 | .151753 03 | .155227 03 | .159673 03 | .162582 03 |
| 138.5            | .138877 03 | .140330 03 | .142081 03 | .144380 03 | .146721 03 | .149333 03 | .152278 03 | .155750 03 | .160190 03 | .163126 03 |
| 139.0            | .139379 03 | .140834 03 | .142589 03 | .144889 03 | .147237 03 | .149854 03 | .152803 03 | .156280 03 | .160720 03 | .163669 03 |
| 139.5            | .139881 03 | .141338 03 | .143097 03 | .145397 03 | .147753 03 | .150374 03 | .153328 03 | .156821 03 | .161289 03 | .164242 03 |
| 140.0            | .140383 03 | .141842 03 | .143604 03 | .145904 03 | .148269 03 | .150894 03 | .153854 03 | .157352 03 | .161827 03 | .164785 03 |
| 140.5            | .140885 03 | .142345 03 | .144112 03 | .146412 03 | .148784 03 | .151414 03 | .154379 03 | .157883 03 | .162365 03 | .165298 03 |
| 141.0            | .141387 03 | .142849 03 | .144619 03 | .146919 03 | .149300 03 | .151934 03 | .154904 03 | .158414 03 | .162904 03 | .165861 03 |
| 141.5            | .141889 03 | .143353 03 | .145127 03 | .147427 03 | .149806 03 | .152445 03 | .155429 03 | .158945 03 | .163442 03 | .166384 03 |
| 142.0            | .142393 03 | .143859 03 | .145635 03 | .147933 03 | .150331 03 | .152975 03 | .155954 03 | .159475 03 | .163980 03 | .166927 03 |
| 142.5            | .142897 03 | .144365 03 | .146142 03 | .148440 03 | .150847 03 | .153495 03 | .156479 03 | .160006 03 | .164510 03 | .167470 03 |
| 143.0            | .143401 03 | .144871 03 | .146650 03 | .148952 03 | .151362 03 | .154015 03 | .157004 03 | .160537 03 | .165056 03 | .168033 03 |
| 143.5            | .143905 03 | .145377 03 | .147157 03 | .149463 03 | .151876 03 | .154535 03 | .157529 03 | .161068 03 | .165594 03 | .168585 03 |
| 144.0            | .144409 03 | .145883 03 | .147665 03 | .149975 03 | .152393 03 | .155055 03 | .158054 03 | .161598 03 | .166132 03 | .169098 03 |
| 144.5            | .144913 03 | .146389 03 | .148172 03 | .150486 03 | .152909 03 | .155574 03 | .158579 03 | .162129 03 | .166670 03 | .169640 03 |
| 145.0            | .145417 03 | .146895 03 | .148680 03 | .150997 03 | .153424 03 | .156094 03 | .159104 03 | .162659 03 | .167207 03 | .170183 03 |
| 145.5            | .145921 03 | .147401 03 | .149187 03 | .151509 03 | .153940 03 | .156614 03 | .159628 03 | .163190 03 | .167745 03 | .170725 03 |
| 146.0            | .146425 03 | .147907 03 | .149694 03 | .152018 03 | .154455 03 | .157134 03 | .160153 03 | .163720 03 | .168283 03 | .171267 03 |
| 146.5            | .146929 03 | .148413 03 | .150202 03 | .152521 03 | .154971 03 | .157654 03 | .160678 03 | .164251 03 | .168820 03 | .171809 03 |
| 147.0            | .147433 03 | .148919 03 | .150709 03 | .153032 03 | .155486 03 | .158174 03 | .161202 03 | .164781 03 | .169358 03 | .172351 03 |
| 147.5            | .147937 03 | .149425 03 | .151217 03 | .153544 03 | .156001 03 | .158693 03 | .161727 03 | .165311 03 | .169895 03 | .172893 03 |
| 148.0            | .148441 03 | .149931 03 | .151724 03 | .154053 03 | .156516 03 | .159213 03 | .162251 03 | .165841 03 | .170432 03 | .173435 03 |
| 148.5            | .148945 03 | .150437 03 | .152231 03 | .154566 03 | .157032 03 | .159732 03 | .162776 03 | .166372 03 | .170970 03 | .173977 03 |
| 149.0            | .149449 03 | .150943 03 | .152739 03 | .155077 03 | .157547 03 | .160252 03 | .163300 03 | .166902 03 | .171507 03 | .174519 03 |
| 149.5            | .149953 03 | .151449 03 | .153246 03 | .155587 03 | .158062 03 | .160772 03 | .163825 03 | .167432 03 | .172044 03 | .175061 03 |
| 150.0            | .150457 03 | .151955 03 | .153753 03 | .156095 03 | .158577 03 | .161291 03 | .164349 03 | .167962 03 | .172581 03 | .175602 03 |
| 150.5            | .150961 03 | .152461 03 | .154261 03 | .156601 03 | .159083 03 | .161811 03 | .164874 03 | .168492 03 | .173118 03 | .176144 03 |
| 151.0            | .151465 03 | .152967 03 | .154768 03 | .157109 03 | .159600 03 | .162338 03 | .165398 03 | .169022 03 | .173655 03 | .176686 03 |
| 151.5            | .151969 03 | .153473 03 | .155275 03 | .157616 03 | .160107 03 | .162850 03 | .165922 03 | .169551 03 | .174192 03 | .177227 03 |
| 152.0            | .152473 03 | .153979 03 | .155783 03 | .158124 03 | .160616 03 | .163369 03 | .166446 03 | .170081 03 | .174729 03 | .177768 03 |
| 152.5            | .152977 03 | .154485 03 | .156290 03 | .158633 03 | .161125 03 | .163888 03 | .166970 03 | .170611 03 | .175266 03 | .178310 03 |
| 153.0            | .153481 03 | .154991 03 | .156797 03 | .159140 03 | .161633 03 | .164408 03 | .167495 03 | .171141 03 | .175803 03 | .178851 03 |
| 153.5            | .153985 03 | .155497 03 | .157304 03 | .159647 03 | .162140 03 | .164927 03 | .168019 03 | .171670 03 | .176339 03 | .179392 03 |
| 154.0            | .154489 03 | .155999 03 | .157807 03 | .160150 03 | .162643 03 | .165446 03 | .168543 03 | .172200 03 | .176876 03 | .179933 03 |
| 154.5            | .154993 03 | .156505 03 | .158313 03 | .160656 03 | .163149 03 | .165966 03 | .169067 03 | .172730 03 | .177412 03 | .180474 03 |
| 155.0            | .155497 03 | .157011 03 | .158819 03 | .161162 03 | .163655 03 | .166484 03 | .169591 03 | .173259 03 | .177949 03 | .181015 03 |
| 155.5            | .155999 03 | .157515 03 | .159323 03 | .161666 03 | .164159 03 | .167000 03 | .170115 03 | .173789 03 | .178485 03 | .181556 03 |
| 156.0            | .156503 03 | .158020 03 | .159828 03 | .162171 03 | .164664 03 | .167523 03 | .170633 03 | .174318 03 | .179022 03 | .182097 03 |
| 156.5            | .156999 03 | .158517 03 | .160325 03 | .162668 03 | .165161 03 | .168042 03 | .171162 03 | .174847 03 | .179558 03 | .182638 03 |
| 157.0            | .157503 03 | .159022 03 | .160830 03 | .163173 03 | .165666 03 | .168561 03 | .171686 03 | .175377 03 | .180094 03 | .183179 03 |
| 157.5            | .157999 03 | .159519 03 | .161327 03 | .163670 03 | .166163 03 | .169068 03 | .172193 03 | .175896 03 | .180630 03 | .183719 03 |
| 158.0            | .158499 03 | .160019 03 | .161827 03 | .164170 03 | .166663 03 | .169578 03 | .172703 03 | .176406 03 | .181167 03 | .184260 03 |
| 158.5            | .158999 03 | .160519 03 | .162327 03 | .164670 03 | .167163 03 | .170088 03 | .173213 03 | .176916 03 | .181673 03 | .184760 03 |
| 159.0            | .159499 03 | .161019 03 | .162827 03 | .165170 03 | .167663 03 | .170588 03 | .173713 03 | .177416 03 | .182173 03 | .185260 03 |
| 159.5            | .159999 03 | .161519 03 | .163327 03 | .165670 03 | .168163 03 | .171088 03 | .174213 03 | .177916 03 | .182673 03 | .185760 03 |
| 160.0            | .160499 03 | .162019 03 | .163827 03 | .166170 03 | .168663 03 | .171588 03 | .174713 03 | .178416 03 | .183173 03 | .186260 03 |
| 160.5            | .160999 03 | .162519 03 | .164327 03 | .166670 03 | .169163 03 | .172088 03 | .175213 03 | .178916 03 | .183673 03 | .186760 03 |
| 161.0            | .161499 03 | .163019 03 | .164827 03 | .167170 03 | .169663 03 | .172588 03 | .175713 03 | .179416 03 | .184173 03 | .187260 03 |
| 161.5            | .161999 03 | .163519 03 | .165327 03 | .167670 03 | .170163 03 | .173088 03 | .176213 03 | .180916 03 | .185673 03 | .188760 03 |
| 162.0            | .162499 03 | .164019 03 | .165827 03 | .168170 03 | .170663 03 | .173588 03 | .176713 03 | .180416 03 | .185173 03 | .188260 03 |

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu$ | .67500  | .65000  | .62500  | .60000  | .55000  | .50000  | .25000  | .20000  | .15000  | .10000  | .07500  |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 12.5  | 16.2964 | 16.4154 | 16.5343 | 16.6533 | 16.7723 | 16.8913 | 17.0103 | 17.1293 | 17.2483 | 17.3673 | 17.4863 |
| 12.6  | 16.3164 | 16.4354 | 16.5543 | 16.6733 | 16.7923 | 16.9113 | 17.0303 | 17.1493 | 17.2683 | 17.3873 | 17.5063 |
| 12.7  | 16.3364 | 16.4554 | 16.5743 | 16.6933 | 16.8123 | 16.9313 | 17.0503 | 17.1693 | 17.2883 | 17.4073 | 17.5263 |
| 12.8  | 16.3564 | 16.4754 | 16.5943 | 16.7133 | 16.8323 | 16.9513 | 17.0703 | 17.1893 | 17.3083 | 17.4273 | 17.5463 |
| 12.9  | 16.3764 | 16.4954 | 16.6143 | 16.7333 | 16.8523 | 16.9713 | 17.0903 | 17.2093 | 17.3283 | 17.4473 | 17.5663 |
| 13.0  | 16.3964 | 16.5154 | 16.6343 | 16.7533 | 16.8723 | 16.9913 | 17.1103 | 17.2293 | 17.3483 | 17.4673 | 17.5863 |
| 13.1  | 16.4164 | 16.5354 | 16.6543 | 16.7733 | 16.8923 | 17.0113 | 17.1303 | 17.2493 | 17.3683 | 17.4873 | 17.6063 |
| 13.2  | 16.4364 | 16.5554 | 16.6743 | 16.7933 | 16.9123 | 17.0313 | 17.1503 | 17.2693 | 17.3883 | 17.5073 | 17.6263 |
| 13.3  | 16.4564 | 16.5754 | 16.6943 | 16.8133 | 16.9323 | 17.0513 | 17.1703 | 17.2893 | 17.4083 | 17.5273 | 17.6463 |
| 13.4  | 16.4764 | 16.5954 | 16.7143 | 16.8333 | 16.9523 | 17.0713 | 17.1903 | 17.3093 | 17.4283 | 17.5473 | 17.6663 |
| 13.5  | 16.4964 | 16.6154 | 16.7343 | 16.8533 | 16.9723 | 17.0913 | 17.2103 | 17.3293 | 17.4483 | 17.5673 | 17.6863 |
| 13.6  | 16.5164 | 16.6354 | 16.7543 | 16.8733 | 16.9923 | 17.1113 | 17.2303 | 17.3493 | 17.4683 | 17.5873 | 17.7063 |
| 13.7  | 16.5364 | 16.6554 | 16.7743 | 16.8933 | 17.0123 | 17.1313 | 17.2503 | 17.3693 | 17.4883 | 17.6073 | 17.7263 |
| 13.8  | 16.5564 | 16.6754 | 16.7943 | 16.9133 | 17.0323 | 17.1513 | 17.2703 | 17.3893 | 17.5083 | 17.6273 | 17.7463 |
| 13.9  | 16.5764 | 16.6954 | 16.8143 | 16.9333 | 17.0523 | 17.1713 | 17.2903 | 17.4093 | 17.5283 | 17.6473 | 17.7663 |
| 14.0  | 16.5964 | 16.7154 | 16.8343 | 16.9533 | 17.0723 | 17.1913 | 17.3103 | 17.4293 | 17.5483 | 17.6673 | 17.7863 |
| 14.1  | 16.6164 | 16.7354 | 16.8543 | 16.9733 | 17.0923 | 17.2113 | 17.3303 | 17.4493 | 17.5683 | 17.6873 | 17.8063 |
| 14.2  | 16.6364 | 16.7554 | 16.8743 | 16.9933 | 17.1123 | 17.2313 | 17.3503 | 17.4693 | 17.5883 | 17.7073 | 17.8263 |
| 14.3  | 16.6564 | 16.7754 | 16.8943 | 17.0133 | 17.1323 | 17.2513 | 17.3703 | 17.4893 | 17.6083 | 17.7273 | 17.8463 |
| 14.4  | 16.6764 | 16.7954 | 16.9143 | 17.0333 | 17.1523 | 17.2713 | 17.3903 | 17.5093 | 17.6283 | 17.7473 | 17.8663 |
| 14.5  | 16.6964 | 16.8154 | 16.9343 | 17.0533 | 17.1723 | 17.2913 | 17.4103 | 17.5293 | 17.6483 | 17.7673 | 17.8863 |
| 14.6  | 16.7164 | 16.8354 | 16.9543 | 17.0733 | 17.1923 | 17.3113 | 17.4303 | 17.5493 | 17.6683 | 17.7873 | 17.9063 |
| 14.7  | 16.7364 | 16.8554 | 16.9743 | 17.0933 | 17.2123 | 17.3313 | 17.4503 | 17.5693 | 17.6883 | 17.8073 | 17.9263 |
| 14.8  | 16.7564 | 16.8754 | 16.9943 | 17.1133 | 17.2323 | 17.3513 | 17.4703 | 17.5893 | 17.7083 | 17.8273 | 17.9463 |
| 14.9  | 16.7764 | 16.8954 | 17.0143 | 17.1333 | 17.2523 | 17.3713 | 17.4903 | 17.6093 | 17.7283 | 17.8473 | 17.9663 |
| 15.0  | 16.7964 | 16.9154 | 17.0343 | 17.1533 | 17.2723 | 17.3913 | 17.5103 | 17.6293 | 17.7483 | 17.8673 | 17.9863 |
| 15.1  | 16.8164 | 16.9354 | 17.0543 | 17.1733 | 17.2923 | 17.4113 | 17.5303 | 17.6493 | 17.7683 | 17.8873 | 18.0063 |
| 15.2  | 16.8364 | 16.9554 | 17.0743 | 17.1933 | 17.3123 | 17.4313 | 17.5503 | 17.6693 | 17.7883 | 17.9073 | 18.0263 |
| 15.3  | 16.8564 | 16.9754 | 17.0943 | 17.2133 | 17.3323 | 17.4513 | 17.5703 | 17.6893 | 17.8083 | 17.9273 | 18.0463 |
| 15.4  | 16.8764 | 16.9954 | 17.1143 | 17.2333 | 17.3523 | 17.4713 | 17.5903 | 17.7093 | 17.8283 | 17.9473 | 18.0663 |
| 15.5  | 16.8964 | 17.0154 | 17.1343 | 17.2533 | 17.3723 | 17.4913 | 17.6103 | 17.7293 | 17.8483 | 17.9673 | 18.0863 |
| 15.6  | 16.9164 | 17.0354 | 17.1543 | 17.2733 | 17.3923 | 17.5113 | 17.6303 | 17.7493 | 17.8683 | 17.9873 | 18.1063 |
| 15.7  | 16.9364 | 17.0554 | 17.1743 | 17.2933 | 17.4123 | 17.5313 | 17.6503 | 17.7693 | 17.8883 | 18.0073 | 18.1263 |
| 15.8  | 16.9564 | 17.0754 | 17.1943 | 17.3133 | 17.4323 | 17.5513 | 17.6703 | 17.7893 | 17.9083 | 18.0273 | 18.1463 |
| 15.9  | 16.9764 | 17.0954 | 17.2143 | 17.3333 | 17.4523 | 17.5713 | 17.6903 | 17.8093 | 17.9283 | 18.0473 | 18.1663 |
| 16.0  | 16.9964 | 17.1154 | 17.2343 | 17.3533 | 17.4723 | 17.5913 | 17.7103 | 17.8293 | 17.9483 | 18.0673 | 18.1863 |
| 16.1  | 17.0164 | 17.1354 | 17.2543 | 17.3733 | 17.4923 | 17.6113 | 17.7303 | 17.8493 | 17.9683 | 18.0873 | 18.2063 |
| 16.2  | 17.0364 | 17.1554 | 17.2743 | 17.3933 | 17.5123 | 17.6313 | 17.7503 | 17.8693 | 17.9883 | 18.1073 | 18.2263 |
| 16.3  | 17.0564 | 17.1754 | 17.2943 | 17.4133 | 17.5323 | 17.6513 | 17.7703 | 17.8893 | 18.0083 | 18.1273 | 18.2463 |
| 16.4  | 17.0764 | 17.1954 | 17.3143 | 17.4333 | 17.5523 | 17.6713 | 17.7903 | 17.9093 | 18.0283 | 18.1473 | 18.2663 |
| 16.5  | 17.0964 | 17.2154 | 17.3343 | 17.4533 | 17.5723 | 17.6913 | 17.8103 | 17.9293 | 18.0483 | 18.1673 | 18.2863 |
| 16.6  | 17.1164 | 17.2354 | 17.3543 | 17.4733 | 17.5923 | 17.7113 | 17.8303 | 17.9493 | 18.0683 | 18.1873 | 18.3063 |
| 16.7  | 17.1364 | 17.2554 | 17.3743 | 17.4933 | 17.6123 | 17.7313 | 17.8503 | 17.9693 | 18.0883 | 18.2073 | 18.3263 |
| 16.8  | 17.1564 | 17.2754 | 17.3943 | 17.5133 | 17.6323 | 17.7513 | 17.8703 | 17.9893 | 18.1083 | 18.2273 | 18.3463 |
| 16.9  | 17.1764 | 17.2954 | 17.4143 | 17.5333 | 17.6523 | 17.7713 | 17.8903 | 18.0093 | 18.1283 | 18.2473 | 18.3663 |
| 17.0  | 17.1964 | 17.3154 | 17.4343 | 17.5533 | 17.6723 | 17.7913 | 17.9103 | 18.0293 | 18.1483 | 18.2673 | 18.3863 |
| 17.1  | 17.2164 | 17.3354 | 17.4543 | 17.5733 | 17.6923 | 17.8113 | 17.9303 | 18.0493 | 18.1683 | 18.2873 | 18.4063 |
| 17.2  | 17.2364 | 17.3554 | 17.4743 | 17.5933 | 17.7123 | 17.8313 | 17.9503 | 18.0693 | 18.1883 | 18.3073 | 18.4263 |
| 17.3  | 17.2564 | 17.3754 | 17.4943 | 17.6133 | 17.7323 | 17.8513 | 17.9703 | 18.0893 | 18.2083 | 18.3273 | 18.4463 |
| 17.4  | 17.2764 | 17.3954 | 17.5143 | 17.6333 | 17.7523 | 17.8713 | 17.9903 | 18.1093 | 18.2283 | 18.3473 | 18.4663 |
| 17.5  | 17.2964 | 17.4154 | 17.5343 | 17.6533 | 17.7723 | 17.8913 | 18.0103 | 18.1293 | 18.2483 | 18.3673 | 18.4863 |
| 17.6  | 17.3164 | 17.4354 | 17.5543 | 17.6733 | 17.7923 | 17.9113 | 18.0303 | 18.1493 | 18.2683 | 18.3873 | 18.5063 |
| 17.7  | 17.3364 | 17.4554 | 17.5743 | 17.6933 | 17.8123 | 17.9313 | 18.0503 | 18.1693 | 18.2883 | 18.4073 | 18.5263 |
| 17.8  | 17.3564 | 17.4754 | 17.5943 | 17.7133 | 17.8323 | 17.9513 | 18.0703 | 18.1893 | 18.3083 | 18.4273 | 18.5463 |
| 17.9  | 17.3764 | 17.4954 | 17.6143 | 17.7333 | 17.8523 | 17.9713 | 18.0903 | 18.2093 | 18.3283 | 18.4473 | 18.5663 |
| 18.0  | 17.3964 | 17.5154 | 17.6343 | 17.7533 | 17.8723 | 17.9913 | 18.1103 | 18.2293 | 18.3483 | 18.4673 | 18.5863 |
| 18.1  | 17.4164 | 17.5354 | 17.6543 | 17.7733 | 17.8923 | 18.0113 | 18.1303 | 18.2493 | 18.3683 | 18.4873 | 18.6063 |
| 18.2  | 17.4364 | 17.5554 | 17.6743 | 17.7933 | 17.9123 | 18.0313 | 18.1503 | 18.2693 | 18.3883 | 18.5073 | 18.6263 |
| 18.3  | 17.4564 | 17.5754 | 17.6943 | 17.8133 | 17.9323 | 18.0513 | 18.1703 | 18.2893 | 18.4083 | 18.5273 | 18.6463 |
| 18.4  | 17.4764 | 17.5954 | 17.7143 | 17.8333 | 17.9523 | 18.0713 | 18.1903 | 18.3093 | 18.4283 | 18.5473 | 18.6663 |
| 18.5  | 17.4964 | 17.6154 | 17.7343 | 17.8533 | 17.9723 | 18.0913 | 18.2103 | 18.3293 | 18.4483 | 18.5673 | 18.6863 |
| 18.6  | 17.5164 | 17.6354 | 17.7543 | 17.8733 | 17.9923 | 18.1113 | 18.2303 | 18.3493 | 18.4683 | 18.5873 | 18.7063 |
| 18.7  | 17.5364 | 17.6554 | 17.7743 | 17.8933 | 18.0123 | 18.1313 | 18.2503 | 18.3693 | 18.4883 | 18.6073 | 18.7263 |
| 18.8  | 17.5564 | 17.6754 | 17.7943 | 17.9133 | 18.0323 | 18.1513 | 18.2703 | 18.3893 | 18.5083 | 18.6273 | 18.7463 |
| 18.9  | 17.5764 | 17.6954 | 17.8143 | 17.9333 | 18.0523 | 18.1713 | 18.2903 | 18.4093 | 18.5283 | 18.6473 | 18.7663 |
| 19.0  | 17.5964 | 17.7154 | 17.8343 | 17.9533 | 18.0723 | 18.1913 | 18.3103 | 18.4293 | 18.5483 | 18.6673 | 18.7863 |
| 19.1  | 17.6164 | 17.7354 | 17.8543 | 17.9733 | 18.0923 | 18.2113 | 18.3303 | 18.4493 | 18.5683 | 18.6873 | 18.8063 |
| 19.2  | 17.6364 | 17.7554 | 17.8743 | 17.9933 | 18.1123 | 18.2313 | 18.3503 | 18.4693 | 18.5883 | 18.7073 | 18.8263 |
| 19.3  | 17.6564 | 17.7754 | 17.8943 | 18.0133 | 18.1323 | 18.2513 | 18.3703 | 18.4893 | 18.6083 | 18.7273 | 18.8463 |
| 19.4  | 17.6764 | 17.7954 | 17.9143 | 18.0333 | 18.1523 | 18.2713 | 18.3903 | 18.5093 | 18.6283 | 18.7473 | 18.8663 |
| 19.5  | 17.6964 | 17.8154 | 17.9343 | 18.0533 | 18.1723 | 18.2913 | 18.4103 | 18.5293 | 18.6483 | 18.7673 | 18.8863 |
| 19.6  | 17.7164 | 17.8354 | 17.9543 | 18.0733 | 18.1923 | 18.3113 | 18.4303 | 18.5493 | 18.6683 | 18.7873 | 18.9063 |
| 19.7  | 17.7364 | 17.8554 | 17.9743 | 18.0933 | 18.2123 | 18.3313 | 18.4503 | 18.5693 | 18.6883 | 18.8073 | 18.9263 |
| 19.8  | 17.7564 | 17.8754 | 17.9943 | 18.1133 | 18.2323 | 18.3513 | 18.4703 | 18.5893 | 18.7083 | 18.8273 | 18.9463 |
| 19.9  | 17.7764 | 17.8954 | 18.0143 | 18.1333 | 18.2523 | 18.3713 | 18.4903 | 18.6093 | 18.7283 | 18.8473 | 18.9663 |
| 20.0  | 17.7964 | 17.9154 | 18.0343 | 18.1533 | 18.2723 | 18.3913 | 18.5103 | 18.6293 | 18.7483 | 18.8673 | 18.9863 |

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1. The first of these is the *Declaration of Independence*, which is the most important document in the history of the United States. It was written by Thomas Jefferson in 1776 and is the foundation of the American system of government.

|        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        | 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Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu$ | .475000   | .450000   | .400000   | .350000   | .300000   | .250000   | .200000   | .150000   | .100000   | .075000   |
|-------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 237.5 | 233201 03 | 233578 03 | 242389 03 | 245317 03 | 248428 03 | 251815 03 | 255621 03 | 260107 03 | 265824 03 | 269552 03 |
| 238.0 | 236702 02 | 237081 03 | 245895 03 | 248826 03 | 251940 03 | 255230 03 | 258641 03 | 263063 03 | 268553 03 | 270085 03 |
| 238.5 | 239204 03 | 239584 03 | 248401 03 | 251335 03 | 254452 03 | 257845 03 | 261660 03 | 266154 03 | 271683 03 | 270618 03 |
| 239.0 | 239705 03 | 240087 03 | 248906 03 | 251840 03 | 254964 03 | 258361 03 | 262179 03 | 266678 03 | 272212 03 | 271151 03 |
| 239.5 | 240206 03 | 240590 03 | 249412 03 | 252352 03 | 255476 03 | 258873 03 | 262699 03 | 267192 03 | 272741 03 | 271684 03 |
| 240.0 | 240708 03 | 241093 03 | 249918 03 | 252851 03 | 256088 03 | 259482 03 | 263318 03 | 267812 03 | 273191 03 | 272137 03 |
| 240.5 | 241210 03 | 241596 03 | 250424 03 | 253350 03 | 256698 03 | 260190 03 | 264037 03 | 268530 03 | 273640 03 | 272587 03 |
| 241.0 | 241711 03 | 242099 03 | 250929 03 | 253851 03 | 257202 03 | 260692 03 | 264539 03 | 269032 03 | 274089 03 | 273034 03 |
| 241.5 | 242212 03 | 242601 03 | 251430 03 | 254352 03 | 257702 03 | 261294 03 | 265141 03 | 269634 03 | 274538 03 | 273481 03 |
| 242.0 | 242714 03 | 243104 03 | 251931 03 | 254853 03 | 258202 03 | 261795 03 | 265642 03 | 270136 03 | 274987 03 | 273928 03 |
| 242.5 | 243215 03 | 243607 03 | 252434 03 | 255354 03 | 258702 03 | 262296 03 | 266147 03 | 270637 03 | 275436 03 | 274375 03 |
| 243.0 | 243716 03 | 244110 03 | 252935 03 | 255855 03 | 259202 03 | 262797 03 | 266648 03 | 271138 03 | 275885 03 | 274822 03 |
| 243.5 | 244218 03 | 244613 03 | 253436 03 | 256356 03 | 259703 03 | 263298 03 | 267149 03 | 271639 03 | 276334 03 | 275269 03 |
| 244.0 | 244719 03 | 245116 03 | 253937 03 | 256857 03 | 260204 03 | 263799 03 | 267650 03 | 272140 03 | 276783 03 | 275716 03 |
| 244.5 | 245221 03 | 245619 03 | 254438 03 | 257358 03 | 260705 03 | 264300 03 | 268151 03 | 272641 03 | 277232 03 | 276163 03 |
| 245.0 | 245722 03 | 246121 03 | 254939 03 | 257859 03 | 261206 03 | 264801 03 | 268652 03 | 273142 03 | 277733 03 | 276610 03 |
| 245.5 | 246224 03 | 246624 03 | 255440 03 | 258360 03 | 261707 03 | 265302 03 | 269153 03 | 273643 03 | 278234 03 | 277057 03 |
| 246.0 | 246725 03 | 247127 03 | 255941 03 | 258861 03 | 262208 03 | 265803 03 | 269654 03 | 274144 03 | 278735 03 | 277504 03 |
| 246.5 | 247226 03 | 247630 03 | 256442 03 | 259362 03 | 262709 03 | 266304 03 | 270155 03 | 274645 03 | 279236 03 | 277951 03 |
| 247.0 | 247728 03 | 248133 03 | 256943 03 | 259863 03 | 263210 03 | 266805 03 | 270656 03 | 275146 03 | 279737 03 | 278398 03 |
| 247.5 | 248229 03 | 248636 03 | 257444 03 | 260364 03 | 263711 03 | 267306 03 | 271157 03 | 275647 03 | 280238 03 | 278845 03 |
| 248.0 | 248731 03 | 249139 03 | 257945 03 | 260865 03 | 264212 03 | 267807 03 | 271658 03 | 276158 03 | 280739 03 | 279292 03 |
| 248.5 | 249232 03 | 249641 03 | 258446 03 | 261366 03 | 264713 03 | 268308 03 | 272159 03 | 276659 03 | 281240 03 | 279739 03 |
| 249.0 | 249733 03 | 250144 03 | 258947 03 | 261867 03 | 265214 03 | 268809 03 | 272660 03 | 277160 03 | 281741 03 | 280186 03 |
| 249.5 | 250235 03 | 250647 03 | 259448 03 | 262368 03 | 265715 03 | 269310 03 | 273161 03 | 277661 03 | 282242 03 | 280633 03 |
| 250.0 | 250736 03 | 251150 03 | 259949 03 | 262869 03 | 266216 03 | 269811 03 | 273662 03 | 278162 03 | 282743 03 | 281080 03 |
| 250.5 | 251238 03 | 251653 03 | 260450 03 | 263370 03 | 266717 03 | 270312 03 | 274163 03 | 278663 03 | 283244 03 | 281527 03 |
| 251.0 | 251739 03 | 252155 03 | 260951 03 | 263871 03 | 267218 03 | 270813 03 | 274664 03 | 279164 03 | 283745 03 | 281974 03 |
| 251.5 | 252240 03 | 252658 03 | 261452 03 | 264372 03 | 267719 03 | 271314 03 | 275165 03 | 279665 03 | 284246 03 | 282421 03 |
| 252.0 | 252742 03 | 253161 03 | 261953 03 | 264873 03 | 268220 03 | 271815 03 | 275666 03 | 280166 03 | 284747 03 | 282868 03 |
| 252.5 | 253243 03 | 253664 03 | 262454 03 | 265374 03 | 268721 03 | 272316 03 | 276167 03 | 280667 03 | 285248 03 | 283315 03 |
| 253.0 | 253745 03 | 254167 03 | 262955 03 | 265875 03 | 269222 03 | 272817 03 | 276668 03 | 281168 03 | 285749 03 | 283762 03 |
| 253.5 | 254246 03 | 254669 03 | 263456 03 | 266376 03 | 269723 03 | 273318 03 | 277169 03 | 281669 03 | 286250 03 | 284209 03 |
| 254.0 | 254747 03 | 255172 03 | 263957 03 | 266877 03 | 270224 03 | 273819 03 | 277670 03 | 282170 03 | 286751 03 | 284656 03 |
| 254.5 | 255248 03 | 255675 03 | 264458 03 | 267378 03 | 270725 03 | 274320 03 | 278171 03 | 282671 03 | 287252 03 | 285103 03 |
| 255.0 | 255750 03 | 256178 03 | 264959 03 | 267879 03 | 271226 03 | 274821 03 | 278672 03 | 283172 03 | 287753 03 | 285550 03 |
| 255.5 | 256252 03 | 256682 03 | 265460 03 | 268380 03 | 271727 03 | 275322 03 | 279173 03 | 283673 03 | 288254 03 | 286000 03 |
| 256.0 | 256754 03 | 257185 03 | 265961 03 | 268881 03 | 272228 03 | 275823 03 | 279674 03 | 284175 03 | 288755 03 | 286447 03 |
| 256.5 | 257256 03 | 257688 03 | 266462 03 | 269382 03 | 272729 03 | 276324 03 | 280175 03 | 284676 03 | 289256 03 | 286894 03 |
| 257.0 | 257758 03 | 258191 03 | 266963 03 | 269883 03 | 273230 03 | 276825 03 | 280676 03 | 285177 03 | 289757 03 | 287341 03 |
| 257.5 | 258260 03 | 258694 03 | 267464 03 | 270384 03 | 273731 03 | 277326 03 | 281177 03 | 285678 03 | 290258 03 | 287788 03 |
| 258.0 | 258762 03 | 259197 03 | 267965 03 | 270885 03 | 274232 03 | 277827 03 | 281678 03 | 286179 03 | 290759 03 | 288235 03 |
| 258.5 | 259264 03 | 259700 03 | 268466 03 | 271386 03 | 274733 03 | 278328 03 | 282179 03 | 286680 03 | 291260 03 | 288682 03 |
| 259.0 | 259766 03 | 260203 03 | 268967 03 | 271887 03 | 275234 03 | 278829 03 | 282680 03 | 287181 03 | 291761 03 | 289129 03 |
| 259.5 | 260268 03 | 260706 03 | 269468 03 | 272388 03 | 275735 03 | 279329 03 | 283181 03 | 287682 03 | 292262 03 | 289576 03 |
| 260.0 | 260770 03 | 261209 03 | 269969 03 | 272889 03 | 276236 03 | 279830 03 | 283682 03 | 288183 03 | 292763 03 | 290023 03 |
| 260.5 | 261272 03 | 261712 03 | 270470 03 | 273390 03 | 276737 03 | 280331 03 | 284183 03 | 288684 03 | 293264 03 | 290470 03 |
| 261.0 | 261774 03 | 262215 03 | 270971 03 | 273891 03 | 277238 03 | 280832 03 | 284684 03 | 289185 03 | 293765 03 | 290917 03 |
| 261.5 | 262276 03 | 262718 03 | 271472 03 | 274392 03 | 277739 03 | 281333 03 | 285185 03 | 289686 03 | 294266 03 | 291364 03 |
| 262.0 | 262778 03 | 263221 03 | 271973 03 | 274893 03 | 278240 03 | 281834 03 | 285686 03 | 290187 03 | 294767 03 | 291811 03 |
| 262.5 | 263280 03 | 263723 03 | 272474 03 | 275394 03 | 278741 03 | 282335 03 | 286187 03 | 290688 03 | 295268 03 | 292258 03 |
| 263.0 | 263782 03 | 264226 03 | 272975 03 | 275895 03 | 279242 03 | 282836 03 | 286688 03 | 291189 03 | 295769 03 | 292705 03 |

### Percentage Points of the $\chi^2$ Distribution Values of $\chi^2$ in Terms of $\alpha$ and $\nu$

[illegible]

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu$ | 0.05    | 0.10    | 0.25    | 0.50    | 1.00    | 2.00    | 5.00    | 10.00   | 20.00   | 50.00   | 100.00  | 200.00  | 500.00  | 1000.00 | 2000.00 | 5000.00 | 10000.00 |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|
| 287.5 | 288.334 | 289.134 | 290.000 | 290.934 | 291.934 | 292.994 | 294.114 | 295.284 | 296.504 | 297.774 | 299.084 | 300.434 | 301.824 | 303.244 | 304.694 | 306.174 | 307.684  |
| 288.0 | 288.833 | 289.633 | 290.500 | 291.433 | 292.433 | 293.493 | 294.613 | 295.783 | 296.993 | 298.263 | 299.573 | 300.923 | 302.313 | 303.733 | 305.183 | 306.663 | 308.173  |
| 288.5 | 289.332 | 290.132 | 291.000 | 291.932 | 292.932 | 293.992 | 295.112 | 296.282 | 297.492 | 298.762 | 300.072 | 301.422 | 302.812 | 304.232 | 305.682 | 307.162 | 308.672  |
| 289.0 | 289.831 | 290.631 | 291.500 | 292.431 | 293.431 | 294.491 | 295.611 | 296.781 | 297.991 | 299.261 | 300.571 | 301.921 | 303.311 | 304.731 | 306.181 | 307.661 | 309.171  |
| 289.5 | 290.330 | 291.130 | 292.000 | 292.930 | 293.930 | 294.990 | 296.110 | 297.280 | 298.490 | 299.760 | 301.070 | 302.420 | 303.810 | 305.230 | 306.680 | 308.160 | 309.670  |
| 290.0 | 291.329 | 292.129 | 293.000 | 293.929 | 294.929 | 295.989 | 297.109 | 298.279 | 299.489 | 300.759 | 302.069 | 303.419 | 304.809 | 306.229 | 307.679 | 309.159 | 310.669  |
| 290.5 | 292.328 | 293.128 | 294.000 | 294.928 | 295.928 | 296.988 | 298.108 | 299.278 | 300.488 | 301.758 | 303.068 | 304.418 | 305.808 | 307.228 | 308.678 | 310.158 | 311.668  |
| 291.0 | 293.327 | 294.127 | 295.000 | 295.927 | 296.927 | 297.987 | 299.107 | 300.277 | 301.487 | 302.757 | 304.067 | 305.417 | 306.807 | 308.227 | 309.677 | 311.157 | 312.667  |
| 291.5 | 294.326 | 295.126 | 296.000 | 296.926 | 297.926 | 298.986 | 300.106 | 301.276 | 302.486 | 303.756 | 305.066 | 306.416 | 307.806 | 309.226 | 310.676 | 312.156 | 313.666  |
| 292.0 | 295.325 | 296.125 | 297.000 | 297.925 | 298.925 | 299.985 | 301.105 | 302.275 | 303.485 | 304.755 | 306.065 | 307.415 | 308.805 | 310.225 | 311.675 | 313.155 | 314.665  |
| 292.5 | 296.324 | 297.124 | 298.000 | 298.924 | 299.924 | 300.984 | 302.104 | 303.274 | 304.484 | 305.754 | 307.064 | 308.414 | 309.804 | 311.224 | 312.674 | 314.154 | 315.664  |
| 293.0 | 297.323 | 298.123 | 299.000 | 299.923 | 300.923 | 301.983 | 303.103 | 304.273 | 305.483 | 306.753 | 308.063 | 309.413 | 310.803 | 312.223 | 313.673 | 315.153 | 316.663  |
| 293.5 | 298.322 | 299.122 | 300.000 | 300.922 | 301.922 | 302.982 | 304.102 | 305.272 | 306.482 | 307.752 | 309.062 | 310.412 | 311.802 | 313.222 | 314.672 | 316.152 | 317.662  |
| 294.0 | 299.321 | 300.121 | 301.000 | 301.921 | 302.921 | 303.981 | 305.101 | 306.271 | 307.481 | 308.751 | 310.061 | 311.411 | 312.801 | 314.221 | 315.671 | 317.151 | 318.661  |
| 294.5 | 300.320 | 301.120 | 302.000 | 302.920 | 303.920 | 304.980 | 306.100 | 307.270 | 308.480 | 309.750 | 311.060 | 312.410 | 313.800 | 315.220 | 316.670 | 318.150 | 319.660  |
| 295.0 | 301.319 | 302.119 | 303.000 | 303.919 | 304.919 | 305.979 | 307.099 | 308.269 | 309.479 | 310.749 | 312.059 | 313.409 | 314.799 | 316.219 | 317.669 | 319.149 | 320.659  |
| 295.5 | 302.318 | 303.118 | 304.000 | 304.918 | 305.918 | 306.978 | 308.098 | 309.268 | 310.478 | 311.748 | 313.058 | 314.408 | 315.798 | 317.218 | 318.668 | 320.148 | 321.658  |
| 296.0 | 303.317 | 304.117 | 305.000 | 305.917 | 306.917 | 307.977 | 309.097 | 310.267 | 311.477 | 312.747 | 314.057 | 315.407 | 316.797 | 318.217 | 319.667 | 321.147 | 322.657  |
| 296.5 | 304.316 | 305.116 | 306.000 | 306.916 | 307.916 | 308.976 | 310.096 | 311.266 | 312.476 | 313.746 | 315.056 | 316.406 | 317.796 | 319.216 | 320.666 | 322.146 | 323.656  |
| 297.0 | 305.315 | 306.115 | 307.000 | 307.915 | 308.915 | 309.975 | 311.095 | 312.265 | 313.475 | 314.745 | 316.055 | 317.405 | 318.795 | 320.215 | 321.665 | 323.145 | 324.655  |
| 297.5 | 306.314 | 307.114 | 308.000 | 308.914 | 309.914 | 310.974 | 312.094 | 313.264 | 314.474 | 315.744 | 317.054 | 318.404 | 319.794 | 321.214 | 322.664 | 324.144 | 325.654  |
| 298.0 | 307.313 | 308.113 | 309.000 | 309.913 | 310.913 | 311.973 | 313.093 | 314.263 | 315.473 | 316.743 | 318.053 | 319.403 | 320.793 | 322.213 | 323.663 | 325.143 | 326.653  |
| 298.5 | 308.312 | 309.112 | 310.000 | 310.912 | 311.912 | 312.972 | 314.092 | 315.262 | 316.472 | 317.742 | 319.052 | 320.402 | 321.792 | 323.212 | 324.662 | 326.142 | 327.652  |
| 299.0 | 309.311 | 310.111 | 311.000 | 311.911 | 312.911 | 313.971 | 315.091 | 316.261 | 317.471 | 318.741 | 320.051 | 321.401 | 322.791 | 324.211 | 325.661 | 327.141 | 328.651  |
| 299.5 | 310.310 | 311.110 | 312.000 | 312.910 | 313.910 | 314.970 | 316.090 | 317.260 | 318.470 | 319.740 | 321.050 | 322.400 | 323.790 | 325.210 | 326.660 | 328.140 | 329.650  |
| 300.0 | 311.309 | 312.109 | 313.000 | 313.909 | 314.909 | 315.969 | 317.089 | 318.259 | 319.469 | 320.739 | 322.049 | 323.399 | 324.789 | 326.209 | 327.659 | 329.139 | 330.649  |
| 300.5 | 312.308 | 313.108 | 314.000 | 314.908 | 315.908 | 316.968 | 318.088 | 319.258 | 320.468 | 321.738 | 323.048 | 324.398 | 325.788 | 327.208 | 328.658 | 330.138 | 331.648  |
| 301.0 | 313.307 | 314.107 | 315.000 | 315.907 | 316.907 | 317.967 | 319.087 | 320.257 | 321.467 | 322.737 | 324.047 | 325.397 | 326.787 | 328.207 | 329.657 | 331.137 | 332.647  |
| 301.5 | 314.306 | 315.106 | 316.000 | 316.906 | 317.906 | 318.966 | 320.086 | 321.256 | 322.466 | 323.736 | 325.046 | 326.396 | 327.786 | 329.206 | 330.656 | 332.136 | 333.646  |
| 302.0 | 315.305 | 316.105 | 317.000 | 317.905 | 318.905 | 319.965 | 321.085 | 322.255 | 323.465 | 324.735 | 326.045 | 327.395 | 328.785 | 330.205 | 331.655 | 333.135 | 334.645  |
| 302.5 | 316.304 | 317.104 | 318.000 | 318.904 | 319.904 | 320.964 | 322.084 | 323.254 | 324.464 | 325.734 | 327.044 | 328.394 | 329.784 | 331.204 | 332.654 | 334.134 | 335.644  |
| 303.0 | 317.303 | 318.103 | 319.000 | 319.903 | 320.903 | 321.963 | 323.083 | 324.253 | 325.463 | 326.733 | 328.043 | 329.393 | 330.783 | 332.203 | 333.653 | 335.133 | 336.643  |
| 303.5 | 318.302 | 319.102 | 320.000 | 320.902 | 321.902 | 322.962 | 324.082 | 325.252 | 326.462 | 327.732 | 329.042 | 330.392 | 331.782 | 333.202 | 334.652 | 336.132 | 337.642  |
| 304.0 | 319.301 | 320.101 | 321.000 | 321.901 | 322.901 | 323.961 | 325.081 | 326.251 | 327.461 | 328.731 | 330.041 | 331.391 | 332.781 | 334.201 | 335.651 | 337.131 | 338.641  |
| 304.5 | 320.300 | 321.100 | 322.000 | 322.900 | 323.900 | 324.960 | 326.080 | 327.250 | 328.460 | 329.730 | 331.040 | 332.390 | 333.780 | 335.200 | 336.650 | 338.130 | 339.640  |
| 305.0 | 321.299 | 322.099 | 323.000 | 323.900 | 324.900 | 325.960 | 327.080 | 328.250 | 329.460 | 330.730 | 332.040 | 333.390 | 334.780 | 336.200 | 337.650 | 339.130 | 340.640  |
| 305.5 | 322.298 | 323.098 | 324.000 | 324.900 | 325.900 | 326.960 | 328.080 | 329.250 | 330.460 | 331.730 | 333.040 | 334.390 | 335.780 | 337.200 | 338.650 | 340.130 | 341.640  |
| 306.0 | 323.297 | 324.097 | 325.000 | 325.900 | 326.900 | 327.960 | 329.080 | 330.250 | 331.460 | 332.730 | 334.040 | 335.390 | 336.780 | 338.200 | 339.650 | 341.130 | 342.640  |
| 306.5 | 324.296 | 325.096 | 326.000 | 326.900 | 327.900 | 328.960 | 330.080 | 331.250 | 332.460 | 333.730 | 335.040 | 336.390 | 337.780 | 339.200 | 340.650 | 342.130 | 343.640  |
| 307.0 | 325.295 | 326.095 | 327.000 | 327.900 | 328.900 | 329.960 | 331.080 | 332.250 | 333.460 | 334.730 | 336.040 | 337.390 | 338.780 | 340.200 | 341.650 | 343.130 | 344.640  |
| 307.5 | 326.294 | 327.094 | 328.000 | 328.900 | 329.900 | 330.960 | 332.080 | 333.250 | 334.460 | 335.730 | 337.040 | 338.390 | 339.780 | 341.200 | 342.650 | 344.130 | 345.640  |
| 308.0 | 327.293 | 328.093 | 329.000 | 329.900 | 330.900 | 331.960 | 333.080 | 334.250 | 335.460 | 336.730 | 338.040 | 339.390 | 340.780 | 342.200 | 343.650 | 345.130 | 346.640  |
| 308.5 | 328.292 | 329.092 | 330.000 | 330.900 | 331.900 | 332.960 | 334.080 | 335.250 | 336.460 | 337.730 | 339.040 | 340.390 | 341.780 | 343.200 | 344.650 | 346.130 | 347.640  |
| 309.0 | 329.291 | 330.091 | 331.000 | 331.900 | 332.900 | 333.960 | 335.080 | 336.250 | 337.460 | 338.730 | 340.040 | 341.390 | 342.780 | 344.200 | 345.650 | 347.130 | 348.640  |
| 309.5 | 330.290 | 331.090 | 332.000 | 332.900 | 333.900 | 334.960 | 336.080 | 337.250 | 338.460 | 339.730 | 341.040 | 342.390 | 343.780 | 345.200 | 346.650 | 348.130 | 349.640  |
| 310.0 | 331.289 | 332.089 | 333.000 | 333.900 | 334.900 | 335.960 | 337.080 | 338.250 | 339.460 | 340.730 | 342.040 | 343.390 | 344.780 | 346.200 | 347.650 | 349.130 | 350.640  |
| 310.5 | 332.288 | 333.088 | 334.000 | 334.900 | 335.900 | 336.960 | 338.080 | 339.250 | 340.460 | 341.730 | 343.040 | 344.390 | 345.780 | 347.200 | 348.650 | 350.130 | 351.640  |
| 311.0 | 333.287 | 334.087 | 335.000 | 335.900 | 336.900 | 337.960 | 339.080 | 340.250 | 341.460 | 342.730 | 344.040 | 345.390 | 346.780 | 348.200 | 349.650 | 351.130 | 352.640  |
| 311.5 | 334.286 | 335.086 | 336.000 | 336.900 | 337.900 | 338.960 | 340.080 | 341.250 | 342.460 | 343.730 | 345.040 | 346.390 | 347.780 | 349.200 | 350.650 | 352.130 | 353.640  |
| 312.0 | 335.285 | 336.085 | 337.000 | 337.900 | 338.900 | 339.960 | 341.080 | 342.250 | 343.460 | 344.730 | 346.040 | 347.390 | 348.780 | 350.200 | 351.650 | 353.130 | 354.640  |

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu$ | 0.75000   | 0.50000   | 0.25000   | 0.10000   | 0.05000   | 0.02500   | 0.01000   | 0.00500   |
|-------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| 32.5  | 31.242 02 | 31.952 03 | 32.155 03 | 32.511 03 | 32.897 03 | 33.332 03 | 33.843 03 | 34.917 03 |
| 32.6  | 31.323 02 | 32.044 03 | 32.256 03 | 32.612 03 | 33.000 03 | 33.435 03 | 33.946 03 | 34.970 03 |
| 32.7  | 31.404 02 | 32.125 03 | 32.337 03 | 32.693 03 | 33.081 03 | 33.516 03 | 34.027 03 | 35.022 03 |
| 32.8  | 31.485 02 | 32.206 03 | 32.418 03 | 32.774 03 | 33.162 03 | 33.597 03 | 34.108 03 | 35.073 03 |
| 32.9  | 31.566 02 | 32.287 03 | 32.499 03 | 32.855 03 | 33.243 03 | 33.678 03 | 34.189 03 | 35.124 03 |
| 33.0  | 31.647 02 | 32.368 03 | 32.580 03 | 32.936 03 | 33.324 03 | 33.759 03 | 34.270 03 | 35.175 03 |
| 33.1  | 31.728 02 | 32.449 03 | 32.661 03 | 33.017 03 | 33.405 03 | 33.840 03 | 34.351 03 | 35.226 03 |
| 33.2  | 31.809 02 | 32.530 03 | 32.742 03 | 33.098 03 | 33.486 03 | 33.921 03 | 34.432 03 | 35.277 03 |
| 33.3  | 31.890 02 | 32.611 03 | 32.823 03 | 33.179 03 | 33.567 03 | 34.002 03 | 34.513 03 | 35.328 03 |
| 33.4  | 31.971 02 | 32.692 03 | 32.904 03 | 33.260 03 | 33.648 03 | 34.083 03 | 34.594 03 | 35.379 03 |
| 33.5  | 32.052 02 | 32.773 03 | 32.985 03 | 33.341 03 | 33.729 03 | 34.164 03 | 34.675 03 | 35.430 03 |
| 33.6  | 32.133 02 | 32.854 03 | 33.066 03 | 33.422 03 | 33.810 03 | 34.245 03 | 34.756 03 | 35.481 03 |
| 33.7  | 32.214 02 | 32.935 03 | 33.147 03 | 33.503 03 | 33.891 03 | 34.326 03 | 34.837 03 | 35.532 03 |
| 33.8  | 32.295 02 | 33.016 03 | 33.228 03 | 33.584 03 | 33.972 03 | 34.407 03 | 34.918 03 | 35.583 03 |
| 33.9  | 32.376 02 | 33.097 03 | 33.309 03 | 33.665 03 | 34.053 03 | 34.488 03 | 35.000 03 | 35.634 03 |
| 34.0  | 32.457 02 | 33.178 03 | 33.390 03 | 33.746 03 | 34.134 03 | 34.569 03 | 35.081 03 | 35.685 03 |
| 34.1  | 32.538 02 | 33.259 03 | 33.471 03 | 33.827 03 | 34.215 03 | 34.650 03 | 35.162 03 | 35.736 03 |
| 34.2  | 32.619 02 | 33.340 03 | 33.552 03 | 33.908 03 | 34.296 03 | 34.731 03 | 35.243 03 | 35.787 03 |
| 34.3  | 32.700 02 | 33.421 03 | 33.633 03 | 33.989 03 | 34.377 03 | 34.812 03 | 35.324 03 | 35.838 03 |
| 34.4  | 32.781 02 | 33.502 03 | 33.714 03 | 34.070 03 | 34.458 03 | 34.893 03 | 35.405 03 | 35.889 03 |
| 34.5  | 32.862 02 | 33.583 03 | 33.795 03 | 34.151 03 | 34.539 03 | 34.974 03 | 35.486 03 | 35.940 03 |
| 34.6  | 32.943 02 | 33.664 03 | 33.876 03 | 34.232 03 | 34.620 03 | 35.055 03 | 35.567 03 | 35.991 03 |
| 34.7  | 33.024 02 | 33.745 03 | 33.957 03 | 34.313 03 | 34.701 03 | 35.136 03 | 35.648 03 | 36.042 03 |
| 34.8  | 33.105 02 | 33.826 03 | 34.038 03 | 34.394 03 | 34.782 03 | 35.217 03 | 35.729 03 | 36.093 03 |
| 34.9  | 33.186 02 | 33.907 03 | 34.119 03 | 34.475 03 | 34.863 03 | 35.298 03 | 35.810 03 | 36.144 03 |
| 35.0  | 33.267 02 | 33.988 03 | 34.200 03 | 34.556 03 | 34.944 03 | 35.379 03 | 35.891 03 | 36.195 03 |
| 35.1  | 33.348 02 | 34.069 03 | 34.281 03 | 34.637 03 | 35.025 03 | 35.460 03 | 35.972 03 | 36.246 03 |
| 35.2  | 33.429 02 | 34.150 03 | 34.362 03 | 34.718 03 | 35.106 03 | 35.541 03 | 36.053 03 | 36.297 03 |
| 35.3  | 33.510 02 | 34.231 03 | 34.443 03 | 34.800 03 | 35.187 03 | 35.622 03 | 36.134 03 | 36.348 03 |
| 35.4  | 33.591 02 | 34.312 03 | 34.524 03 | 34.881 03 | 35.268 03 | 35.703 03 | 36.215 03 | 36.399 03 |
| 35.5  | 33.672 02 | 34.393 03 | 34.605 03 | 34.962 03 | 35.349 03 | 35.784 03 | 36.296 03 | 36.450 03 |
| 35.6  | 33.753 02 | 34.474 03 | 34.686 03 | 35.043 03 | 35.430 03 | 35.865 03 | 36.377 03 | 36.501 03 |
| 35.7  | 33.834 02 | 34.555 03 | 34.767 03 | 35.124 03 | 35.511 03 | 35.946 03 | 36.458 03 | 36.552 03 |
| 35.8  | 33.915 02 | 34.636 03 | 34.848 03 | 35.205 03 | 35.592 03 | 36.027 03 | 36.539 03 | 36.603 03 |
| 35.9  | 33.996 02 | 34.717 03 | 34.929 03 | 35.286 03 | 35.673 03 | 36.108 03 | 36.620 03 | 36.654 03 |
| 36.0  | 34.077 02 | 34.798 03 | 35.010 03 | 35.367 03 | 35.754 03 | 36.189 03 | 36.701 03 | 36.705 03 |
| 36.1  | 34.158 02 | 34.879 03 | 35.091 03 | 35.448 03 | 35.835 03 | 36.270 03 | 36.782 03 | 36.756 03 |
| 36.2  | 34.239 02 | 34.960 03 | 35.172 03 | 35.529 03 | 35.916 03 | 36.351 03 | 36.863 03 | 36.807 03 |
| 36.3  | 34.320 02 | 35.041 03 | 35.253 03 | 35.610 03 | 36.000 03 | 36.432 03 | 36.944 03 | 36.858 03 |
| 36.4  | 34.401 02 | 35.122 03 | 35.334 03 | 35.691 03 | 36.081 03 | 36.513 03 | 37.025 03 | 36.909 03 |
| 36.5  | 34.482 02 | 35.203 03 | 35.415 03 | 35.772 03 | 36.162 03 | 36.594 03 | 37.106 03 | 36.960 03 |
| 36.6  | 34.563 02 | 35.284 03 | 35.496 03 | 35.853 03 | 36.243 03 | 36.675 03 | 37.187 03 | 37.011 03 |
| 36.7  | 34.644 02 | 35.365 03 | 35.577 03 | 35.934 03 | 36.324 03 | 36.756 03 | 37.268 03 | 37.062 03 |
| 36.8  | 34.725 02 | 35.446 03 | 35.658 03 | 36.015 03 | 36.405 03 | 36.837 03 | 37.349 03 | 37.113 03 |
| 36.9  | 34.806 02 | 35.527 03 | 35.739 03 | 36.096 03 | 36.486 03 | 36.918 03 | 37.430 03 | 37.164 03 |
| 37.0  | 34.887 02 | 35.608 03 | 35.820 03 | 36.177 03 | 36.567 03 | 37.000 03 | 37.511 03 | 37.215 03 |
| 37.1  | 34.968 02 | 35.689 03 | 35.901 03 | 36.258 03 | 36.648 03 | 37.081 03 | 37.592 03 | 37.266 03 |
| 37.2  | 35.049 02 | 35.770 03 | 35.982 03 | 36.339 03 | 36.729 03 | 37.162 03 | 37.673 03 | 37.317 03 |
| 37.3  | 35.130 02 | 35.851 03 | 36.063 03 | 36.420 03 | 36.810 03 | 37.243 03 | 37.754 03 | 37.368 03 |
| 37.4  | 35.211 02 | 35.932 03 | 36.144 03 | 36.501 03 | 36.891 03 | 37.324 03 | 37.835 03 | 37.419 03 |
| 37.5  | 35.292 02 | 36.013 03 | 36.225 03 | 36.582 03 | 36.972 03 | 37.405 03 | 37.916 03 | 37.470 03 |
| 37.6  | 35.373 02 | 36.094 03 | 36.306 03 | 36.663 03 | 37.053 03 | 37.486 03 | 38.000 03 | 37.521 03 |
| 37.7  | 35.454 02 | 36.175 03 | 36.387 03 | 36.744 03 | 37.134 03 | 37.567 03 | 38.081 03 | 37.572 03 |
| 37.8  | 35.535 02 | 36.256 03 | 36.468 03 | 36.825 03 | 37.215 03 | 37.648 03 | 38.162 03 | 37.623 03 |
| 37.9  | 35.616 02 | 36.337 03 | 36.549 03 | 36.906 03 | 37.296 03 | 37.729 03 | 38.243 03 | 37.674 03 |
| 38.0  | 35.697 02 | 36.418 03 | 36.630 03 | 36.987 03 | 37.377 03 | 37.810 03 | 38.324 03 | 37.725 03 |
| 38.1  | 35.778 02 | 36.499 03 | 36.711 03 | 37.068 03 | 37.458 03 | 37.891 03 | 38.405 03 | 37.776 03 |
| 38.2  | 35.859 02 | 36.580 03 | 36.792 03 | 37.149 03 | 37.539 03 | 37.972 03 | 38.486 03 | 37.827 03 |
| 38.3  | 35.940 02 | 36.661 03 | 36.873 03 | 37.230 03 | 37.620 03 | 38.053 03 | 38.567 03 | 37.878 03 |
| 38.4  | 36.021 02 | 36.742 03 | 36.954 03 | 37.311 03 | 37.701 03 | 38.134 03 | 38.648 03 | 37.929 03 |
| 38.5  | 36.102 02 | 36.823 03 | 37.035 03 | 37.392 03 | 37.782 03 | 38.215 03 | 38.729 03 | 37.980 03 |
| 38.6  | 36.183 02 | 36.904 03 | 37.116 03 | 37.473 03 | 37.863 03 | 38.296 03 | 38.810 03 | 38.031 03 |
| 38.7  | 36.264 02 | 36.985 03 | 37.197 03 | 37.554 03 | 37.944 03 | 38.377 03 | 38.891 03 | 38.082 03 |
| 38.8  | 36.345 02 | 37.066 03 | 37.278 03 | 37.635 03 | 38.025 03 | 38.458 03 | 38.972 03 | 38.133 03 |
| 38.9  | 36.426 02 | 37.147 03 | 37.359 03 | 37.716 03 | 38.106 03 | 38.539 03 | 39.053 03 | 38.184 03 |
| 39.0  | 36.507 02 | 37.228 03 | 37.440 03 | 37.797 03 | 38.187 03 | 38.620 03 | 39.134 03 | 38.235 03 |
| 39.1  | 36.588 02 | 37.309 03 | 37.521 03 | 37.878 03 | 38.268 03 | 38.701 03 | 39.215 03 | 38.286 03 |
| 39.2  | 36.669 02 | 37.390 03 | 37.602 03 | 37.959 03 | 38.349 03 | 38.782 03 | 39.296 03 | 38.337 03 |
| 39.3  | 36.750 02 | 37.471 03 | 37.683 03 | 38.040 03 | 38.430 03 | 38.863 03 | 39.377 03 | 38.388 03 |
| 39.4  | 36.831 02 | 37.552 03 | 37.764 03 | 38.121 03 | 38.511 03 | 38.944 03 | 39.458 03 | 38.439 03 |
| 39.5  | 36.912 02 | 37.633 03 | 37.845 03 | 38.202 03 | 38.592 03 | 39.025 03 | 39.539 03 | 38.490 03 |
| 39.6  | 36.993 02 | 37.714 03 | 37.926 03 | 38.283 03 | 38.673 03 | 39.106 03 | 39.620 03 | 38.541 03 |
| 39.7  | 37.074 02 | 37.795 03 | 38.007 03 | 38.364 03 | 38.754 03 | 39.187 03 | 39.701 03 | 38.592 03 |
| 39.8  | 37.155 02 | 37.876 03 | 38.088 03 | 38.445 03 | 38.835 03 | 39.268 03 | 39.782 03 | 38.643 03 |
| 39.9  | 37.236 02 | 37.957 03 | 38.169 03 | 38.526 03 | 38.916 03 | 39.349 03 | 39.863 03 | 38.694 03 |
| 40.0  | 37.317 02 | 38.038 03 | 38.250 03 | 38.607 03 | 39.000 03 | 39.430 03 | 39.944 03 | 38.745 03 |

Percentage Points of the  $\chi^2$  -Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu \backslash Q$ | .475000    | .450000    | .400000    | .350000    | .300000    | .250000    | .200000    | .150000    | .100000    | .075000    |
|--------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 327.5              | .33865 03  | .340105 03 | .343451 03 | .346932 03 | .350626 03 | .354642 03 | .359149 03 | .364451 03 | .371195 03 | .375524 03 |
| 328.0              | .338965 03 | .340368 03 | .343756 03 | .347240 03 | .351136 03 | .355155 03 | .359665 03 | .364971 03 | .371719 03 | .376112 03 |
| 328.5              | .339266 03 | .340668 03 | .344056 03 | .347540 03 | .351436 03 | .355455 03 | .359965 03 | .365271 03 | .372019 03 | .376404 03 |
| 329.0              | .339567 03 | .340969 03 | .344357 03 | .347840 03 | .351736 03 | .355755 03 | .360265 03 | .365571 03 | .372319 03 | .376704 03 |
| 329.5              | .339868 03 | .341270 03 | .344658 03 | .348140 03 | .352036 03 | .356055 03 | .360565 03 | .365871 03 | .372619 03 | .377004 03 |
| 330.0              | .340169 03 | .341571 03 | .344959 03 | .348440 03 | .352336 03 | .356355 03 | .360865 03 | .366171 03 | .372919 03 | .377304 03 |
| 330.5              | .340470 03 | .341872 03 | .345260 03 | .348740 03 | .352636 03 | .356655 03 | .361165 03 | .366471 03 | .373219 03 | .377604 03 |
| 331.0              | .340771 03 | .342173 03 | .345561 03 | .349040 03 | .352936 03 | .356955 03 | .361465 03 | .366771 03 | .373519 03 | .377904 03 |
| 331.5              | .341072 03 | .342474 03 | .345862 03 | .349340 03 | .353236 03 | .357255 03 | .361765 03 | .367071 03 | .373819 03 | .378204 03 |
| 332.0              | .341373 03 | .342775 03 | .346163 03 | .349640 03 | .353536 03 | .357555 03 | .362065 03 | .367371 03 | .374119 03 | .378504 03 |
| 332.5              | .341674 03 | .343076 03 | .346464 03 | .349940 03 | .353836 03 | .357855 03 | .362365 03 | .367671 03 | .374419 03 | .378804 03 |
| 333.0              | .341975 03 | .343377 03 | .346765 03 | .350240 03 | .354136 03 | .358155 03 | .362665 03 | .367971 03 | .374719 03 | .379104 03 |
| 333.5              | .342276 03 | .343678 03 | .347066 03 | .350540 03 | .354436 03 | .358455 03 | .362965 03 | .368271 03 | .375019 03 | .379404 03 |
| 334.0              | .342577 03 | .343979 03 | .347367 03 | .350840 03 | .354736 03 | .358755 03 | .363265 03 | .368571 03 | .375319 03 | .379704 03 |
| 334.5              | .342878 03 | .344280 03 | .347668 03 | .351140 03 | .355036 03 | .359055 03 | .363565 03 | .368871 03 | .375619 03 | .380004 03 |
| 335.0              | .343179 03 | .344581 03 | .347969 03 | .351440 03 | .355336 03 | .359355 03 | .363865 03 | .369171 03 | .375919 03 | .380304 03 |
| 335.5              | .343480 03 | .344882 03 | .348270 03 | .351740 03 | .355636 03 | .359655 03 | .364165 03 | .369471 03 | .376219 03 | .380604 03 |
| 336.0              | .343781 03 | .345183 03 | .348571 03 | .352040 03 | .355936 03 | .359955 03 | .364465 03 | .369771 03 | .376519 03 | .380904 03 |
| 336.5              | .344082 03 | .345484 03 | .348872 03 | .352340 03 | .356236 03 | .360255 03 | .364765 03 | .370071 03 | .376819 03 | .381204 03 |
| 337.0              | .344383 03 | .345785 03 | .349173 03 | .352640 03 | .356536 03 | .360555 03 | .365065 03 | .370371 03 | .377119 03 | .381504 03 |
| 337.5              | .344684 03 | .346086 03 | .349474 03 | .352940 03 | .356836 03 | .360855 03 | .365365 03 | .370671 03 | .377419 03 | .381804 03 |
| 338.0              | .344985 03 | .346387 03 | .349775 03 | .353240 03 | .357136 03 | .361155 03 | .365665 03 | .370971 03 | .377719 03 | .382104 03 |
| 338.5              | .345286 03 | .346688 03 | .350076 03 | .353376 03 | .357272 03 | .361291 03 | .365801 03 | .371107 03 | .377855 03 | .382404 03 |
| 339.0              | .345587 03 | .346989 03 | .350377 03 | .353676 03 | .357572 03 | .361591 03 | .366101 03 | .371407 03 | .378155 03 | .382704 03 |
| 339.5              | .345888 03 | .347290 03 | .350678 03 | .353976 03 | .357872 03 | .361891 03 | .366401 03 | .371707 03 | .378455 03 | .383004 03 |
| 340.0              | .346189 03 | .347591 03 | .350979 03 | .354276 03 | .358172 03 | .362191 03 | .366701 03 | .372007 03 | .378755 03 | .383304 03 |
| 340.5              | .346490 03 | .347892 03 | .351280 03 | .354576 03 | .358472 03 | .362491 03 | .367001 03 | .372307 03 | .379055 03 | .383604 03 |
| 341.0              | .346791 03 | .348193 03 | .351581 03 | .354876 03 | .358772 03 | .362791 03 | .367301 03 | .372607 03 | .379355 03 | .383904 03 |
| 341.5              | .347092 03 | .348494 03 | .351882 03 | .355176 03 | .359072 03 | .363091 03 | .367601 03 | .372907 03 | .379655 03 | .384204 03 |
| 342.0              | .347393 03 | .348795 03 | .352183 03 | .355476 03 | .359372 03 | .363391 03 | .367901 03 | .373207 03 | .379955 03 | .384504 03 |
| 342.5              | .347694 03 | .349096 03 | .352484 03 | .355776 03 | .359672 03 | .363691 03 | .368201 03 | .373507 03 | .380255 03 | .384804 03 |
| 343.0              | .347995 03 | .349397 03 | .352785 03 | .356076 03 | .359972 03 | .363991 03 | .368501 03 | .373807 03 | .380555 03 | .385104 03 |
| 343.5              | .348296 03 | .349698 03 | .353083 03 | .356376 03 | .360272 03 | .364291 03 | .368801 03 | .374107 03 | .380855 03 | .385404 03 |
| 344.0              | .348597 03 | .349999 03 | .353380 03 | .356672 03 | .360568 03 | .364587 03 | .369097 03 | .374403 03 | .381155 03 | .385704 03 |
| 344.5              | .348898 03 | .350300 03 | .353687 03 | .356976 03 | .360872 03 | .364891 03 | .369401 03 | .374697 03 | .381455 03 | .386004 03 |
| 345.0              | .349199 03 | .350601 03 | .353999 03 | .357288 03 | .361184 03 | .365203 03 | .369713 03 | .375009 03 | .381755 03 | .386304 03 |
| 345.5              | .349500 03 | .350902 03 | .354300 03 | .357588 03 | .361484 03 | .365503 03 | .370013 03 | .375309 03 | .382055 03 | .386604 03 |
| 346.0              | .349801 03 | .351203 03 | .354601 03 | .357888 03 | .361784 03 | .365803 03 | .370313 03 | .375609 03 | .382355 03 | .386904 03 |
| 346.5              | .350102 03 | .351504 03 | .354904 03 | .358192 03 | .362092 03 | .366111 03 | .370621 03 | .375917 03 | .382655 03 | .387204 03 |
| 347.0              | .350403 03 | .351805 03 | .355205 03 | .358492 03 | .362392 03 | .366411 03 | .370921 03 | .376217 03 | .382955 03 | .387504 03 |
| 347.5              | .350704 03 | .352106 03 | .355506 03 | .358792 03 | .362692 03 | .366711 03 | .371221 03 | .376517 03 | .383255 03 | .387804 03 |
| 348.0              | .351005 03 | .352407 03 | .355809 03 | .359096 03 | .362996 03 | .367015 03 | .371525 03 | .376821 03 | .383555 03 | .388104 03 |
| 348.5              | .351306 03 | .352708 03 | .356110 03 | .359396 03 | .363296 03 | .367315 03 | .371825 03 | .377121 03 | .383855 03 | .388404 03 |
| 349.0              | .351607 03 | .353009 03 | .356413 03 | .359699 03 | .363599 03 | .367618 03 | .372128 03 | .377424 03 | .384155 03 | .388704 03 |
| 349.5              | .351908 03 | .353310 03 | .356714 03 | .359999 03 | .363900 03 | .367919 03 | .372429 03 | .377725 03 | .384455 03 | .389004 03 |
| 350.0              | .352209 03 | .353611 03 | .357015 03 | .360301 03 | .364201 03 | .368220 03 | .372730 03 | .378026 03 | .384755 03 | .389304 03 |
| 350.5              | .352510 03 | .353912 03 | .357316 03 | .360601 03 | .364501 03 | .368520 03 | .373030 03 | .378326 03 | .385025 03 | .389574 03 |
| 351.0              | .352811 03 | .354213 03 | .357617 03 | .360901 03 | .364801 03 | .368820 03 | .373330 03 | .378626 03 | .385325 03 | .389874 03 |
| 351.5              | .353112 03 | .354514 03 | .357918 03 | .361201 03 | .365101 03 | .369120 03 | .373630 03 | .378926 03 | .385625 03 | .390174 03 |
| 352.0              | .353413 03 | .354815 03 | .358219 03 | .361501 03 | .365401 03 | .369420 03 | .373930 03 | .379226 03 | .385925 03 | .390474 03 |
| 352.5              | .353714 03 | .355116 03 | .358520 03 | .361801 03 | .365701 03 | .369720 03 | .374230 03 | .379526 03 | .386225 03 | .390774 03 |
| 353.0              | .354015 03 | .355417 03 | .358821 03 | .362101 03 | .366001 03 | .370020 03 | .374530 03 | .379826 03 | .386525 03 | .391074 03 |
| 353.5              | .354316 03 | .355718 03 | .359122 03 | .362401 03 | .366301 03 | .370320 03 | .374830 03 | .380126 03 | .386825 03 | .391374 03 |
| 354.0              | .354617 03 | .356019 03 | .359423 03 | .362701 03 | .366601 03 | .370620 03 | .375130 03 | .380426 03 | .387125 03 | .391674 03 |
| 354.5              | .354918 03 | .356320 03 | .359724 03 | .363001 03 | .366901 03 | .370920 03 | .375430 03 | .380726 03 | .387425 03 | .391974 03 |
| 355.0              | .355219 03 | .356621 03 | .360025 03 | .363301 03 | .367201 03 | .371220 03 | .375730 03 | .381026 03 | .387725 03 | .392274 03 |
| 355.5              | .355520 03 | .356922 03 | .360326 03 | .363601 03 | .367501 03 | .371520 03 | .376030 03 | .381326 03 | .388025 03 | .392574 03 |
| 356.0              | .355821 03 | .357223 03 | .360627 03 | .363901 03 | .367801 03 | .371820 03 | .376330 03 | .381626 03 | .388325 03 | .392874 03 |
| 356.5              | .356122 03 | .357524 03 | .360928 03 | .364201 03 | .368101 03 | .372120 03 | .376630 03 | .381926 03 | .388625 03 | .393174 03 |
| 357.0              | .356423 03 | .357825 03 | .361229 03 | .364501 03 | .368401 03 | .372420 03 | .376930 03 | .382226 03 | .388925 03 | .393474 03 |
| 357.5              | .356724 03 | .358126 03 | .361530 03 | .364801 03 | .368701 03 | .372720 03 | .377230 03 | .382526 03 | .389225 03 | .393774 03 |
| 358.0              | .357025 03 | .358427 03 | .361831 03 | .365101 03 | .369001 03 | .373020 03 | .377530 03 | .382826 03 | .389525 03 | .394074 03 |
| 358.5              | .357326 03 | .358728 03 | .362132 03 | .365401 03 | .369301 03 | .373320 03 | .377830 03 | .383126 03 | .389825 03 | .394374 03 |
| 359.0              | .357627 03 | .359029 03 | .362433 03 | .365701 03 | .369601 03 | .373620 03 | .378130 03 | .383426 03 | .390125 03 | .394674 03 |
| 359.5              | .357928 03 | .359330 03 | .362734 03 | .366001 03 | .369901 03 | .373920 03 | .378430 03 | .383726 03 | .390425 03 | .394974 03 |
| 360.0              | .358229 03 | .359631 03 | .363035 03 | .366301 03 | .370201 03 | .374220 03 | .378730 03 | .384026 03 | .390725 03 | .395274 03 |
| 360.5              | .358530 03 | .359932 03 | .363339 03 | .366601 03 | .370501 03 | .374520 03 | .379030 03 | .384326 03 | .391025 03 | .395574 03 |
| 361.0              | .358831 03 | .360233 03 | .363643 03 | .366901 03 | .370801 03 | .374820 03 | .379330 03 | .384626 03 | .391325 03 | .395874 03 |
| 361.5              | .359132 03 | .360534 03 | .363938 03 | .367201 03 | .371101 03 | .375120 03 | .379630 03 | .384926 03 | .391625 03 | .396174 03 |
| 362.0              | .359433 03 | .360835 03 | .364239 03 | .367501 03 | .371401 03 | .375420 03 | .379930 03 | .385226 03 | .391925 03 | .396474 03 |

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu$ | .475000    | .450000    | .400000    | .350000    | .300000    | .250000    | .200000    | .150000    | .100000    | .075000    |
|-------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 362.5 | .363523 01 | .365224 03 | .366691 03 | .372297 03 | .376122 03 | .382880 03 | .384945 03 | .390431 03 | .397407 03 | .401946 03 |
| 363.0 | .364024 01 | .365726 03 | .369195 03 | .372804 03 | .376632 03 | .380792 03 | .385461 03 | .390950 03 | .397931 03 | .402473 03 |
| 363.5 | .364525 01 | .366229 03 | .369700 03 | .373311 03 | .377142 03 | .381305 03 | .385976 03 | .391470 03 | .398454 03 | .402999 03 |
| 364.0 | .365026 01 | .366731 03 | .370203 03 | .373818 03 | .377651 03 | .381817 03 | .386492 03 | .391989 03 | .398978 03 | .403526 03 |
| 364.5 | .365527 01 | .367233 03 | .370709 03 | .374325 03 | .378161 03 | .382330 03 | .387008 03 | .392508 03 | .399502 03 | .404053 03 |
| 365.0 | .366028 01 | .367736 03 | .371214 03 | .374832 03 | .378671 03 | .382842 03 | .387523 03 | .393027 03 | .400026 03 | .404580 03 |
| 365.5 | .366530 01 | .368238 03 | .371719 03 | .375340 03 | .379181 03 | .383355 03 | .388039 03 | .393546 03 | .400549 03 | .405106 03 |
| 366.0 | .367031 01 | .368740 03 | .372224 03 | .375847 03 | .379690 03 | .383867 03 | .388554 03 | .394066 03 | .401073 03 | .405633 03 |
| 366.5 | .367532 01 | .369243 03 | .372728 03 | .376354 03 | .380200 03 | .384380 03 | .389070 03 | .394585 03 | .401597 03 | .406159 03 |
| 367.0 | .368033 01 | .369745 03 | .373233 03 | .376861 03 | .380710 03 | .384892 03 | .389586 03 | .395104 03 | .402120 03 | .406686 03 |
| 367.5 | .368534 01 | .370247 03 | .373738 03 | .377368 03 | .381219 03 | .385405 03 | .390101 03 | .395623 03 | .402644 03 | .407213 03 |
| 368.0 | .369035 01 | .370750 03 | .374242 03 | .377875 03 | .381729 03 | .385917 03 | .390617 03 | .396142 03 | .403168 03 | .407739 03 |
| 368.5 | .369537 01 | .371252 03 | .374747 03 | .378382 03 | .382239 03 | .386430 03 | .391132 03 | .396661 03 | .403691 03 | .408266 03 |
| 369.0 | .370038 01 | .371754 03 | .375252 03 | .378889 03 | .382748 03 | .386942 03 | .391648 03 | .397180 03 | .404215 03 | .408792 03 |
| 369.5 | .370539 01 | .372257 03 | .375756 03 | .379396 03 | .383256 03 | .387454 03 | .392163 03 | .397699 03 | .404739 03 | .409319 03 |
| 370.0 | .371040 01 | .372759 03 | .376261 03 | .379904 03 | .383768 03 | .387967 03 | .392679 03 | .398218 03 | .405262 03 | .409845 03 |
| 370.5 | .371541 01 | .373261 03 | .376766 03 | .380411 03 | .384277 03 | .388479 03 | .393194 03 | .398738 03 | .405786 03 | .410372 03 |
| 371.0 | .372042 01 | .373763 03 | .377270 03 | .380915 03 | .384787 03 | .388992 03 | .393710 03 | .399257 03 | .406309 03 | .410898 03 |
| 371.5 | .372543 01 | .374264 03 | .377775 03 | .381425 03 | .385297 03 | .389504 03 | .394225 03 | .399776 03 | .406833 03 | .411425 03 |
| 372.0 | .373044 01 | .374766 03 | .378280 03 | .381932 03 | .385806 03 | .390016 03 | .394740 03 | .400295 03 | .407356 03 | .411951 03 |
| 372.5 | .373545 01 | .375267 03 | .378784 03 | .382439 03 | .386316 03 | .390529 03 | .395256 03 | .400814 03 | .407880 03 | .412477 03 |
| 373.0 | .374046 01 | .375769 03 | .379289 03 | .382946 03 | .386825 03 | .391041 03 | .395771 03 | .401333 03 | .408403 03 | .412904 03 |
| 373.5 | .374547 01 | .376270 03 | .379793 03 | .383453 03 | .387335 03 | .391554 03 | .396287 03 | .401852 03 | .408927 03 | .413430 03 |
| 374.0 | .375048 01 | .376772 03 | .380298 03 | .383960 03 | .387845 03 | .392066 03 | .396802 03 | .402371 03 | .409450 03 | .413956 03 |
| 374.5 | .375549 01 | .377274 03 | .380803 03 | .384467 03 | .388354 03 | .392578 03 | .397318 03 | .402890 03 | .409974 03 | .414463 03 |
| 375.0 | .376050 01 | .377775 03 | .381337 03 | .385004 03 | .388894 03 | .393121 03 | .397863 03 | .403439 03 | .410520 03 | .415029 03 |
| 375.5 | .376551 01 | .378276 03 | .381842 03 | .385511 03 | .389403 03 | .393630 03 | .398384 03 | .403967 03 | .411044 03 | .415555 03 |
| 376.0 | .377052 01 | .378777 03 | .382347 03 | .386018 03 | .389913 03 | .394145 03 | .398894 03 | .404476 03 | .411544 03 | .416062 03 |
| 376.5 | .377553 01 | .379278 03 | .382849 03 | .386522 03 | .390419 03 | .394652 03 | .399407 03 | .404985 03 | .412067 03 | .416588 03 |
| 377.0 | .378054 01 | .379779 03 | .383356 03 | .387032 03 | .390932 03 | .395170 03 | .399924 03 | .405504 03 | .412591 03 | .417124 03 |
| 377.5 | .378555 01 | .380280 03 | .383881 03 | .387559 03 | .391462 03 | .395702 03 | .400460 03 | .406003 03 | .413114 03 | .417640 03 |
| 378.0 | .379056 01 | .380781 03 | .384384 03 | .388064 03 | .391971 03 | .396212 03 | .400985 03 | .406522 03 | .413637 03 | .418167 03 |
| 378.5 | .379557 01 | .381282 03 | .384887 03 | .388569 03 | .392478 03 | .396719 03 | .401500 03 | .407041 03 | .414561 03 | .419093 03 |
| 379.0 | .380058 01 | .381783 03 | .385389 03 | .389072 03 | .392983 03 | .397224 03 | .402004 03 | .407545 03 | .415064 03 | .419595 03 |
| 379.5 | .380559 01 | .382284 03 | .385891 03 | .389576 03 | .393489 03 | .397730 03 | .402511 03 | .408052 03 | .415573 03 | .420104 03 |
| 380.0 | .381060 01 | .382785 03 | .386393 03 | .390079 03 | .393994 03 | .398235 03 | .403016 03 | .408557 03 | .416068 03 | .420595 03 |
| 380.5 | .381561 01 | .383286 03 | .386895 03 | .390583 03 | .394500 03 | .398741 03 | .403522 03 | .409063 03 | .416574 03 | .421086 03 |
| 381.0 | .382062 01 | .383787 03 | .387397 03 | .391085 03 | .395004 03 | .399245 03 | .404026 03 | .409567 03 | .417078 03 | .421577 03 |
| 381.5 | .382563 01 | .384288 03 | .387899 03 | .391589 03 | .395508 03 | .399749 03 | .404530 03 | .410071 03 | .417582 03 | .422068 03 |
| 382.0 | .383064 01 | .384789 03 | .388401 03 | .392101 03 | .396020 03 | .400261 03 | .405042 03 | .410583 03 | .418094 03 | .422559 03 |
| 382.5 | .383565 01 | .385290 03 | .388903 03 | .392603 03 | .396522 03 | .400763 03 | .405544 03 | .411085 03 | .418596 03 | .423090 03 |
| 383.0 | .384066 01 | .385791 03 | .389403 03 | .393103 03 | .397022 03 | .401263 03 | .406044 03 | .411585 03 | .419096 03 | .423581 03 |
| 383.5 | .384567 01 | .386292 03 | .390005 03 | .393705 03 | .397624 03 | .401865 03 | .406646 03 | .412187 03 | .419698 03 | .424072 03 |
| 384.0 | .385068 01 | .386793 03 | .390405 03 | .394105 03 | .398024 03 | .402265 03 | .407046 03 | .412587 03 | .420178 03 | .424563 03 |
| 384.5 | .385569 01 | .387294 03 | .390907 03 | .394607 03 | .398526 03 | .402767 03 | .407548 03 | .413089 03 | .420669 03 | .425060 03 |
| 385.0 | .386070 01 | .387795 03 | .391407 03 | .395107 03 | .399026 03 | .403267 03 | .408048 03 | .413589 03 | .421160 03 | .425551 03 |
| 385.5 | .386571 01 | .388296 03 | .391909 03 | .395609 03 | .399528 03 | .403769 03 | .408550 03 | .414091 03 | .421651 03 | .426042 03 |
| 386.0 | .387072 01 | .388797 03 | .392411 03 | .396111 03 | .400030 03 | .404271 03 | .409052 03 | .414593 03 | .422142 03 | .426533 03 |
| 386.5 | .387573 01 | .389298 03 | .392911 03 | .396611 03 | .400530 03 | .404771 03 | .409552 03 | .415093 03 | .422633 03 | .427024 03 |
| 387.0 | .388074 01 | .389799 03 | .393411 03 | .397111 03 | .401030 03 | .405271 03 | .410052 03 | .415593 03 | .423124 03 | .427515 03 |

|  | .475000 | .480000 | .485000 | .490000 | .495000 | .500000 | .505000 | .510000 | .515000 | .520000 | .525000 | .530000 | .535000 | .540000 | .545000 | .550000 | .555000 | .560000 | .565000 | .570000 | .575000 | .580000 | .585000 | .590000 | .595000 | .600000 | .605000 | .610000 | .615000 | .620000 | .625000 | .630000 | .635000 | .640000 | .645000 | .650000 | .655000 | .660000 | .665000 | .670000 | .675000 | .680000 | .685000 | .690000 | .695000 | .700000 | .705000 | .710000 | .715000 | .720000 | .725000 | .730000 | .735000 | .740000 | .745000 | .750000 | .755000 | .760000 | .765000 | .770000 | .775000 | .780000 | .785000 | .790000 | .795000 | .800000 | .805000 | .810000 | .815000 | .820000 | .825000 | .830000 | .835000 | .840000 | .845000 | .850000 | .855000 | .860000 | .865000 | .870000 | .875000 | .880000 | .885000 | .890000 | .895000 | .900000 | .905000 | .910000 | .915000 | .920000 | .925000 | .930000 | .935000 | .940000 | .945000 | .950000 | .955000 | .960000 | .965000 | .970000 | .975000 | .980000 | .985000 | .990000 | .995000 | 1.000000 | 1.005000 | 1.010000 | 1.015000 | 1.020000 | 1.025000 | 1.030000 | 1.035000 | 1.040000 | 1.045000 | 1.050000 | 1.055000 | 1.060000 | 1.065000 | 1.070000 | 1.075000 | 1.080000 | 1.085000 | 1.090000 | 1.095000 | 1.100000 | 1.105000 | 1.110000 | 1.115000 | 1.120000 | 1.125000 | 1.130000 | 1.135000 | 1.140000 | 1.145000 | 1.150000 | 1.155000 | 1.160000 | 1.165000 | 1.170000 | 1.175000 | 1.180000 | 1.185000 | 1.190000 | 1.195000 | 1.200000 | 1.205000 | 1.210000 | 1.215000 | 1.220000 | 1.225000 | 1.230000 | 1.235000 | 1.240000 | 1.245000 | 1.250000 | 1.255000 | 1.260000 | 1.265000 | 1.270000 | 1.275000 | 1.280000 | 1.285000 | 1.290000 | 1.295000 | 1.300000 | 1.305000 | 1.310000 | 1.315000 | 1.320000 | 1.325000 | 1.330000 | 1.335000 | 1.340000 | 1.345000 | 1.350000 | 1.355000 | 1.360000 | 1.365000 | 1.370000 | 1.375000 | 1.380000 | 1.385000 | 1.390000 | 1.395000 | 1.400000 | 1.405000 | 1.410000 | 1.415000 | 1.420000 | 1.425000 | 1.430000 | 1.435000 | 1.440000 | 1.445000 | 1.450000 | 1.455000 | 1.460000 | 1.465000 | 1.470000 | 1.475000 | 1.480000 | 1.485000 | 1.490000 | 1.495000 | 1.500000 | 1.505000 | 1.510000 | 1.515000 | 1.520000 | 1.525000 | 1.530000 | 1.535000 | 1.540000 | 1.545000 | 1.550000 | 1.555000 | 1.560000 | 1.565000 | 1.570000 | 1.575000 | 1.580000 | 1.585000 | 1.590000 | 1.595000 | 1.600000 | 1.605000 | 1.610000 | 1.615000 | 1.620000 | 1.625000 | 1.630000 | 1.635000 | 1.640000 | 1.645000 | 1.650000 | 1.655000 | 1.660000 | 1.665000 | 1.670000 | 1.675000 | 1.680000 | 1.685000 | 1.690000 | 1.695000 | 1.700000 | 1.705000 | 1.710000 | 1.715000 | 1.720000 | 1.725000 | 1.730000 | 1.735000 | 1.740000 | 1.745000 | 1.750000 | 1.755000 | 1.760000 | 1.765000 | 1.770000 | 1.775000 | 1.780000 | 1.785000 | 1.790000 | 1.795000 | 1.800000 | 1.805000 | 1.810000 | 1.815000 | 1.820000 | 1.825000 | 1.830000 | 1.835000 | 1.840000 | 1.845000 | 1.850000 | 1.855000 | 1.860000 | 1.865000 | 1.870000 | 1.875000 | 1.880000 | 1.885000 | 1.890000 | 1.895000 | 1.900000 | 1.905000 | 1.910000 | 1.915000 | 1.920000 | 1.925000 | 1.930000 | 1.935000 | 1.940000 | 1.945000 | 1.950000 | 1.955000 | 1.960000 | 1.965000 | 1.970000 | 1.975000 | 1.980000 | 1.985000 | 1.990000 | 1.995000 | 2.000000 | 2.005000 | 2.010000 | 2.015000 | 2.020000 | 2.025000 | 2.030000 | 2.035000 | 2.040000 | 2.045000 | 2.050000 | 2.055000 | 2.060000 | 2.065000 | 2.070000 | 2.075000 | 2.080000 | 2.085000 | 2.090000 | 2.095000 | 2.100000 | 2.105000 | 2.110000 | 2.115000 | 2.120000 |
|--|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
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### Percentage Points of the $\chi^2$ -Distribution Values of $\chi^2$ in Terms of $Q$ and $\nu$

[illegible]

[illegible]

71 38549.

112

### Percentage Points of the $\chi^2$ -Distribution Expressed in Terms of $Q$ and $\nu$

[illegible]

|  | .010000 | .012500 | .015000 | .020000 | .025000 | .030000 | .035000 | .040000 | .045000 | .050000 | .055000 | .060000 | .065000 | .070000 | .075000 | .080000 | .085000 | .090000 | .095000 | .100000 | .105000 | .110000 | .115000 | .120000 | .125000 | .130000 | .135000 | .140000 | .145000 | .150000 | .155000 | .160000 | .165000 | .170000 | .175000 | .180000 | .185000 | .190000 | .195000 | .200000 | .205000 | .210000 | .215000 | .220000 | .225000 | .230000 | .235000 | .240000 | .245000 | .250000 | .255000 | .260000 | .265000 | .270000 | .275000 | .280000 | .285000 | .290000 | .295000 | .300000 | .305000 | .310000 | .315000 | .320000 | .325000 | .330000 | .335000 | .340000 | .345000 | .350000 | .355000 | .360000 | .365000 | .370000 | .375000 | .380000 | .385000 | .390000 | .395000 | .400000 | .405000 | .410000 | .415000 | .420000 | .425000 | .430000 | .435000 | .440000 | .445000 | .450000 | .455000 | .460000 | .465000 | .470000 | .475000 | .480000 | .485000 | .490000 | .495000 | .500000 | .505000 | .510000 | .515000 | .520000 | .525000 | .530000 | .535000 | .540000 | .545000 | .550000 | .555000 | .560000 | .565000 | .570000 | .575000 | .580000 | .585000 | .590000 | .595000 | .600000 | .605000 | .610000 | .615000 | .620000 | .625000 | .630000 | .635000 | .640000 | .645000 | .650000 | .655000 | .660000 | .665000 | .670000 | .675000 | .680000 | .685000 | .690000 | .695000 | .700000 | .705000 | .710000 | .715000 | .720000 | .725000 | .730000 | .735000 | .740000 | .745000 | .750000 | .755000 | .760000 | .765000 | .770000 | .775000 | .780000 | .785000 | .790000 | .795000 | .800000 | .805000 | .810000 | .815000 | .820000 | .825000 | .830000 | .835000 | .840000 | .845000 | .850000 | .855000 | .860000 | .865000 | .870000 | .875000 | .880000 | .885000 | .890000 | .895000 | .900000 | .905000 | .910000 | .915000 | .920000 | .925000 | .930000 | .935000 | .940000 | .945000 | .950000 | .955000 | .960000 | .965000 | .970000 | .975000 | .980000 | .985000 | .990000 | .995000 | 1.000000 | 1.005000 | 1.010000 | 1.015000 | 1.020000 | 1.025000 | 1.030000 | 1.035000 | 1.040000 | 1.045000 | 1.050000 | 1.055000 | 1.060000 | 1.065000 | 1.070000 | 1.075000 | 1.080000 | 1.085000 | 1.090000 | 1.095000 | 1.100000 | 1.105000 | 1.110000 | 1.115000 | 1.120000 | 1.125000 | 1.130000 | 1.135000 | 1.140000 | 1.145000 | 1.150000 | 1.155000 | 1.160000 | 1.165000 | 1.170000 | 1.175000 | 1.180000 | 1.185000 | 1.190000 | 1.195000 | 1.200000 | 1.205000 | 1.210000 | 1.215000 | 1.220000 | 1.225000 | 1.230000 | 1.235000 | 1.240000 | 1.245000 | 1.250000 | 1.255000 | 1.260000 | 1.265000 | 1.270000 | 1.275000 | 1.280000 | 1.285000 | 1.290000 | 1.295000 | 1.300000 | 1.305000 | 1.310000 | 1.315000 | 1.320000 | 1.325000 | 1.330000 | 1.335000 | 1.340000 | 1.345000 | 1.350000 | 1.355000 | 1.360000 | 1.365000 | 1.370000 | 1.375000 | 1.380000 | 1.385000 | 1.390000 | 1.395000 | 1.400000 | 1.405000 | 1.410000 | 1.415000 | 1.420000 | 1.425000 | 1.430000 | 1.435000 | 1.440000 | 1.445000 | 1.450000 | 1.455000 | 1.460000 | 1.465000 | 1.470000 | 1.475000 | 1.480000 | 1.485000 | 1.490000 | 1.495000 | 1.500000 | 1.505000 | 1.510000 | 1.515000 | 1.520000 | 1.525000 | 1.530000 | 1.535000 | 1.540000 | 1.545000 | 1.550000 | 1.555000 | 1.560000 | 1.565000 | 1.570000 | 1.575000 | 1.580000 | 1.585000 | 1.590000 | 1.595000 | 1.600000 | 1.605000 | 1.610000 | 1.615000 | 1.620000 | 1.625000 | 1.630000 | 1.635000 | 1.640000 | 1.645000 | 1.650000 | 1.655000 | 1.660000 | 1.665000 | 1.670000 | 1.675000 | 1.680000 | 1.685000 | 1.690000 | 1.695000 | 1.700000 | 1.705000 | 1.710000 | 1.715000 | 1.720000 | 1.72 |
|--|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|------|
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Percentile Points of the  $\chi^2$  Distribution  
 Values of  $\chi^2$  in Terms of  $U$  and  $v$

| $U$ | $v$ | 1.0    | 1.5    | 2.0    | 2.5    | 3.0    | 3.5    | 4.0    | 4.5    | 5.0    | 5.5    | 6.0    | 6.5    | 7.0    | 7.5    | 8.0    | 8.5    | 9.0    | 9.5    | 10.0   | 10.5   | 11.0   | 11.5   | 12.0   | 12.5   | 13.0   | 13.5   | 14.0   | 14.5   | 15.0   | 15.5   | 16.0   | 16.5   | 17.0   | 17.5   | 18.0   | 18.5   | 19.0   | 19.5   | 20.0   | 20.5   | 21.0   | 21.5   | 22.0   | 22.5   | 23.0   | 23.5   | 24.0   | 24.5   | 25.0   | 25.5   | 26.0   | 26.5   | 27.0   | 27.5   | 28.0   | 28.5   | 29.0   | 29.5   | 30.0   | 30.5   | 31.0   | 31.5   | 32.0   | 32.5   | 33.0   | 33.5   | 34.0   | 34.5   | 35.0   | 35.5   | 36.0   | 36.5   | 37.0   | 37.5   | 38.0   | 38.5   | 39.0   | 39.5   | 40.0   | 40.5   | 41.0   | 41.5   | 42.0   | 42.5   | 43.0   | 43.5   | 44.0   | 44.5   | 45.0   | 45.5   | 46.0   | 46.5   | 47.0   | 47.5   | 48.0   | 48.5   | 49.0   | 49.5   | 50.0   | 50.5   | 51.0   | 51.5   | 52.0   | 52.5   | 53.0   | 53.5   | 54.0   | 54.5   | 55.0   | 55.5   | 56.0   | 56.5   | 57.0   | 57.5   | 58.0   | 58.5   | 59.0   | 59.5   | 60.0   | 60.5   | 61.0   | 61.5   | 62.0   | 62.5   | 63.0   | 63.5   | 64.0   | 64.5   | 65.0   | 65.5   | 66.0   | 66.5   | 67.0   | 67.5   | 68.0   | 68.5   | 69.0   | 69.5   | 70.0   | 70.5   | 71.0   | 71.5   | 72.0   | 72.5   | 73.0   | 73.5   | 74.0   | 74.5   | 75.0   | 75.5   | 76.0   | 76.5   | 77.0   | 77.5   | 78.0   | 78.5   | 79.0   | 79.5   | 80.0   | 80.5   | 81.0   | 81.5   | 82.0   | 82.5   | 83.0   | 83.5   | 84.0   | 84.5   | 85.0   | 85.5   | 86.0   | 86.5   | 87.0   | 87.5   | 88.0   | 88.5   | 89.0   | 89.5   | 90.0   | 90.5   | 91.0   | 91.5   | 92.0   | 92.5   | 93.0   | 93.5   | 94.0   | 94.5   | 95.0   | 95.5   | 96.0   | 96.5   | 97.0   | 97.5   | 98.0   | 98.5   | 99.0   | 99.5   | 100.0  |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        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|-----|-----|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-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| 0.1 | 0.1 | 0.0001 | 0.0002 | 0.0003 | 0.0004 | 0.0005 | 0.0006 | 0.0007 | 0.0008 | 0.0009 | 0.0010 | 0.0011 | 0.0012 | 0.0013 | 0.0014 | 0.0015 | 0.0016 | 0.0017 | 0.0018 | 0.0019 | 0.0020 | 0.0021 | 0.0022 | 0.0023 | 0.0024 | 0.0025 | 0.0026 | 0.0027 | 0.0028 | 0.0029 | 0.0030 | 0.0031 | 0.0032 | 0.0033 | 0.0034 | 0.0035 | 0.0036 | 0.0037 | 0.0038 | 0.0039 | 0.0040 | 0.0041 | 0.0042 | 0.0043 | 0.0044 | 0.0045 | 0.0046 | 0.0047 | 0.0048 | 0.0049 | 0.0050 | 0.0051 | 0.0052 | 0.0053 | 0.0054 | 0.0055 | 0.0056 | 0.0057 | 0.0058 | 0.0059 | 0.0060 | 0.0061 | 0.0062 | 0.0063 | 0.0064 | 0.0065 | 0.0066 | 0.0067 | 0.0068 | 0.0069 | 0.0070 | 0.0071 | 0.0072 | 0.0073 | 0.0074 | 0.0075 | 0.0076 | 0.0077 | 0.0078 | 0.0079 | 0.0080 | 0.0081 | 0.0082 | 0.0083 | 0.0084 | 0.0085 | 0.0086 | 0.0087 | 0.0088 | 0.0089 | 0.0090 | 0.0091 | 0.0092 | 0.0093 | 0.0094 | 0.0095 | 0.0096 | 0.0097 | 0.0098 | 0.0099 | 0.0100 | 0.0101 | 0.0102 | 0.0103 | 0.0104 | 0.0105 | 0.0106 | 0.0107 | 0.0108 | 0.0109 | 0.0110 | 0.0111 | 0.0112 | 0.0113 | 0.0114 | 0.0115 | 0.0116 | 0.0117 | 0.0118 | 0.0119 | 0.0120 | 0.0121 | 0.0122 | 0.0123 | 0.0124 | 0.0125 | 0.0126 | 0.0127 | 0.0128 | 0.0129 | 0.0130 | 0.0131 | 0.0132 | 0.0133 | 0.0134 | 0.0135 | 0.0136 | 0.0137 | 0.0138 | 0.0139 | 0.0140 | 0.0141 | 0.0142 | 0.0143 | 0.0144 | 0.0145 | 0.0146 | 0.0147 | 0.0148 | 0.0149 | 0.0150 | 0.0151 | 0.0152 | 0.0153 | 0.0154 | 0.0155 | 0.0156 | 0.0157 | 0.0158 | 0.0159 | 0.0160 | 0.0161 | 0.0162 | 0.0163 | 0.0164 | 0.0165 | 0.0166 | 0.0167 | 0.0168 | 0.0169 | 0.0170 | 0.0171 | 0.0172 | 0.0173 | 0.0174 | 0.0175 | 0.0176 | 0.0177 | 0.0178 | 0.0179 | 0.0180 | 0.0181 | 0.0182 | 0.0183 | 0.0184 | 0.0185 | 0.0186 | 0.0187 | 0.0188 | 0.0189 | 0.0190 | 0.0191 | 0.0192 | 0.0193 | 0.0194 | 0.0195 | 0.0196 | 0.0197 | 0.0198 | 0.0199 | 0.0200 | 0.0201 | 0.0202 | 0.0203 | 0.0204 | 0.0205 | 0.0206 | 0.0207 | 0.0208 | 0.0209 | 0.0210 | 0.0211 | 0.0212 | 0.0213 | 0.0214 | 0.0215 | 0.0216 | 0.0217 | 0.0218 | 0.0219 | 0.0220 | 0.0221 | 0.0222 | 0.0223 | 0.0224 | 0.0225 | 0.0226 | 0.0227 | 0.0228 | 0.0229 | 0.0230 | 0.0231 | 0.0232 | 0.0233 | 0.0234 | 0.0235 | 0.0236 | 0.0237 | 0.0238 | 0.0239 | 0.0240 | 0.0241 | 0.0242 | 0.0243 | 0.0244 | 0.0245 | 0.0246 | 0.0247 | 0.0248 | 0.0249 | 0.0250 | 0.0251 | 0.0252 | 0.0253 | 0.0254 | 0.0255 | 0.0256 | 0.0257 | 0.0258 | 0.0259 | 0.0260 | 0.0261 | 0.0262 | 0.0263 | 0.0264 | 0.0265 | 0.0266 | 0.0267 | 0.0268 | 0.0269 | 0.0270 | 0.0271 | 0.0272 | 0.0273 | 0.0274 | 0.0275 | 0.0276 | 0.0277 | 0.0278 | 0.0279 | 0.0280 | 0.0281 | 0.0282 | 0.0283 | 0.0284 | 0.0285 | 0.0286 | 0.0287 | 0.0288 | 0.0289 | 0.0290 | 0.0291 | 0.0292 | 0.0293 | 0.0294 | 0.0295 | 0.0296 | 0.0297 | 0.0298 | 0.0299 | 0.0300 | 0.0301 | 0.0302 | 0.0303 | 0.0304 | 0.0305 | 0.0306 | 0.0307 | 0.0308 | 0.0309 | 0.0310 | 0.0311 | 0.0312 | 0.0313 | 0.0314 | 0.0315 | 0.0316 | 0.0317 | 0.0318 | 0.0319 | 0.0320 | 0.0321 | 0.0322 | 0.0323 | 0.0324 | 0.0325 | 0.0326 | 0.0327 | 0.0328 | 0.0329 | 0.0330 | 0.0331 | 0.0332 | 0.0333 | 0.0334 | 0.0335 | 0.0336 | 0.0337 | 0.0338 | 0.0339 | 0.0340 | 0.0341 | 0.0342 | 0.0343 | 0.0344 | 0.0345 | 0.0346 | 0.0347 | 0.0348 | 0.0349 | 0.0350 | 0.0351 | 0.0352 | 0.0353 | 0.0354 | 0.0355 | 0.0356 | 0.0357 | 0.0358 | 0.0359 | 0.0360 | 0.0361 | 0.0362 | 0.0363 | 0.0364 | 0.0365 | 0.0366 | 0.0367 | 0.0368 | 0.0369 | 0.0370 | 0.0371 | 0.0372 | 0.0373 | 0.0374 | 0.0375 | 0.0376 | 0.0377 | 0.0378 | 0.0379 | 0.0380 | 0.0381 | 0.0382 | 0.0383 | 0.0384 | 0.0385 | 0.0386 | 0.0387 | 0.0388 | 0.0389 | 0.0390 | 0.0391 | 0.0392 | 0.0393 | 0.0394 | 0.0395 | 0.0396 | 0.0397 | 0.0398 | 0.0399 | 0.0400 | 0.0401 | 0.0402 | 0.0403 | 0.0404 | 0.0405 | 0.0406 | 0.0407 | 0.0408 | 0.0409 | 0.0410 | 0.0411 | 0.0412 | 0.0413 | 0.0414 | 0.0415 | 0.0416 | 0.0417 | 0.0418 | 0.0419 | 0.0420 | 0.0421 | 0.0422 | 0.0423 | 0.0424 | 0.0425 | 0.0426 | 0.0427 | 0.0428 | 0.0429 | 0.0430 | 0.0431 | 0.0432 | 0.0433 | 0.0434 | 0.0435 | 0.0436 | 0.0437 | 0.0438 | 0.0439 | 0.0440 | 0.0441 | 0.0442 | 0.0443 | 0.0444 | 0.0445 | 0.0446 | 0.0447 | 0.0448 | 0.0449 | 0.0450 | 0.0451 | 0.0452 | 0.0453 | 0.0454 | 0.0455 | 0.0456 | 0.0457 | 0.0458 | 0.0459 | 0.0460 | 0.0461 | 0.0462 | 0.0463 | 0.0464 | 0.0465 | 0.0466 | 0.0467 | 0.0468 | 0.0469 | 0.0470 | 0.0471 | 0.0472 | 0.0473 | 0.0474 | 0.0475 | 0.0476 | 0.0477 | 0.0478 | 0.0479 | 0.0480 | 0.0481 | 0.0482 | 0.0483 | 0.0484 | 0.0485 | 0.0486 | 0.0487 | 0.0488 | 0.0489 | 0.0490 | 0.0491 | 0.0492 | 0.0493 | 0.0494 | 0.0495 | 0.0496 | 0.0497 | 0.0498 | 0.0499 | 0.0500 | 0.0501 | 0.0502 | 0.0503 | 0.0504 | 0.0505 | 0.0506 | 0.0507 | 0.0508 | 0.0509 | 0.0510 | 0.0511 | 0.0512 | 0.0513 | 0.0514 | 0.0515 | 0.0516 | 0.0517 | 0.0518 | 0.0519 | 0.0520 | 0.0521 | 0.0522 | 0.0523 | 0.0524 | 0.0525 | 0.0526 | 0.0527 | 0.0528 | 0.0529 | 0.0530 | 0.0531 | 0.0532 | 0.0533 | 0.0534 | 0.0535 | 0.0536 | 0.0537 | 0.0538 | 0.0539 | 0.0540 | 0.0541 | 0.0542 | 0.0543 | 0.0544 | 0.0545 | 0.0546 | 0.0547 | 0.0548 | 0.0549 | 0.0550 | 0.0551 | 0.0552 | 0.0553 | 0.0554 | 0.0555 | 0.0556 | 0.0557 | 0.0558 | 0.0559 | 0.0560 | 0.0561 | 0.0562 | 0.0563 | 0.0564 | 0.0565 | 0.0566 | 0.0567 | 0.0568 | 0.0569 | 0.0570 | 0.0571 | 0.0572 | 0.0573 | 0.0574 | 0.0575 | 0.0576 | 0.0577 | 0.0578 | 0.0579 | 0.0580 | 0.0581 | 0.0582 | 0.0583 | 0.0584 | 0.0585 | 0.0586 | 0.0587 | 0.0588 | 0.0589 | 0.0590 | 0.0591 | 0.0592 | 0.0593 | 0.0594 | 0.0595 | 0.0596 | 0.0597 | 0.0598 | 0.0599 | 0.0600 | 0.0601 | 0.0602 | 0.0603 | 0.0604 | 0.0605 | 0.0606 | 0.0607 | 0.0608 | 0.0609 | 0.0610 | 0.0611 | 0.0612 | 0.0613 | 0.0614 | 0.0615 | 0.0616 | 0.0617 | 0.0618 | 0.0619 | 0.0620 | 0.0621 | 0.0622 | 0.0623 | 0.0624 | 0.0625 | 0.0626 | 0.0627 | 0.0628 | 0.0629 | 0.0630 | 0.0631 | 0.0632 | 0.0633 | 0.0634 | 0.0635 | 0.0636 | 0.0637 | 0.0638 | 0.0639 | 0.0640 | 0.0641 | 0.0642 | 0.0643 | 0.0644 | 0.0645 | 0.0646 | 0.0647 | 0.0648 | 0.0649 | 0.0650 | 0.0651 | 0.0652 | 0.0653 | 0.0654 | 0.0655 | 0.0656 | 0.0657 | 0.0658 | 0.0659 | 0.0660 | 0.0661 | 0.0662 | 0.0663 | 0.0664 | 0.0665 | 0.0666 | 0.0667 | 0.0668 | 0.0669 | 0.0670 | 0.0671 | 0.0672 | 0.0673 | 0.0674 | 0.0675 | 0.0676 | 0.0677 | 0.0678 | 0.0679 | 0.0680 | 0.0681 | 0.0682 | 0.0683 | 0.0684 | 0.0685 | 0.0686 | 0.0687 | 0.0688 | 0.0689 | 0.0690 | 0.0691 | 0.0692 | 0.0693 | 0.0694 | 0.0695 | 0.0696 | 0.0697 | 0.0698 | 0.0699 | 0.0700 | 0.0701 | 0.0702 | 0.0703 | 0.0704 | 0.0705 | 0.0706 | 0.0707 | 0.0708 | 0.0709 | 0.0710 | 0.0711 | 0.0712 | 0.0713 | 0.0714 | 0.0715 | 0.0716 | 0.0717 | 0.0718 | 0.0719 | 0.0720 | 0.0721 | 0.0722 | 0.0723 | 0.0724 | 0.0725 | 0.0726 | 0.0727 | 0.0728 | 0.0729 | 0.0730 | 0.0731 | 0.0732 | 0.0733 | 0.0734 | 0.0735 | 0.0736 | 0.0737 | 0.0738 | 0.0739 | 0.0740 | 0.0741 | 0.0742 | 0.0743 | 0.0744 | 0.0745 | 0.0746 | 0.0747 | 0.0748 | 0.0749 | 0.0750 | 0.0751 | 0.0752 | 0.0753 | 0.0754 | 0.0755 | 0.0756 | 0.0757 | 0.0758 | 0.0759 | 0.0760 | 0.0761 | 0.0762 | 0.0763 | 0.0764 | 0.0765 | 0.0766 | 0.0767 | 0.0768 | 0.0769 | 0.0770 | 0.0771 | 0.0772 | 0.0773 | 0.0774 | 0.0775 | 0.0776 | 0.0777 | 0.0778 | 0.0779 | 0.0780 | 0.0781 | 0.0782 | 0.0783 | 0.0784 | 0.0785 | 0.0786 | 0.0787 | 0.0788 | 0.0789 | 0.0790 | 0.0791 | 0.0792 | 0.0793 | 0.0794 | 0.0795 | 0.0796 | 0.0797 | 0.0798 | 0.0799 | 0.0800 | 0.0801 | 0.0802 | 0.0803 | 0.0804 | 0.0805 | 0.0806 | 0.0807 | 0.0808 | 0.0809 | 0.0810 | 0.0811 | 0.0812 | 0.0813 | 0.0814 | 0.0815 | 0.0816 | 0.0817 | 0.0818 | 0.0819 | 0.0820 | 0.0821 | 0.0822 | 0.0823 | 0.0824 | 0.0825 | 0.0826 | 0.0827 | 0.0828 | 0.0829 | 0.0830 | 0.0831 | 0.0832 | 0.0833 | 0.0834 | 0.0835 | 0.0836 | 0.0837 | 0.0838 | 0.0839 | 0.0840 | 0.0841 | 0.0842 | 0.0843 | 0.0844 | 0.0845 | 0.0846 | 0.0847 | 0.0848 | 0.0849 | 0.0850 | 0.0851 | 0.0852 | 0.0853 | 0.0854 | 0.0855 | 0.0856 | 0.0857 | 0.0858 | 0.0859 | 0.0860 | 0.0861 | 0.0862 | 0.0863 | 0.0864 | 0.0865 | 0.0866 | 0.0867 | 0.0868 | 0.0869 | 0.0870 | 0.0871 | 0.0872 | 0.0873 | 0.0874 | 0.0875 | 0.0876 | 0.0877 | 0.0878 | 0.0879 | 0.0880 | 0.0881 | 0.0882 | 0.0883 | 0.0884 | 0.0885 | 0.0886 | 0.0887 | 0.0888 | 0.0889 | 0.0890 | 0.0891 | 0.0892 | 0.0893 | 0.0894 | 0.0895 | 0.0896 | 0.0897 | 0.0898 | 0.0899 | 0.0900 | 0.0901 | 0.0902 | 0.0903 | 0.0904 | 0.0905 | 0.0906 | 0.0907 | 0.0908 | 0.0909 | 0.0910 | 0.0911 | 0.0912 | 0.0913 | 0.0914 | 0.0915 | 0.0916 | 0.0917 | 0.0918 | 0.0919 | 0.0920 | 0.0921 | 0.0922 | 0.0923 | 0.0924 | 0.0925 | 0.0926 | 0.0927 | 0.0928 | 0.0929 | 0.0930 | 0.0931 | 0.0932 | 0.0933 | 0.0934 | 0.0935 | 0.0936 | 0.0937 | 0.0938 | 0.0939 | 0.0940 | 0.0941 | 0.0942 | 0.0943 | 0.0944 | 0.0945 | 0.0946 | 0.0947 | 0.0948 | 0.0949 | 0.0950 | 0 |

### Percentage Points of the $\chi^2$ Distribution

Values of  $\chi^2$  in terms of  $Q$  and  $r$

[illegible]

### Percentage Points of the $\chi^2$ Distribution Values of $\chi^2$ in Terms of $Q$ and $v$

[illegible]

### Percentage Points of the $\chi^2$ Distribution

[illegible]

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $p$

| $1-Q$ | .050000    | .045000    | .040000    | .035000    | .030000    | .025000    | .020000    | .015000    | .012500    | .010000    |
|-------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 40.00 | .557585 02 | .561235 02 | .564885 02 | .568535 02 | .572185 02 | .575835 02 | .579485 02 | .583135 02 | .586785 02 | .590435 02 |
| 40.25 | .562577 02 | .566227 02 | .569877 02 | .573527 02 | .577177 02 | .580827 02 | .584477 02 | .588127 02 | .591777 02 | .595427 02 |
| 40.50 | .567569 02 | .571219 02 | .574869 02 | .578519 02 | .582169 02 | .585819 02 | .589469 02 | .593119 02 | .596769 02 | .600419 02 |
| 40.75 | .572561 02 | .576211 02 | .579861 02 | .583511 02 | .587161 02 | .590811 02 | .594461 02 | .598111 02 | .601761 02 | .605411 02 |
| 41.00 | .577553 02 | .581203 02 | .584853 02 | .588503 02 | .592153 02 | .595803 02 | .599453 02 | .603103 02 | .606753 02 | .610403 02 |
| 41.25 | .582545 02 | .586195 02 | .589845 02 | .593495 02 | .597145 02 | .600795 02 | .604445 02 | .608095 02 | .611745 02 | .615395 02 |
| 41.50 | .587537 02 | .591187 02 | .594837 02 | .598487 02 | .602137 02 | .605787 02 | .609437 02 | .613087 02 | .616737 02 | .620387 02 |
| 41.75 | .592529 02 | .596179 02 | .599829 02 | .603479 02 | .607129 02 | .610779 02 | .614429 02 | .618079 02 | .621729 02 | .625379 02 |
| 42.00 | .597521 02 | .601171 02 | .604821 02 | .608471 02 | .612121 02 | .615771 02 | .619421 02 | .623071 02 | .626721 02 | .630371 02 |
| 42.25 | .602513 02 | .606163 02 | .609813 02 | .613463 02 | .617113 02 | .620763 02 | .624413 02 | .628063 02 | .631713 02 | .635363 02 |
| 42.50 | .607505 02 | .611155 02 | .614805 02 | .618455 02 | .622105 02 | .625755 02 | .629405 02 | .633055 02 | .636705 02 | .640355 02 |
| 42.75 | .612497 02 | .616147 02 | .619797 02 | .623447 02 | .627097 02 | .630747 02 | .634397 02 | .638047 02 | .641697 02 | .645347 02 |
| 43.00 | .617489 02 | .621139 02 | .624789 02 | .628439 02 | .632089 02 | .635739 02 | .639389 02 | .643039 02 | .646689 02 | .650339 02 |
| 43.25 | .622481 02 | .626131 02 | .629781 02 | .633431 02 | .637081 02 | .640731 02 | .644381 02 | .648031 02 | .651681 02 | .655331 02 |
| 43.50 | .627473 02 | .631123 02 | .634773 02 | .638423 02 | .642073 02 | .645723 02 | .649373 02 | .653023 02 | .656673 02 | .660323 02 |
| 43.75 | .632465 02 | .636115 02 | .639765 02 | .643415 02 | .647065 02 | .650715 02 | .654365 02 | .658015 02 | .661665 02 | .665315 02 |
| 44.00 | .637457 02 | .641107 02 | .644757 02 | .648407 02 | .652057 02 | .655707 02 | .659357 02 | .663007 02 | .666657 02 | .670307 02 |
| 44.25 | .642449 02 | .646099 02 | .649749 02 | .653399 02 | .657049 02 | .660699 02 | .664349 02 | .667999 02 | .671649 02 | .675299 02 |
| 44.50 | .647441 02 | .651091 02 | .654741 02 | .658391 02 | .662041 02 | .665691 02 | .669341 02 | .672991 02 | .676641 02 | .680291 02 |
| 44.75 | .652433 02 | .656083 02 | .659733 02 | .663383 02 | .667033 02 | .670683 02 | .674333 02 | .677983 02 | .681633 02 | .685283 02 |
| 45.00 | .657425 02 | .661075 02 | .664725 02 | .668375 02 | .672025 02 | .675675 02 | .679325 02 | .682975 02 | .686625 02 | .690275 02 |
| 45.25 | .662417 02 | .666067 02 | .669717 02 | .673367 02 | .677017 02 | .680667 02 | .684317 02 | .687967 02 | .691617 02 | .695267 02 |
| 45.50 | .667409 02 | .671059 02 | .674709 02 | .678359 02 | .682009 02 | .685659 02 | .689309 02 | .692959 02 | .696609 02 | .700259 02 |
| 45.75 | .672401 02 | .676051 02 | .679701 02 | .683351 02 | .687001 02 | .690651 02 | .694301 02 | .697951 02 | .701601 02 | .705251 02 |
| 46.00 | .677393 02 | .681043 02 | .684693 02 | .688343 02 | .691993 02 | .695643 02 | .699293 02 | .702943 02 | .706593 02 | .710243 02 |
| 46.25 | .682385 02 | .686035 02 | .689685 02 | .693335 02 | .696985 02 | .700635 02 | .704285 02 | .707935 02 | .711585 02 | .715235 02 |
| 46.50 | .687377 02 | .691027 02 | .694677 02 | .698327 02 | .701977 02 | .705627 02 | .709277 02 | .712927 02 | .716577 02 | .720227 02 |
| 46.75 | .692369 02 | .696019 02 | .699669 02 | .703319 02 | .706969 02 | .710619 02 | .714269 02 | .717919 02 | .721569 02 | .725219 02 |
| 47.00 | .697361 02 | .701011 02 | .704661 02 | .708311 02 | .711961 02 | .715611 02 | .719261 02 | .722911 02 | .726561 02 | .730211 02 |
| 47.25 | .702353 02 | .706003 02 | .709653 02 | .713303 02 | .716953 02 | .720603 02 | .724253 02 | .727903 02 | .731553 02 | .735203 02 |
| 47.50 | .707345 02 | .710995 02 | .714645 02 | .718295 02 | .721945 02 | .725595 02 | .729245 02 | .732895 02 | .736545 02 | .740195 02 |
| 47.75 | .712337 02 | .715987 02 | .719637 02 | .723287 02 | .726937 02 | .730587 02 | .734237 02 | .737887 02 | .741537 02 | .745187 02 |
| 48.00 | .717329 02 | .720979 02 | .724629 02 | .728279 02 | .731929 02 | .735579 02 | .739229 02 | .742879 02 | .746529 02 | .750179 02 |
| 48.25 | .722321 02 | .725971 02 | .729621 02 | .733271 02 | .736921 02 | .740571 02 | .744221 02 | .747871 02 | .751521 02 | .755171 02 |
| 48.50 | .727313 02 | .730963 02 | .734613 02 | .738263 02 | .741913 02 | .745563 02 | .749213 02 | .752863 02 | .756513 02 | .760163 02 |
| 48.75 | .732305 02 | .735955 02 | .739605 02 | .743255 02 | .746905 02 | .750555 02 | .754205 02 | .757855 02 | .761505 02 | .765155 02 |
| 49.00 | .737297 02 | .740947 02 | .744597 02 | .748247 02 | .751897 02 | .755547 02 | .759197 02 | .762847 02 | .766497 02 | .770147 02 |
| 49.25 | .742289 02 | .745939 02 | .749589 02 | .753239 02 | .756889 02 | .760539 02 | .764189 02 | .767839 02 | .771489 02 | .775139 02 |
| 49.50 | .747281 02 | .750931 02 | .754581 02 | .758231 02 | .761881 02 | .765531 02 | .769181 02 | .772831 02 | .776481 02 | .780131 02 |
| 49.75 | .752273 02 | .755923 02 | .759573 02 | .763223 02 | .766873 02 | .770523 02 | .774173 02 | .777823 02 | .781473 02 | .785123 02 |
| 50.00 | .757265 02 | .760915 02 | .764565 02 | .768215 02 | .771865 02 | .775515 02 | .779165 02 | .782815 02 | .786465 02 | .790115 02 |
| 50.25 | .762257 02 | .765907 02 | .769557 02 | .773207 02 | .776857 02 | .780507 02 | .784157 02 | .787807 02 | .791457 02 | .795107 02 |
| 50.50 | .767249 02 | .770899 02 | .774549 02 | .778199 02 | .781849 02 | .785499 02 | .789149 02 | .792799 02 | .796449 02 | .800099 02 |
| 50.75 | .772241 02 | .775891 02 | .779541 02 | .783191 02 | .786841 02 | .790491 02 | .794141 02 | .797791 02 | .801441 02 | .805091 02 |
| 51.00 | .777233 02 | .780883 02 | .784533 02 | .788183 02 | .791833 02 | .795483 02 | .799133 02 | .802783 02 | .806433 02 | .810083 02 |
| 51.25 | .782225 02 | .785875 02 | .789525 02 | .793175 02 | .796825 02 | .800475 02 | .804125 02 | .807775 02 | .811425 02 | .815075 02 |
| 51.50 | .787217 02 | .790867 02 | .794517 02 | .798167 02 | .801817 02 | .805467 02 | .809117 02 | .812767 02 | .816417 02 | .820067 02 |
| 51.75 | .792209 02 | .795859 02 | .799509 02 | .803159 02 | .806809 02 | .810459 02 | .814109 02 | .817759 02 | .821409 02 | .825059 02 |
| 52.00 | .797201 02 | .800851 02 | .804501 02 | .808151 02 | .811801 02 | .815451 02 | .819101 02 | .822751 02 | .826401 02 | .830051 02 |
| 52.25 | .802193 02 | .805843 02 | .809493 02 | .813143 02 | .816793 02 | .820443 02 | .824093 02 | .827743 02 | .831393 02 | .835043 02 |
| 52.50 | .807185 02 | .810835 02 | .814485 02 | .818135 02 | .821785 02 | .825435 02 | .829085 02 | .832735 02 | .836385 02 | .840035 02 |
| 52.75 | .812177 02 | .815827 02 | .819477 02 | .823127 02 | .826777 02 | .830427 02 | .834077 02 | .837727 02 | .841377 02 | .845027 02 |
| 53.00 | .817169 02 | .820819 02 | .824469 02 | .828119 02 | .831769 02 | .835419 02 | .839069 02 | .842719 02 | .846369 02 | .850019 02 |
| 53.25 | .822161 02 | .825811 02 | .829461 02 | .833111 02 | .836761 02 | .840411 02 | .844061 02 | .847711 02 | .851361 02 | .855011 02 |
| 53.50 | .827153 02 | .830803 02 | .834453 02 | .838103 02 | .841753 02 | .845403 02 | .849053 02 | .852703 02 | .856353 02 | .860003 02 |
| 53.75 | .832145 02 | .835795 02 | .839445 02 | .843095 02 | .846745 02 | .850395 02 | .854045 02 | .857695 02 | .861345 02 | .864995 02 |
| 54.00 | .837137 02 | .840787 02 | .844437 02 | .848087 02 | .851737 02 | .855387 02 | .859037 02 | .862687 02 | .866337 02 | .869987 02 |
| 54.25 | .842129 02 | .845779 02 | .849429 02 | .853079 02 | .856729 02 | .860379 02 | .864029 02 | .867679 02 | .871329 02 | .874979 02 |
| 54.50 | .847121 02 | .850771 02 | .854421 02 | .858071 02 | .861721 02 | .865371 02 | .869021 02 | .872671 02 | .876321 02 | .879971 02 |
| 54.75 | .852113 02 | .855763 02 | .859413 02 | .863063 02 | .866713 02 | .870363 02 | .874013 02 | .877663 02 | .881313 02 | .884963 02 |
| 55.00 | .857105 02 | .860755 02 | .864405 02 | .868055 02 | .871705 02 | .875355 02 | .879005 02 | .882655 02 | .886305 02 | .889955 02 |
| 55.25 | .862097 02 | .865747 02 | .869397 02 | .873047 02 | .876697 02 | .880347 02 | .883997 02 | .887647 02 | .891297 02 | .894947 02 |
| 55.50 | .867089 02 | .870739 02 | .874389 02 | .878039 02 | .881689 02 | .885339 02 | .888989 02 | .892639 02 | .896289 02 | .900039 02 |
| 55.75 | .872081 02 | .875731 02 | .879381 02 | .883031 02 | .886681 02 | .890331 02 | .893981 02 | .897631 02 | .901281 02 | .904931 02 |
| 56.00 | .877073 02 | .880723 02 | .884373 02 | .888023 02 | .891673 02 | .895323 02 | .898973 02 | .902623 02 | .906273 02 | .909923 02 |
| 56.25 | .882065 02 | .885715 02 | .889365 02 | .893015 02 | .896665 02 | .900315 02 | .903965 02 | .907615 02 | .911265 02 | .914915 02 |
| 56.50 | .887057 02 | .890707 02 | .894357 02 | .898007 02 | .901657 02 | .905307 02 | .908957 02 | .912607 02 | .916257 02 | .919907 02 |
| 56.75 | .892049 02 | .895699 02 | .899349 02 | .902999 02 | .906649 02 | .910299 02 | .913949 02 | .917599 02 | .921249 02 | .924899 02 |
| 57.00 | .897041 02 | .900691 02 | .904341 02 | .907991 02 | .911641 02 | .915291 02 | .918941 02 | .922591 02 | .926241 02 | .929891 02 |
| 57.25 | .902033 02 | .905683 02 | .909333 02 | .912983 02 | .916633 02 | .920283 02 | .923933 02 | .927583 02 | .931233 02 | .934883 02 |
| 57.50 | .907025 02 | .910675 02 | .914325 02 | .917975 02 | .921625 02 | .925275 02 | .928925 02 | .932575 02 | .936225 02 | .939875 02 |
| 57.75 | .912017 02 | .915667 02 | .919317 02 | .922967 02 | .926617 02 | .930267 02 | .933917 02 | .937567 02 | .941217 02 | .944867 02 |
| 58.00 | .917009 02 | .920659 02 | .924309 02 | .927959 02 | .931609 02 | .935259 02 | .938909 02 | .942559 02 | .946209 02 | .949859 02 |
| 58.25 | .922001 02 | .925651 02 | .929301 02 | .932951 02 | .936601 02 | .940251 02 | .943901 02 | .947551 02 | .951201 02 | .954851 02 |
| 58.50 | .927003 02 | .930653 02 | .934303 02 | .937953 02 | .941603 02 | .945253 02 | .948903 02 | .952553 02 | .956203 02 | .959853 02 |
| 58.75 | .932005 02 | .935655 02 | .939305 02 | .942955 02 | .946605 02 | .950255 02 | .953905 02 | .957555 02 | .961205 02 | .964855 02 |
| 59.00 | .937007 02 | .940657 02 | .944307 02 | .947957 02 | .951607 02 | .955257 02 | .958907 02 | .962557 02 | .966207 02 | .969857 02 |
| 59.25 | .942009 02 | .945659 02 | .949309 02 | .952959 02 | .956609 02 | .960259 02 | .963909 02 | .967559 02 | .971209 02 | .974859 02 |
| 59.50 | .947001 02 | .950651 02 | .954301 02 | .9         |            |            |            |            |            |            |

[illegible]

[illegible]124

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu$ | .01   | .02   | .05   | .10   | .20   | .50   | 1.00  | 2.00  | 5.00  | 10.00 | 20.00  | 50.00  | 100.00 | 200.00 | 500.00 | 1000.00 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|---------|
| 1     | .0001 | .0002 | .0005 | .0010 | .0020 | .0044 | .0083 | .0150 | .0288 | .0540 | .1039  | .1929  | .3330  | .5000  | .7500  | 1.0000  |
| 2     | .0100 | .0200 | .0400 | .0738 | .1332 | .2338 | .3839 | .5423 | .7178 | .9053 | 1.1039 | 1.3122 | 1.5312 | 1.7514 | 1.9717 | 2.1790  |
| 3     | .0044 | .0089 | .0177 | .0318 | .0541 | .0890 | .1332 | .1888 | .2538 | .3280 | .4114  | .5039  | .6054  | .7169  | .8384  | .9699   |
| 4     | .0020 | .0040 | .0080 | .0149 | .0259 | .0429 | .0658 | .0957 | .1326 | .1764 | .2270  | .2853  | .3514  | .4254  | .5074  | .5973   |
| 5     | .0011 | .0022 | .0044 | .0078 | .0129 | .0218 | .0344 | .0507 | .0708 | .0947 | .1224  | .1538  | .1889  | .2276  | .2699  | .3257   |
| 6     | .0006 | .0012 | .0024 | .0041 | .0068 | .0110 | .0170 | .0259 | .0380 | .0523 | .0688  | .0874  | .0108  | .1299  | .1594  | .1993   |
| 7     | .0004 | .0007 | .0014 | .0025 | .0041 | .0065 | .0103 | .0156 | .0228 | .0321 | .0436  | .0572  | .0730  | .0910  | .1113  | .1340   |
| 8     | .0003 | .0005 | .0010 | .0017 | .0028 | .0045 | .0070 | .0108 | .0163 | .0236 | .0331  | .0450  | .0594  | .0764  | .0960  | .1183   |
| 9     | .0002 | .0004 | .0008 | .0013 | .0022 | .0037 | .0057 | .0085 | .0126 | .0182 | .0257  | .0354  | .0480  | .0634  | .0817  | .1030   |
| 10    | .0002 | .0003 | .0006 | .0010 | .0017 | .0028 | .0044 | .0066 | .0100 | .0140 | .0200  | .0280  | .0381  | .0504  | .0650  | .0829   |
| 11    | .0001 | .0002 | .0005 | .0008 | .0014 | .0023 | .0038 | .0056 | .0082 | .0116 | .0160  | .0224  | .0307  | .0411  | .0537  | .0687   |
| 12    | .0001 | .0002 | .0004 | .0007 | .0012 | .0020 | .0033 | .0050 | .0072 | .0100 | .0137  | .0193  | .0260  | .0350  | .0460  | .0592   |
| 13    | .0001 | .0001 | .0003 | .0006 | .0010 | .0017 | .0028 | .0042 | .0062 | .0086 | .0120  | .0169  | .0230  | .0314  | .0416  | .0533   |
| 14    | .0001 | .0001 | .0003 | .0005 | .0009 | .0015 | .0025 | .0038 | .0055 | .0076 | .0106  | .0149  | .0204  | .0274  | .0363  | .0471   |
| 15    | .0001 | .0001 | .0002 | .0004 | .0008 | .0013 | .0022 | .0034 | .0050 | .0069 | .0095  | .0133  | .0182  | .0246  | .0329  | .0431   |
| 16    | .0001 | .0001 | .0002 | .0004 | .0007 | .0012 | .0020 | .0031 | .0045 | .0063 | .0086  | .0119  | .0161  | .0214  | .0282  | .0368   |
| 17    | .0001 | .0001 | .0002 | .0003 | .0006 | .0011 | .0018 | .0028 | .0040 | .0055 | .0075  | .0104  | .0140  | .0188  | .0251  | .0331   |
| 18    | .0001 | .0001 | .0002 | .0003 | .0005 | .0010 | .0016 | .0025 | .0036 | .0049 | .0066  | .0091  | .0123  | .0164  | .0213  | .0278   |
| 19    | .0001 | .0001 | .0002 | .0003 | .0005 | .0009 | .0015 | .0023 | .0033 | .0045 | .0060  | .0082  | .0110  | .0146  | .0189  | .0247   |
| 20    | .0001 | .0001 | .0002 | .0003 | .0004 | .0008 | .0013 | .0021 | .0030 | .0041 | .0054  | .0073  | .0097  | .0129  | .0166  | .0218   |
| 21    | .0001 | .0001 | .0002 | .0003 | .0004 | .0007 | .0012 | .0019 | .0027 | .0037 | .0048  | .0064  | .0085  | .0113  | .0145  | .0185   |
| 22    | .0001 | .0001 | .0002 | .0003 | .0004 | .0006 | .0011 | .0018 | .0025 | .0034 | .0044  | .0058  | .0076  | .0099  | .0127  | .0161   |
| 23    | .0001 | .0001 | .0002 | .0003 | .0004 | .0006 | .0010 | .0017 | .0024 | .0032 | .0041  | .0053  | .0069  | .0088  | .0112  | .0141   |
| 24    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0009 | .0015 | .0022 | .0029 | .0038  | .0048  | .0061  | .0077  | .0096  | .0121   |
| 25    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0008 | .0014 | .0021 | .0028 | .0036  | .0045  | .0056  | .0069  | .0085  | .0106   |
| 26    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0008 | .0013 | .0020 | .0027 | .0034  | .0043  | .0053  | .0064  | .0078  | .0095   |
| 27    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0007 | .0013 | .0019 | .0026 | .0033  | .0041  | .0050  | .0060  | .0073  | .0087   |
| 28    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0007 | .0012 | .0018 | .0025 | .0031  | .0039  | .0047  | .0056  | .0068  | .0080   |
| 29    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0007 | .0012 | .0017 | .0024 | .0030  | .0037  | .0045  | .0053  | .0064  | .0075   |
| 30    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0007 | .0011 | .0016 | .0023 | .0028  | .0035  | .0042  | .0050  | .0059  | .0069   |
| 31    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0011 | .0016 | .0022 | .0027  | .0034  | .0040  | .0048  | .0056  | .0065   |
| 32    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0010 | .0015 | .0021 | .0026  | .0032  | .0038  | .0045  | .0053  | .0061   |
| 33    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0010 | .0015 | .0021 | .0026  | .0031  | .0037  | .0043  | .0050  | .0057   |
| 34    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0010 | .0014 | .0020 | .0025  | .0030  | .0035  | .0041  | .0047  | .0054   |
| 35    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0009 | .0014 | .0019 | .0024  | .0029  | .0034  | .0039  | .0045  | .0051   |
| 36    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0009 | .0013 | .0018 | .0023  | .0028  | .0032  | .0037  | .0042  | .0048   |
| 37    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0008 | .0013 | .0017 | .0022  | .0027  | .0031  | .0036  | .0041  | .0046   |
| 38    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0008 | .0012 | .0016 | .0021  | .0025  | .0030  | .0034  | .0039  | .0044   |
| 39    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0008 | .0012 | .0015 | .0020  | .0024  | .0028  | .0032  | .0037  | .0042   |
| 40    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0008 | .0011 | .0015 | .0019  | .0023  | .0027  | .0031  | .0035  | .0040   |
| 41    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0011 | .0014 | .0018  | .0022  | .0026  | .0030  | .0034  | .0038   |
| 42    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0010 | .0013 | .0017  | .0021  | .0024  | .0028  | .0032  | .0036   |
| 43    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0010 | .0013 | .0016  | .0020  | .0023  | .0027  | .0030  | .0034   |
| 44    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0009 | .0012 | .0015  | .0018  | .0021  | .0024  | .0028  | .0031   |
| 45    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0009 | .0012 | .0014  | .0017  | .0020  | .0023  | .0026  | .0030   |
| 46    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0008 | .0011 | .0013  | .0016  | .0019  | .0022  | .0025  | .0028   |
| 47    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0008 | .0010 | .0012  | .0015  | .0018  | .0021  | .0024  | .0027   |
| 48    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0008 | .0010 | .0012  | .0014  | .0017  | .0020  | .0023  | .0026   |
| 49    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0008 | .0009 | .0011  | .0013  | .0015  | .0018  | .0021  | .0024   |
| 50    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0008 | .0009 | .0010  | .0012  | .0014  | .0016  | .0019  | .0022   |
| 51    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0008 | .0009 | .0010  | .0011  | .0013  | .0015  | .0017  | .0020   |
| 52    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0008 | .0009 | .0010  | .0011  | .0012  | .0014  | .0016  | .0018   |
| 53    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0008 | .0009 | .0010  | .0011  | .0012  | .0013  | .0015  | .0017   |
| 54    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0008 | .0009 | .0010  | .0011  | .0012  | .0013  | .0014  | .0016   |
| 55    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0008 | .0009 | .0010  | .0011  | .0012  | .0013  | .0014  | .0015   |
| 56    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0008 | .0009 | .0010  | .0011  | .0012  | .0013  | .0014  | .0015   |
| 57    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0008 | .0009 | .0010  | .0011  | .0012  | .0013  | .0014  | .0015   |
| 58    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0008 | .0009 | .0010  | .0011  | .0012  | .0013  | .0014  | .0015   |
| 59    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0008 | .0009 | .0010  | .0011  | .0012  | .0013  | .0014  | .0015   |
| 60    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0008 | .0009 | .0010  | .0011  | .0012  | .0013  | .0014  | .0015   |
| 61    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0008 | .0009 | .0010  | .0011  | .0012  | .0013  | .0014  | .0015   |
| 62    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0008 | .0009 | .0010  | .0011  | .0012  | .0013  | .0014  | .0015   |
| 63    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0008 | .0009 | .0010  | .0011  | .0012  | .0013  | .0014  | .0015   |
| 64    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0008 | .0009 | .0010  | .0011  | .0012  | .0013  | .0014  | .0015   |
| 65    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0008 | .0009 | .0010  | .0011  | .0012  | .0013  | .0014  | .0015   |
| 66    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0008 | .0009 | .0010  | .0011  | .0012  | .0013  | .0014  | .0015   |
| 67    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0008 | .0009 | .0010  | .0011  | .0012  | .0013  | .0014  | .0015   |
| 68    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0008 | .0009 | .0010  | .0011  | .0012  | .0013  | .0014  | .0015   |
| 69    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0008 | .0009 | .0010  | .0011  | .0012  | .0013  | .0014  | .0015   |
| 70    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0008 | .0009 | .0010  | .0011  | .0012  | .0013  | .0014  | .0015   |
| 71    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0008 | .0009 | .0010  | .0011  | .0012  | .0013  | .0014  | .0015   |
| 72    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0008 | .0009 | .0010  | .0011  | .0012  | .0013  | .0014  | .0015   |
| 73    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0008 | .0009 | .0010  | .0011  | .0012  | .0013  | .0014  | .0015   |
| 74    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0008 | .0009 | .0010  | .0011  | .0012  | .0013  | .0014  | .0015   |
| 75    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0008 | .0009 | .0010  | .0011  | .0012  | .0013  | .0014  | .0015   |
| 76    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0008 | .0009 | .0010  | .0011  | .0012  | .0013  | .0014  | .0015   |
| 77    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0008 | .0009 | .0010  | .0011  | .0012  | .0013  | .0014  | .0015   |
| 78    | .0001 | .0001 | .0002 | .0003 | .0004 | .0005 | .0006 | .0007 | .0008 | .0009 |        |        |        |        |        |         |

### Percentage Points of the $\chi^2$ Distribution Values of $\chi^2$ in Terms of $Q$ and $v$

|        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |     |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|----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--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-----|
| 178991 | 178992 | 178993 | 178994 | 178995 | 178996 | 178997 | 178998 | 178999 | 179000 | 179001 | 179002 | 179003 | 179004 | 179005 | 179006 | 179007 | 179008 | 179009 | 179010 | 179011 | 179012 | 179013 | 179014 | 179015 | 179016 | 179017 | 179018 | 179019 | 179020 | 179021 | 179022 | 179023 | 179024 | 179025 | 179026 | 179027 | 179028 | 179029 | 179030 | 179031 | 179032 | 179033 | 179034 | 179035 | 179036 | 179037 | 179038 | 179039 | 179040 | 179041 | 179042 | 179043 | 179044 | 179045 | 179046 | 179047 | 179048 | 179049 | 179050 | 179051 | 179052 | 179053 | 179054 | 179055 | 179056 | 179057 | 179058 | 179059 | 179060 | 179061 | 179062 | 179063 | 179064 | 179065 | 179066 | 179067 | 179068 | 179069 | 179070 | 179071 | 179072 | 179073 | 179074 | 179075 | 179076 | 179077 | 179078 | 179079 | 179080 | 179081 | 179082 | 179083 | 179084 | 179085 | 179086 | 179087 | 179088 | 179089 | 179090 | 179091 | 179092 | 179093 | 179094 | 179095 | 179096 | 179097 | 179098 | 179099 | 179100 | 179101 | 179102 | 179103 | 179104 | 179105 | 179106 | 179107 | 179108 | 179109 | 179110 | 179111 | 179112 | 179113 | 179114 | 179115 | 179116 | 179117 | 179118 | 179119 | 179120 | 179121 | 179122 | 179123 | 179124 | 179125 | 179126 | 179127 | 179128 | 179129 | 179130 | 179131 | 179132 | 179133 | 179134 | 179135 | 179136 | 179137 | 179138 | 179139 | 179140 | 179141 | 179142 | 179143 | 179144 | 179145 | 179146 | 179147 | 179148 | 179149 | 179150 | 179151 | 179152 | 179153 | 179154 | 179155 | 179156 | 179157 | 179158 | 179159 | 179160 | 179161 | 179162 | 179163 | 179164 | 179165 | 179166 | 179167 | 179168 | 179169 | 179170 | 179171 | 179172 | 179173 | 179174 | 179175 | 179176 | 179177 | 179178 | 179179 | 179180 | 179181 | 179182 | 179183 | 179184 | 179185 | 179186 | 179187 | 179188 | 179189 | 179190 | 179191 | 179192 | 179193 | 179194 | 179195 | 179196 | 179197 | 179198 | 179199 | 179200 | 179201 | 179202 | 179203 | 179204 | 179205 | 179206 | 179207 | 179208 | 179209 | 179210 | 179211 | 179212 | 179213 | 179214 | 179215 | 179216 | 179217 | 179218 | 179219 | 179220 | 179221 | 179222 | 179223 | 179224 | 179225 | 179226 | 179227 | 179228 | 179229 | 179230 | 179231 | 179232 | 179233 | 179234 | 179235 | 179236 | 179237 | 179238 | 179239 | 179240 | 179241 | 179242 | 179243 | 179244 | 179245 | 179246 | 179247 | 179248 | 179249 | 179250 | 179251 | 179252 | 179253 | 179254 | 179255 | 179256 | 179257 | 179258 | 179259 | 179260 | 179261 | 179262 | 179263 | 179264 | 179265 | 179266 | 179267 | 179268 | 179269 | 179270 | 179271 | 179272 | 179273 | 179274 | 179275 | 179276 | 179277 | 179278 | 179279 | 179280 | 179281 | 179282 | 179283 | 179284 | 179285 | 179286 | 179287 | 179288 | 179289 | 179290 | 179291 | 179292 | 179293 | 179294 | 179295 | 179296 | 179297 | 179298 | 179299 | 179300 | 179301 | 179302 | 179303 | 179304 | 179305 | 179306 | 179307 | 179308 | 179309 | 179310 | 179311 | 179312 | 179313 | 179314 | 179315 | 179316 | 179317 | 179318 | 179319 | 179320 | 179321 | 179322 | 179323 | 179324 | 179325 | 179326 | 179327 | 179328 | 179329 | 179330 | 179331 | 179332 | 179333 | 179334 | 179335 | 179336 | 179337 | 179338 | 179339 | 179340 | 179341 | 179342 | 179343 | 179344 | 179345 | 179346 | 179347 | 179348 | 179349 | 179350 | 179351 | 179352 | 179353 | 179354 | 179355 | 179356 | 179357 | 179358 | 179359 | 179360 | 179361 | 179362 | 179363 | 179364 | 179365 | 179366 | 179367 | 179368 | 179369 | 179370 | 179371 | 179372 | 179373 | 179374 | 179375 | 179376 | 179377 | 179378 | 179379 | 179380 | 179381 | 179382 | 179383 | 179384 | 179385 | 179386 | 179387 | 179388 | 179389 | 179390 | 179391 | 179392 | 179393 | 179394 | 179395 | 179396 | 179397 | 179398 | 179399 | 179400 | 179401 | 179402 | 179403 | 179404 | 179405 | 179406 | 179407 | 179408 | 179409 | 179410 | 179411 | 179412 | 179413 | 179414 | 179415 | 179416 | 179417 | 179418 | 179419 | 179420 | 179421 | 179422 | 179423 | 179424 | 179425 | 179426 | 179427 | 179428 | 179429 | 179430 | 179431 | 179432 | 179433 | 179434 | 179435 | 179436 | 179437 | 179438 | 179439 | 179440 | 179441 | 179442 | 179443 | 179444 | 179445 | 179446 | 179447 | 179448 | 179449 | 179450 | 179451 | 179452 | 179453 | 179454 | 179455 | 179456 | 179457 | 179458 | 179459 | 179460 | 179461 | 179462 | 179463 | 179464 | 179465 | 179466 | 179467 | 179468 | 179469 | 179470 | 179471 | 179472 | 179473 | 179474 | 179475 | 179476 | 179477 | 179478 | 179479 | 179480 | 179481 | 179482 | 179483 | 179484 | 179485 | 179486 | 179487 | 179488 | 179489 | 179490 | 179491 | 179492 | 179493 | 179494 | 179495 | 179496 | 179497 | 179498 | 179499 | 179500 | 179501 | 179502 | 179503 | 179504 | 179505 | 179506 | 179507 | 179508 | 179509 | 179510 | 179511 | 179512 | 179513 | 179514 | 179515 | 179516 | 179517 | 179518 | 179519 | 179520 | 179521 | 179522 | 179523 | 179524 | 179525 | 179526 | 179527 | 179528 | 179529 | 179530 | 179531 | 179532 | 179533 | 179534 | 179535 | 179536 | 179537 | 179538 | 179539 | 179540 | 179541 | 179542 | 179543 | 179544 | 179545 | 179546 | 179547 | 179548 | 179549 | 179550 | 179551 | 179552 | 179553 | 179554 | 179555 | 179556 | 179557 | 179558 | 179559 | 179560 | 179561 | 179562 | 179563 | 179564 | 179565 | 179566 | 179567 | 179568 | 179569 | 179570 | 179571 | 179572 | 179573 | 179574 | 179575 | 179576 | 179577 | 179578 | 179579 | 179580 | 179581 | 179582 | 179583 | 179584 | 179585 | 179586 | 179587 | 179588 | 179589 | 179590 | 179591 | 179592 | 179593 | 179594 | 179595 | 179596 | 179597 | 179598 | 179599 | 179600 | 179601 | 179602 | 179603 | 179604 | 179605 | 179606 | 179607 | 179608 | 179609 | 179610 | 179611 | 179612 | 179613 | 179614 | 179615 | 179616 | 179617 | 179618 | 179619 | 179620 | 179621 | 179622 | 179623 | 179624 | 179625 | 179626 | 179627 | 179628 | 179629 | 179630 | 179631 | 179632 | 179633 | 179634 | 179635 | 179636 | 179637 | 179638 | 179639 | 179640 | 179641 | 179642 | 179643 | 179644 | 179645 | 179646 | 179647 | 179648 | 179649 | 179650 | 179651 | 179652 | 179653 | 179654 | 179655 | 179656 | 179657 | 179658 | 179659 | 179660 | 179661 | 179662 | 179663 | 179664 | 179665 | 179666 | 179667 | 179668 | 179669 | 179670 | 179671 | 179672 | 179673 | 179674 | 179675 | 179676 | 179677 | 179678 | 179679 | 179680 | 179681 | 179682 | 179683 | 179684 | 179685 | 179686 | 179687 | 179688 | 179689 | 179690 | 179691 | 179692 | 179693 | 179694 | 179695 | 179696 | 179697 | 179698 | 179699 | 179700 | 179701 | 179702 | 179703 | 179704 | 179705 | 179706 | 179707 | 179708 | 179709 | 179710 | 179711 | 179712 | 179713 | 179714 | 179715 | 179716 | 179717 | 179718 | 179719 | 179720 | 179721 | 179722 | 179723 | 179724 | 179725 | 179726 | 179727 | 179728 | 179729 | 179730 | 179731 | 179732 | 179733 | 179734 | 179735 | 179736 | 179737 | 179738 | 179739 | 179740 | 179741 | 179742 | 179743 | 179744 | 179745 | 179746 | 179747 | 179748 | 179749 | 179750 | 179751 | 179752 | 179753 | 179754 | 179755 | 179756 | 179757 | 179758 | 179759 | 179760 | 179761 | 179762 | 179763 | 179764 | 179765 | 179766 | 179767 | 179768 | 179769 | 179770 | 179771 | 179772 | 179773 | 179774 | 179775 | 179776 | 179777 | 179778 | 179779 | 179780 | 179781 | 179782 | 179783 | 179784 | 179785 | 179786 | 179787 | 179788 | 179789 | 179790 | 179791 | 179792 | 179793 | 179794 | 179795 | 179796 | 179797 | 179798 | 179799 | 179800 | 179801 | 179802 | 179803 | 179804 | 179805 | 179806 | 179807 | 179808 | 179809 | 179810 | 179811 | 179812 | 179813 | 179814 | 179815 | 179816 | 179817 | 179818 | 179819 | 179820 | 179821 | 179822 | 179823 | 179824 | 179825 | 179826 | 179827 | 179828 | 179829 | 179830 | 179831 | 179832 | 179833 | 179834 | 179835 | 179836 | 179837 | 179838 | 179839 | 179840 | 179841 | 179842 | 179843 | 179844 | 179845 | 179846 | 179847 | 179848 | 179849 | 179850 | 179851 | 179852 | 179853 | 179854 | 179855 | 179856 | 179857 | 179858 | 179859 | 179860 | 179861 | 179862 | 179863 | 179864 | 179865 | 179866 | 179867 | 179868 | 179869 | 179870 | 179871 | 179872 | 179873 | 179874 | 179875 | 179876 | 179877 | 179878 | 179879 | 179880 | 179881 | 179882 | 179883 | 179884 | 179885 | 179886 | 179887 | 179888 | 179889 | 179890 | 179891 | 179892 | 179893 | 179894 | 179895 | 179896 | 179897 | 179898 | 179899 | 179900 | 179901 | 179902 | 179903 | 179904 | 179905 | 179906 | 179907 | 179908 | 179909 | 179910 | 179911 | 179912 | 179913 | 179914 | 179915 | 179916 | 179917 | 179918 | 179919 | 179920 | 179921 | 179922 | 179923 | 179924 | 179925 | 179926 | 179927 | 179928 | 179929 | 179930 | 179931 | 179932 | 179933 | 179934 | 179935 | 179936 | 179937 | 179938 | 179939 | 179940 | 179941 | 179942 | 179943 | 179944 | 179945 | 179946 | 179947 | 179948 | 179949 | 179950 | 179951 | 179952 | 179953 | 179954 | 179955 | 179956 | 179957 | 179958 | 179959 | 179960 | 179961 | 179962 | 179963 | 179964 | 179965 | 179966 | 179967 | 179968 | 179969 | 179970 | 179971 | 179972 | 179973 | 179974 | 179975 | 179976 | 179977 | 179978 | 179979 | 179980 | 179981 | 179982 | 179983 | 179984 | 179985 | 179986 | 179987 | 179988 | 179989 | 179990 | 179991 | 179992 | 179993 | 179994 | 179995 | 179996 | 179997 | 179998 | 179999 | 180000 | 180001 | 180002 | 180003 | 180004 | 180005 | 180006 | 180007 | 180008 | 180009 | 180010 | 180011 | 180012 | 180013 | 180014 | 180015 | 180016 | 180017 | 180018 | 180019 | 180020 | 180021 | 180022 | 180023 | 180024 | 180025 | 180026 | 180027 | 180028 | 180029 | 180030 | 180031 | 180032 | 180033 | 180034 | 180035 | 180036 | 180037 | 180038 | 180039 | 180040 | 180041 | 180042 | 180043 | 180044 | 180045 | 180046 | 180047 | 180048 | 180049 | 180050 | 180051 | 180052 | 180053 | 180054 | 180055 | 180056 | 180057 | 180058 | 180059 | 180060 | 180061 | 180062 | 180063 | 180064 | 180065 | 180066 | 180067 | 180068 | 180069 | 180070 | 180071 | 180072 | 180073 | 180074 | 180075 | 180076 | 180077 | 180078 | 180079 | 180080 | 180081 | 180082 | 180083 | 180084 | 180085 | 180086 | 180087 | 180088 | 180089 | 180090 | 180091 | 180092 | 180093 | 180094 | 180095 | 180096 | 180097 | 180098 | 180099 | 180100 | 180101 | 180102 | 180103 | 180104 | 180105 | 180106 | 180107 | 180108 | 180109 | 180110 | 180111 | 180112 | 180113 | 180114 | 180115 | 180 |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|----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--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-----|

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $v$

| $Q$   | 0.50000 | 0.55000 | 0.60000 | 0.65000 | 0.70000 | 0.75000 | 0.80000 | 0.85000 | 0.90000 | 0.95000 | 1.00000 | 1.05000 | 1.10000 | 1.15000 | 1.20000 | 1.25000 | 1.30000 | 1.35000 | 1.40000 |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 162.5 | 193246  | 193272  | 193298  | 193324  | 193350  | 193376  | 193402  | 193428  | 193454  | 193480  | 193506  | 193532  | 193558  | 193584  | 193610  | 193636  | 193662  | 193688  | 193714  |
| 163.0 | 193741  | 193767  | 193793  | 193819  | 193845  | 193871  | 193897  | 193923  | 193949  | 193975  | 194001  | 194027  | 194053  | 194079  | 194105  | 194131  | 194157  | 194183  | 194209  |
| 163.5 | 194234  | 194260  | 194286  | 194312  | 194338  | 194364  | 194390  | 194416  | 194442  | 194468  | 194494  | 194520  | 194546  | 194572  | 194598  | 194624  | 194650  | 194676  | 194702  |
| 164.0 | 194728  | 194754  | 194780  | 194806  | 194832  | 194858  | 194884  | 194910  | 194936  | 194962  | 194988  | 195014  | 195040  | 195066  | 195092  | 195118  | 195144  | 195170  | 195196  |
| 164.5 | 195222  | 195248  | 195274  | 195300  | 195326  | 195352  | 195378  | 195404  | 195430  | 195456  | 195482  | 195508  | 195534  | 195560  | 195586  | 195612  | 195638  | 195664  | 195690  |
| 165.0 | 195716  | 195742  | 195768  | 195794  | 195820  | 195846  | 195872  | 195898  | 195924  | 195950  | 195976  | 196002  | 196028  | 196054  | 196080  | 196106  | 196132  | 196158  | 196184  |
| 165.5 | 196210  | 196236  | 196262  | 196288  | 196314  | 196340  | 196366  | 196392  | 196418  | 196444  | 196470  | 196496  | 196522  | 196548  | 196574  | 196600  | 196626  | 196652  | 196678  |
| 166.0 | 196704  | 196730  | 196756  | 196782  | 196808  | 196834  | 196860  | 196886  | 196912  | 196938  | 196964  | 196990  | 197016  | 197042  | 197068  | 197094  | 197120  | 197146  | 197172  |
| 166.5 | 197198  | 197224  | 197250  | 197276  | 197302  | 197328  | 197354  | 197380  | 197406  | 197432  | 197458  | 197484  | 197510  | 197536  | 197562  | 197588  | 197614  | 197640  | 197666  |
| 167.0 | 197692  | 197718  | 197744  | 197770  | 197796  | 197822  | 197848  | 197874  | 197900  | 197926  | 197952  | 197978  | 198004  | 198030  | 198056  | 198082  | 198108  | 198134  | 198160  |
| 167.5 | 198186  | 198212  | 198238  | 198264  | 198290  | 198316  | 198342  | 198368  | 198394  | 198420  | 198446  | 198472  | 198498  | 198524  | 198550  | 198576  | 198602  | 198628  | 198654  |
| 168.0 | 198680  | 198706  | 198732  | 198758  | 198784  | 198810  | 198836  | 198862  | 198888  | 198914  | 198940  | 198966  | 198992  | 199018  | 199044  | 199070  | 199096  | 199122  | 199148  |
| 168.5 | 199174  | 199200  | 199226  | 199252  | 199278  | 199304  | 199330  | 199356  | 199382  | 199408  | 199434  | 199460  | 199486  | 199512  | 199538  | 199564  | 199590  | 199616  | 199642  |
| 169.0 | 199668  | 199694  | 199720  | 199746  | 199772  | 199798  | 199824  | 199850  | 199876  | 199902  | 199928  | 199954  | 199980  | 200006  | 200032  | 200058  | 200084  | 200110  | 200136  |
| 169.5 | 200162  | 200188  | 200214  | 200240  | 200266  | 200292  | 200318  | 200344  | 200370  | 200396  | 200422  | 200448  | 200474  | 200500  | 200526  | 200552  | 200578  | 200604  | 200630  |
| 170.0 | 200656  | 200682  | 200708  | 200734  | 200760  | 200786  | 200812  | 200838  | 200864  | 200890  | 200916  | 200942  | 200968  | 200994  | 201020  | 201046  | 201072  | 201098  | 201124  |
| 170.5 | 201150  | 201176  | 201202  | 201228  | 201254  | 201280  | 201306  | 201332  | 201358  | 201384  | 201410  | 201436  | 201462  | 201488  | 201514  | 201540  | 201566  | 201592  | 201618  |
| 171.0 | 201644  | 201670  | 201696  | 201722  | 201748  | 201774  | 201800  | 201826  | 201852  | 201878  | 201904  | 201930  | 201956  | 201982  | 202008  | 202034  | 202060  | 202086  | 202112  |
| 171.5 | 202138  | 202164  | 202190  | 202216  | 202242  | 202268  | 202294  | 202320  | 202346  | 202372  | 202398  | 202424  | 202450  | 202476  | 202502  | 202528  | 202554  | 202580  | 202606  |
| 172.0 | 202632  | 202658  | 202684  | 202710  | 202736  | 202762  | 202788  | 202814  | 202840  | 202866  | 202892  | 202918  | 202944  | 202970  | 202996  | 203022  | 203048  | 203074  | 203100  |
| 172.5 | 203126  | 203152  | 203178  | 203204  | 203230  | 203256  | 203282  | 203308  | 203334  | 203360  | 203386  | 203412  | 203438  | 203464  | 203490  | 203516  | 203542  | 203568  | 203594  |
| 173.0 | 203620  | 203646  | 203672  | 203698  | 203724  | 203750  | 203776  | 203802  | 203828  | 203854  | 203880  | 203906  | 203932  | 203958  | 203984  | 204010  | 204036  | 204062  | 204088  |
| 173.5 | 204114  | 204140  | 204166  | 204192  | 204218  | 204244  | 204270  | 204296  | 204322  | 204348  | 204374  | 204400  | 204426  | 204452  | 204478  | 204504  | 204530  | 204556  | 204582  |
| 174.0 | 204608  | 204634  | 204660  | 204686  | 204712  | 204738  | 204764  | 204790  | 204816  | 204842  | 204868  | 204894  | 204920  | 204946  | 204972  | 204998  | 205024  | 205050  | 205076  |
| 174.5 | 205102  | 205128  | 205154  | 205180  | 205206  | 205232  | 205258  | 205284  | 205310  | 205336  | 205362  | 205388  | 205414  | 205440  | 205466  | 205492  | 205518  | 205544  | 205570  |
| 175.0 | 205596  | 205622  | 205648  | 205674  | 205700  | 205726  | 205752  | 205778  | 205804  | 205830  | 205856  | 205882  | 205908  | 205934  | 205960  | 205986  | 206012  | 206038  | 206064  |
| 175.5 | 206090  | 206116  | 206142  | 206168  | 206194  | 206220  | 206246  | 206272  | 206298  | 206324  | 206350  | 206376  | 206402  | 206428  | 206454  | 206480  | 206506  | 206532  | 206558  |
| 176.0 | 206584  | 206610  | 206636  | 206662  | 206688  | 206714  | 206740  | 206766  | 206792  | 206818  | 206844  | 206870  | 206896  | 206922  | 206948  | 206974  | 206999  | 207025  | 207051  |
| 176.5 | 207077  | 207103  | 207129  | 207155  | 207181  | 207207  | 207233  | 207259  | 207285  | 207311  | 207337  | 207363  | 207389  | 207415  | 207441  | 207467  | 207493  | 207519  | 207545  |
| 177.0 | 207571  | 207597  | 207623  | 207649  | 207675  | 207701  | 207727  | 207753  | 207779  | 207805  | 207831  | 207857  | 207883  | 207909  | 207935  | 207961  | 207987  | 208013  | 208039  |
| 177.5 | 208065  | 208091  | 208117  | 208143  | 208169  | 208195  | 208221  | 208247  | 208273  | 208299  | 208325  | 208351  | 208377  | 208403  | 208429  | 208455  | 208481  | 208507  | 208533  |
| 178.0 | 208559  | 208585  | 208611  | 208637  | 208663  | 208689  | 208715  | 208741  | 208767  | 208793  | 208819  | 208845  | 208871  | 208897  | 208923  | 208949  | 208975  | 209001  | 209027  |
| 178.5 | 209053  | 209079  | 209105  | 209131  | 209157  | 209183  | 209209  | 209235  | 209261  | 209287  | 209313  | 209339  | 209365  | 209391  | 209417  | 209443  | 209469  | 209495  | 209521  |
| 179.0 | 209547  | 209573  | 209599  | 209625  | 209651  | 209677  | 209703  | 209729  | 209755  | 209781  | 209807  | 209833  | 209859  | 209885  | 209911  | 209937  | 209963  | 209989  | 210015  |
| 179.5 | 210041  | 210067  | 210093  | 210119  | 210145  | 210171  | 210197  | 210223  | 210249  | 210275  | 210301  | 210327  | 210353  | 210379  | 210405  | 210431  | 210457  | 210483  | 210509  |
| 180.0 | 210535  | 210561  | 210587  | 210613  | 210639  | 210665  | 210691  | 210717  | 210743  | 210769  | 210795  | 210821  | 210847  | 210873  | 210899  | 210925  | 210951  | 210977  | 211003  |
| 180.5 | 211029  | 211055  | 211081  | 211107  | 211133  | 211159  | 211185  | 211211  | 211237  | 211263  | 211289  | 211315  | 211341  | 211367  | 211393  | 211419  | 211445  | 211471  | 211497  |
| 181.0 | 211523  | 211549  | 211575  | 211601  | 211627  | 211653  | 211679  | 211705  | 211731  | 211757  | 211783  | 211809  | 211835  | 211861  | 211887  | 211913  | 211939  | 211965  | 211991  |
| 181.5 | 212017  | 212043  | 212069  | 212095  | 212121  | 212147  | 212173  | 212199  | 212225  | 212251  | 212277  | 212303  | 212329  | 212355  | 212381  | 212407  | 212433  | 212459  | 212485  |
| 182.0 | 212511  | 212537  | 212563  | 212589  | 212615  | 212641  | 212667  | 212693  | 212719  | 212745  | 212771  | 212797  | 212823  | 212849  | 212875  | 212901  | 212927  | 212953  | 212979  |
| 182.5 | 213005  | 213031  | 213057  | 213083  | 213109  | 213135  | 213161  | 213187  | 213213  | 213239  | 213265  | 213291  | 213317  | 213343  | 213369  | 213395  | 213421  | 213447  | 213473  |
| 183.0 | 213499  | 213525  | 213551  | 213577  | 213603  | 213629  | 213655  | 213681  | 213707  | 213733  | 213759  | 213785  | 213811  | 213837  | 213863  | 213889  | 213915  | 213941  | 213967  |
| 183.5 | 213993  | 214019  | 214045  | 214071  | 214097  | 214123  | 214149  | 214175  | 214201  | 214227  | 214253  | 214279  | 214305  | 214331  | 214357  | 214383  | 214409  | 214435  | 214461  |
| 184.0 | 214487  | 214513  | 214539  | 214565  | 214591  | 214617  | 214643  | 214669  | 214695  | 214721  | 214747  | 214773  | 214799  | 214825  | 214851  | 214877  | 214903  | 214929  | 214955  |
| 184.5 | 214981  | 215007  | 215033  | 215059  | 215085  | 215111  | 215137  | 215163  | 215189  | 215215  | 215241  | 215267  | 215293  | 215319  | 215345  | 215371  | 215397  | 215423  | 215449  |
| 185.0 | 215475  | 215501  | 215527  | 215553  | 215579  | 215605  | 215631  | 215657  | 215683  | 215709  | 215735  | 215761  | 215787  | 215813  | 215839  | 215865  | 215891  | 215917  | 215943  |
| 185.5 | 215969  | 215995  | 216021  | 216047  | 216073  | 216099  | 216125  | 216151  | 216177  | 216203  | 216229  | 216255  | 216281  | 216307  | 216333  | 216359  | 216385  | 216411  | 216437  |
| 186.0 | 216463  | 216489  | 216515  | 216541  | 216567  | 216593  | 216619  | 216645  | 216671  | 216697  | 216723  | 216749  | 216775  | 216801  | 216827  | 216853  | 216879  | 216905  | 216931  |
| 186.5 | 216957  | 216983  | 217009  | 217035  | 217061  | 217087  | 217113  | 217139  | 217165  | 217191  | 217217  | 217243  | 217269  | 217295  | 217321  | 217347  | 217373  | 217399  | 217425  |
| 187.0 | 217451  | 217477  | 217503  | 217529  | 217555  | 217581  | 217607  | 217633  | 217659  | 217685  | 217711  | 217737  | 217763  | 217789  | 217815  | 217841  | 217867  | 217893  | 217919  |

### Percentage Points of the $\chi^2$ Distribution Values of $\chi^2$ in Terms of $Q$ and $\nu$

|       |       |       |       |       |       |       |       |       |         |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 22304 | 22305 | 22306 | 22307 | 22308 | 22309 | 22310 | 22311 | 22312 | 22313   | 22314 | 22315 | 22316 | 22317 | 22318 | 22319 | 22320 | 22321 | 22322 | 22323 | 22324 | 22325 | 22326 | 22327 | 22328 | 22329 | 22330 | 22331 | 22332 | 22333 | 22334 | 22335 | 22336 | 22337 | 22338 | 22339 | 22340 | 22341 | 22342 | 22343 | 22344 | 22345 | 22346 | 22347 | 22348 | 22349 | 22350 | 22351 | 22352 | 22353 | 22354 | 22355 | 22356 | 22357 | 22358 | 22359 | 22360 | 22361 | 22362 | 22363 | 22364 | 22365 | 22366 | 22367 | 22368 | 22369 | 22370 | 22371 | 22372 | 22373 | 22374 | 22375 | 22376 | 22377 | 22378 | 22379 | 22380 | 22381 | 22382 | 22383 | 22384 | 22385 | 22386 | 22387 | 22388 | 22389 | 22390 | 22391 | 22392 | 22393 | 22394 | 22395 | 22396 | 22397 | 22398 | 22399 | 22400 | 22401 | 22402 | 22403 | 22404 | 22405 | 22406 | 22407 | 22408 | 22409 | 22410 | 22411 | 22412 | 22413 | 22414 | 22415 | 22416 | 22417 | 22418 | 22419 | 22420 | 22421 | 22422 | 22423 | 22424 | 22425 | 22426 | 22427 | 22428 | 22429 | 22430 | 22431 | 22432 | 22433 | 22434 | 22435 | 22436 | 22437 | 22438 | 22439 | 22440 | 22441 | 22442 | 22443 | 22444 | 22445 | 22446 | 22447 | 22448 | 22449 | 22450 | 22451 | 22452 | 22453 | 22454 | 22455 | 22456 | 22457 | 22458 | 22459 | 22460 | 22461 | 22462 | 22463 | 22464 | 22465 | 22466 | 22467 | 22468 | 22469 | 22470 | 22471 | 22472 | 22473 | 22474 | 22475 | 22476 | 22477 | 22478 | 22479 | 22480 | 22481 | 22482 | 22483 | 22484 | 22485 | 22486 | 22487 | 22488 | 22489 | 22490 | 22491 | 22492 | 22493 | 22494 | 22495 | 22496 | 22497 | 22498 | 22499 | 22500 | 22501 | 22502 | 22503 | 22504 | 22505 | 22506 | 22507 | 22508 | 22509 | 22510 | 22511 | 22512 | 22513 | 22514 | 22515 | 22516 | 22517 | 22518 | 22519 | 22520 | 22521 | 22522 | 22523 | 22524 | 22525 | 22526 | 22527 | 22528 | 22529 | 22530 | 22531 | 22532 | 22533 | 22534 | 22535 | 22536 | 22537 | 22538 | 22539 | 22540 | 22541 | 22542 | 22543 | 22544 | 22545 | 22546 | 22547 | 22548 | 22549 | 22550 | 22551 | 22552 | 22553 | 22554 | 22555 | 22556 | 22557 | 22558 | 22559 | 22560 | 22561 | 22562 | 22563 | 22564 | 22565 | 22566 | 22567 | 22568 | 22569 | 22570 | 22571 | 22572 | 22573 | 22574 | 22575 | 22576 | 22577 | 22578 | 22579 | 22580 | 22581 | 22582 | 22583 | 22584 | 22585 | 22586 | 22587 | 22588 | 22589 | 22590 | 22591 | 22592 | 22593 | 22594 | 22595 | 22596 | 22597 | 22598 | 22599 | 22600 | 22601 | 22602 | 22603 | 22604 | 22605 | 22606 | 22607 | 22608 | 22609 | 22610 | 22611 | 22612 | 22613 | 22614 | 22615 | 22616 | 22617 | 22618 | 22619 | 22620 | 22621 | 22622 | 22623 | 22624 | 22625 | 22626 | 22627 | 22628 | 22629 | 22630 | 22631 | 22632 | 22633 | 22634 | 22635 | 22636 | 22637 | 22638 | 22639 | 22640 | 22641 | 22642 | 22643 | 22644 | 22645 | 22646 | 22647 | 22648 | 22649 | 22650 | 22651 | 22652 | 22653 | 22654 | 22655 | 22656 | 22657 | 22658 | 22659 | 22660 | 22661 | 22662 | 22663 | 22664 | 22665 | 22666 | 22667 | 22668 | 22669 | 22670 | 22671 | 22672 | 22673 | 22674 | 22675 | 22676 | 22677 | 22678 | 22679 | 22680 | 22681 | 22682 | 22683 | 22684 | 22685 | 22686 | 22687 | 22688 | 22689 | 22690 | 22691 | 22692 | 22693 | 22694 | 22695 | 22696 | 22697 | 22698 | 22699 | 22700 | 22701 | 22702 | 22703 | 22704 | 22705 | 22706 | 22707 | 22708 | 22709 | 22710 | 22711 | 22712 |
| 22304 | 22305 | 22306 | 22307 | 22308 | 22309 | 22310 | 22311 | 22312 | 22313   | 22314 | 22315 | 22316 | 22317 | 22318 | 22319 | 22320 | 22321 | 22322 | 22323 | 22324 | 22325 | 22326 | 22327 | 22328 | 22329 | 22330 | 22331 | 22332 | 22333 | 22334 | 22335 | 22336 | 22337 | 22338 | 22339 | 22340 | 22341 | 22342 | 22343 | 22344 | 22345 | 22346 | 22347 | 22348 | 22349 | 22350 | 22351 | 22352 | 22353 | 22354 | 22355 | 22356 | 22357 | 22358 | 22359 | 22360 | 22361 | 22362 | 22363 | 22364 | 22365 | 22366 | 22367 | 22368 | 22369 | 22370 | 22371 | 22372 | 22373 | 22374 | 22375 | 22376 | 22377 | 22378 | 22379 | 22380 | 22381 | 22382 | 22383 | 22384 | 22385 | 22386 | 22387 | 22388 | 22389 | 22390 | 22391 | 22392 | 22393 | 22394 | 22395 | 22396 | 22397 | 22398 | 22399 | 22400 | 22401 | 22402 | 22403 | 22404 | 22405 | 22406 | 22407 | 22408 | 22409 | 22410 | 22411 | 22412 | 22413 | 22414 | 22415 | 22416 | 22417 | 22418 | 22419 | 22420 | 22421 | 22422 | 22423 | 22424 | 22425 | 22426 | 22427 | 22428 | 22429 | 22430 | 22431 | 22432 | 22433 | 22434 | 22435 | 22436 | 22437 | 22438 | 22439 | 22440 | 22441 | 22442 | 22443 | 22444 | 22445 | 22446 | 22447 | 22448 | 22449 | 22450 | 22451 | 22452 | 22453 | 22454 | 22455 | 22456 | 22457 | 22458 | 22459 | 22460 | 22461 | 22462 | 22463 | 22464 | 22465 | 22466 | 22467 | 22468 | 22469 | 22470 | 22471 | 22472 | 22473 | 22474 | 22475 | 22476 | 22477 | 22478 | 22479 | 22480 | 22481 | 22482 | 22483 | 22484 | 22485 | 22486 | 22487 | 22488 | 22489 | 22490 | 22491 | 22492 | 22493 | 22494 | 22495 | 22496 | 22497 | 22498 | 22499 | 22500 | 22501 | 22502 | 22503 | 22504 | 22505 | 22506 | 22507 | 22508 | 22509 | 22510 | 22511 | 22512 | 22513 | 22514 | 22515 | 22516 | 22517 | 22518 | 22519 | 22520 | 22521 | 22522 | 22523 | 22524 | 22525 | 22526 | 22527 | 22528 | 22529 | 22530 | 22531 | 22532 | 22533 | 22534 | 22535 | 22536 | 22537 | 22538 | 22539 | 22540 | 22541 | 22542 | 22543 | 22544 | 22545 | 22546 | 22547 | 22548 | 22549 | 22550 | 22551 | 22552 | 22553 | 22554 | 22555 | 22556 | 22557 | 22558 | 22559 | 22560 | 22561 | 22562 | 22563 | 22564 | 22565 | 22566 | 22567 | 22568 | 22569 | 22570 | 22571 | 22572 | 22573 | 22574 | 22575 | 22576 | 22577 | 22578 | 22579 | 22580 | 22581 | 22582 | 22583 | 22584 | 22585 | 22586 | 22587 | 22588 | 22589 | 22590 | 22591 | 22592 | 22593 | 22594 | 22595 | 22596 | 22597 | 22598 | 22599 | 22600 | 22601 | 22602 | 22603 | 22604 | 22605 | 22606 | 22607 | 22608 | 22609 | 22610 | 22611 | 22612 | 22613 | 22614 | 22615 | 22616 | 22617 | 22618 | 22619 | 22620 | 22621 | 22622 | 22623 | 22624 | 22625 | 22626 | 22627 | 22628 | 22629 | 22630 | 22631 | 22632 | 22633 | 22634 | 22635 | 22636 | 22637 | 22638 | 22639 | 22640 | 22641 | 22642 | 22643 | 22644 | 22645 | 22646 | 22647 | 22648 | 22649 | 22650 | 22651 | 22652 | 22653 | 22654 | 22655 | 22656 | 22657 | 22658 | 22659 | 22660 | 22661 | 22662 | 22663 | 22664 | 22665 | 22666 | 22667 | 22668 | 22669 | 22670 | 22671 | 22672 | 22673 | 22674 | 22675 | 22676 | 22677 | 22678 | 22679 | 22680 | 22681 | 22682 | 22683 | 22684 | 22685 | 22686 | 22687 | 22688 | 22689 | 22690 | 22691 | 22692 | 22693 | 22694 | 22695 | 22696 | 22697 | 22698 | 22699 | 22700 | 22701 | 22702 | 22703 | 22704 | 22705 | 22706 | 22707 | 22708 | 22709 | 22710 | 22711 | 22712 |
| 22304 | 22305 | 22306 | 22307 | 22308 | 22309 | 22310 | 22311 | 22312 | 22313   | 22314 | 22315 | 22316 | 22317 | 22318 | 22319 | 22320 | 22321 | 22322 | 22323 | 22324 | 22325 | 22326 | 22327 | 22328 | 22329 | 22330 | 22331 | 22332 | 22333 | 22334 | 22335 | 22336 | 22337 | 22338 | 22339 | 22340 | 22341 | 22342 | 22343 | 22344 | 22345 | 22346 | 22347 | 22348 | 22349 | 22350 | 22351 | 22352 | 22353 | 22354 | 22355 | 22356 | 22357 | 22358 | 22359 | 22360 | 22361 | 22362 | 22363 | 22364 | 22365 | 22366 | 22367 | 22368 | 22369 | 22370 | 22371 | 22372 | 22373 | 22374 | 22375 | 22376 | 22377 | 22378 | 22379 | 22380 | 22381 | 22382 | 22383 | 22384 | 22385 | 22386 | 22387 | 22388 | 22389 | 22390 | 22391 | 22392 | 22393 | 22394 | 22395 | 22396 | 22397 | 22398 | 22399 | 22400 | 22401 | 22402 | 22403 | 22404 | 22405 | 22406 | 22407 | 22408 | 22409 | 22410 | 22411 | 22412 | 22413 | 22414 | 22415 | 22416 | 22417 | 22418 | 22419 | 22420 | 22421 | 22422 | 22423 | 22424 | 22425 | 22426 | 22427 | 22428 | 22429 | 22430 | 22431 | 22432 | 22433 | 22434 | 22435 | 22436 | 22437 | 22438 | 22439 | 22440 | 22441 | 22442 | 22443 | 22444 | 22445 | 22446 | 22447 | 22448 | 22449 | 22450 | 22451 | 22452 | 22453 | 22454 | 22455 | 22456 | 22457 | 22458 | 22459 | 22460 | 22461 | 22462 | 22463 | 22464 | 22465 | 22466 | 22467 | 22468 | 22469 | 22470 | 22471 | 22472 | 22473 | 22474 | 22475 | 22476 | 22477 | 22478 | 22479 | 22480 | 22481 | 22482 | 22483 | 22484 | 22485 | 22486 | 22487 | 22488 | 22489 | 22490 | 22491 | 22492 | 22493 | 22494 | 22495 | 22496 | 22497 | 22498 | 22499 | 22500 | 22501 | 22502 | 22503 | 22504 | 22505 | 22506 | 22507 | 22508 | 22509 | 22510 | 22511 | 22512 | 22513 | 22514 | 22515 | 22516 | 22517 | 22518 | 22519 | 22520 | 22521 | 22522 | 22523 | 22524 | 22525 | 22526 | 22527 | 22528 | 22529 | 22530 | 22531 | 22532 | 22533 | 22534 | 22535 | 22536 | 22537 | 22538 | 22539 | 22540 | 22541 | 22542 | 22543 | 22544 | 22545 | 22546 | 22547 | 22548 | 22549 | 22550 | 22551 | 22552 | 22553 | 22554 | 22555 | 22556 | 22557 | 22558 | 22559 | 22560 | 22561 | 22562 | 22563 | 22564 | 22565 | 22566 | 22567 | 22568 | 22569 | 22570 | 22571 | 22572 | 22573 | 22574 | 22575 | 22576 | 22577 | 22578 | 22579 | 22580 | 22581 | 22582 | 22583 | 22584 | 22585 | 22586 | 22587 | 22588 | 22589 | 22590 | 22591 | 22592 | 22593 | 22594 | 22595 | 22596 | 22597 | 22598 | 22599 | 22600 | 22601 | 22602 | 22603 | 22604 | 22605 | 22606 | 22607 | 22608 | 22609 | 22610 | 22611 | 22612 | 22613 | 22614 | 22615 | 22616 | 22617 | 22618 | 22619 | 22620 | 22621 | 22622 | 22623 | 22624 | 22625 | 22626 | 22627 | 22628 | 22629 | 22630 | 22631 | 22632 | 22633 | 22634 | 22635 | 22636 | 22637 | 22638 | 22639 | 22640 | 22641 | 22642 | 22643 | 22644 | 22645 | 22646 | 22647 | 22648 | 22649 | 22650 | 22651 | 22652 | 22653 | 22654 | 22655 | 22656 | 22657 | 22658 | 22659 | 22660 | 22661 | 22662 | 22663 | 22664 | 22665 | 22666 | 22667 | 22668 | 22669 | 22670 | 22671 | 22672 | 22673 | 22674 | 22675 | 22676 | 22677 | 22678 | 22679 | 22680 | 22681 | 22682 | 22683 | 22684 | 22685 | 22686 | 22687 | 22688 | 22689 | 22690 | 22691 | 22692 | 22693 | 22694 | 22695 | 22696 | 22697 | 22698 | 22699 | 22700 | 22701 | 22702 | 22703 | 22704 | 22705 | 22706 | 22707 | 22708 | 22709 | 22710 | 22711 | 22712 |
| 22304 | 22305 | 22306 | 22307 | 22308 | 22309 | 22310 | 22311 | 22312 | 22313</ |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |

### Percentage Points of the $\chi^2$ -Distribution in Terms of $\chi^2$ and $\chi^2$ Values of $\chi^2$ for $\chi^2$ and $\chi^2$

[illegible]

### Percentage Points of the $\chi^2$ Distribution

|        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |   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   |        |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |      |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----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| 222    | 223    | 224    | 225    | 226    | 227    | 228    | 229    | 230    | 231    | 232    | 233    | 234    | 235    | 236    | 237    | 238    | 239    | 240    | 241    | 242    | 243    | 244    | 245    | 246    | 247    | 248    | 249    | 250    | 251    | 252    | 253    | 254    | 255    | 256    | 257    | 258    | 259    | 260    | 261    | 262    | 263    | 264    | 265    | 266    | 267    | 268    | 269    | 270    | 271    | 272    | 273    | 274    | 275    | 276    | 277    | 278    | 279    | 280    | 281    | 282    | 283    | 284    | 285    | 286    | 287    | 288    | 289    | 290    | 291    | 292    | 293    | 294    | 295    | 296    | 297    | 298    | 299    | 300    | 301    | 302    | 303    | 304    | 305    | 306    | 307    | 308    | 309    | 310    | 311    | 312    | 313    | 314    | 315    | 316    | 317    | 318    | 319    | 320    | 321    | 322    | 323    | 324    | 325    | 326    | 327    | 328    | 329    | 330    | 331    | 332    | 333    | 334    | 335    | 336    | 337    | 338    | 339    | 340    | 341    | 342    | 343    | 344    | 345    | 346    | 347    | 348    | 349    | 350    | 351    | 352    | 353    | 354    | 355    | 356    | 357    | 358    | 359    | 360    | 361    | 362    | 363    | 364    | 365    | 366    | 367    | 368    | 369    | 370    | 371    | 372    | 373    | 374    | 375    | 376    | 377    | 378    | 379    | 380    | 381    | 382    | 383    | 384    | 385    | 386    | 387    | 388    | 389    | 390    | 391    | 392    | 393    | 394    | 395    | 396    | 397    | 398    | 399    | 400    | 401    | 402    | 403    | 404    | 405    | 406    | 407    | 408    | 409    | 410    | 411    | 412    | 413    | 414    | 415    | 416    | 417    | 418    | 419    | 420    | 421    | 422    | 423    | 424    | 425    | 426    | 427    | 428    | 429    | 430    | 431    | 432    | 433    | 434    | 435    | 436    | 437    | 438    | 439    | 440    | 441    | 442    | 443    | 444    | 445    | 446    | 447    | 448    | 449    | 450    | 451    | 452    | 453    | 454    | 455    | 456    | 457    | 458    | 459    | 460    | 461    | 462    | 463    | 464    | 465    | 466    | 467    | 468    | 469    | 470    | 471    | 472    | 473    | 474    | 475    | 476    | 477    | 478    | 479    | 480    | 481    | 482    | 483    | 484    | 485    | 486    | 487    | 488    | 489    | 490    | 491    | 492    | 493    | 494    | 495    | 496    | 497    | 498    | 499    | 500    | 501    | 502    | 503    | 504    | 505    | 506    | 507    | 508    | 509    | 510    | 511    | 512    | 513    | 514    | 515    | 516    | 517    | 518    | 519    | 520    | 521    | 522    | 523    | 524    | 525    | 526    | 527    | 528    | 529    | 530    | 531    | 532    | 533    | 534    | 535    | 536    | 537    | 538    | 539    | 540    | 541    | 542    | 543    | 544    | 545    | 546    | 547    | 548    | 549    | 550    | 551    | 552    | 553    | 554    | 555    | 556    | 557 | 558 | 559 | 560 | 561 | 562 | 563 | 564 | 565 | 566 | 567 | 568 | 569 | 570 | 571 | 572 | 573 | 574 | 575 | 576 | 577 | 578 | 579 | 580 | 581 | 582 | 583 | 584 | 585 | 586 | 587 | 588 | 589 | 590 | 591 | 592 | 593 | 594 | 595 | 596 | 597 | 598 | 599 | 600 | 601 | 602 | 603 | 604 | 605 | 606 | 607 | 608 | 609 | 610 | 611 | 612 | 613 | 614 | 615 | 616 | 617 | 618 | 619 | 620 | 621 | 622 | 623 | 624 | 625 | 626 | 627 | 628 | 629 | 630 | 631 | 632 | 633 | 634 | 635 | 636 | 637 | 638 | 639 | 640 | 641 | 642 | 643 | 644 | 645 | 646 | 647 | 648 | 649 | 650 | 651 | 652 | 653 | 654 | 655 | 656 | 657 | 658 | 659 | 660 | 661 | 662 | 663 | 664 | 665 | 666 | 667 | 668 | 669 | 670 | 671 | 672 | 673 | 674 | 675 | 676 | 677 | 678 | 679 | 680 | 681 | 682 | 683 | 684 | 685 | 686 | 687 | 688 | 689 | 690 | 691 | 692 | 693 | 694 | 695 | 696 | 697 | 698 | 699 | 700 | 701 | 702 | 703 | 704 | 705 | 706 | 707 | 708 | 709 | 710 | 711 | 712 | 713 | 714 | 715 | 716 | 717 | 718 | 719 | 720 | 721 | 722 | 723 | 724 | 725 | 726 | 727 | 728 | 729 | 730 | 731 | 732 | 733 | 734 | 735 | 736 | 737 | 738 | 739 | 740 | 741 | 742 | 743 | 744 | 745 | 746 | 747 | 748 | 749 | 750 | 751 | 752 | 753 | 754 | 755 | 756 | 757 | 758 | 759 | 760 | 761 | 762 | 763 | 764 | 765 | 766 | 767 | 768 | 769 | 770 | 771 | 772 | 773 | 774 | 775 | 776 | 777 | 778 | 779 | 780 | 781 | 782 | 783 | 784 | 785 | 786 | 787 | 788 | 789 | 790 | 791 | 792 | 793 | 794 | 795 | 796 | 797 | 798 | 799 | 800 | 801 | 802 | 803 | 804 | 805 | 806 | 807 | 808 | 809 | 810 | 811 | 812 | 813 | 814 | 815 | 816 | 817 | 818 | 819 | 820 | 821 | 822 | 823 | 824 | 825 | 826 | 827 | 828 | 829 | 830 | 831 | 832 | 833 | 834 | 835 | 836 | 837 | 838 | 839 | 840 | 841 | 842 | 843 | 844 | 845 | 846 | 847 | 848 | 849 | 850 | 851 | 852 | 853 | 854 | 855 | 856 | 857 | 858 | 859 | 860 | 861 | 862 | 863 | 864 | 865 | 866 | 867 | 868 | 869 | 870 | 871 | 872 | 873 | 874 | 875 | 876 | 877 | 878 | 879 | 880 | 881 | 882 | 883 | 884 | 885 | 886 | 887 | 888 | 889 | 890 | 891 | 892 | 893 | 894 | 895 | 896 | 897 | 898 | 899 | 900 | 901 | 902 | 903 | 904 | 905 | 906 | 907 | 908 | 909 | 910 | 911 | 912 | 913 | 914 | 915 | 916 | 917 | 918 | 919 | 920 | 921 | 922 | 923 | 924 | 925 | 926 | 927 | 928 | 929 | 930 | 931 | 932 | 933 | 934 | 935 | 936 | 937 | 938 | 939 | 940 | 941 | 942 | 943 | 944 | 945 | 946 | 947 | 948 | 949 | 950 | 951 | 952 | 953 | 954 | 955 | 956 | 957 | 958 | 959 | 960 | 961 | 962 | 963 | 964 | 965 | 966 | 967 | 968 | 969 | 970 | 971 | 972 | 973 | 974 | 975 | 976 | 977 | 978 | 979 | 980 | 981 | 982 | 983 | 984 | 985 | 986 | 987 | 988 | 989 | 990 | 991 | 992 | 993 | 994 | 995 | 996 | 997 | 998 | 999 | 1000 |
| 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 | 291122 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |      |

Percentage Points of the  $\chi^2$  Distribution  
in Terms of  $\chi^2$  and  $r$

[illegible]

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $\nu$  and  $p$

[illegible]

[illegible][illegible]



Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu$ | .55000     | .60000     | .65000     | .70000     | .75000     | .80000     | .85000     | .90000     | .95000     | 1.00000    |
|-------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 362.5 | .437697 03 | .439886 03 | .442781 03 | .446146 03 | .449920 03 | .454000 03 | .458383 03 | .463063 03 | .467955 03 | .473000 03 |
| 363.0 | .438427 03 | .440616 03 | .443511 03 | .446876 03 | .450650 03 | .454730 03 | .459113 03 | .463793 03 | .468685 03 | .473830 03 |
| 363.5 | .439157 03 | .441346 03 | .444241 03 | .447606 03 | .451380 03 | .455460 03 | .459843 03 | .464523 03 | .469415 03 | .474660 03 |
| 364.0 | .439887 02 | .442076 03 | .444971 03 | .448336 03 | .452110 03 | .456190 03 | .460573 03 | .465253 03 | .470145 03 | .475390 03 |
| 364.5 | .440617 03 | .442806 03 | .445701 03 | .449066 03 | .452840 03 | .456920 03 | .461303 03 | .465983 03 | .470875 03 | .476120 03 |
| 365.0 | .441347 03 | .443536 03 | .446431 03 | .449796 03 | .453570 03 | .457650 03 | .462033 03 | .466713 03 | .471605 03 | .476850 03 |
| 365.5 | .442077 03 | .444266 03 | .447161 03 | .450526 03 | .454300 03 | .458380 03 | .462763 03 | .467443 03 | .472335 03 | .477580 03 |
| 366.0 | .442807 03 | .444996 03 | .447891 03 | .451256 03 | .455030 03 | .459110 03 | .463493 03 | .468173 03 | .473065 03 | .478310 03 |
| 366.5 | .443537 03 | .445726 03 | .448621 03 | .451986 03 | .455760 03 | .459840 03 | .464223 03 | .468903 03 | .473795 03 | .479040 03 |
| 367.0 | .444267 03 | .446456 03 | .449351 03 | .452716 03 | .456490 03 | .460570 03 | .464953 03 | .469633 03 | .474525 03 | .479770 03 |
| 367.5 | .445000 03 | .447189 03 | .450084 03 | .453449 03 | .457223 03 | .461303 03 | .465686 03 | .470366 03 | .475258 03 | .480403 03 |
| 368.0 | .445730 03 | .447919 03 | .450814 03 | .454179 03 | .457953 03 | .462033 03 | .466416 03 | .471096 03 | .475988 03 | .481133 03 |
| 368.5 | .446460 03 | .448649 03 | .451544 03 | .454909 03 | .458683 03 | .462763 03 | .467146 03 | .471826 03 | .476718 03 | .481863 03 |
| 369.0 | .447190 03 | .449379 03 | .452274 03 | .455639 03 | .459413 03 | .463493 03 | .467876 03 | .472556 03 | .477448 03 | .482593 03 |
| 369.5 | .447920 03 | .450109 03 | .453004 03 | .456369 03 | .460143 03 | .464223 03 | .468606 03 | .473286 03 | .478178 03 | .483323 03 |
| 370.0 | .448650 03 | .450839 03 | .453734 03 | .457099 03 | .460873 03 | .464953 03 | .469336 03 | .474016 03 | .478908 03 | .484053 03 |
| 370.5 | .449380 03 | .451569 03 | .454464 03 | .457829 03 | .461603 03 | .465683 03 | .470066 03 | .474746 03 | .479638 03 | .484783 03 |
| 371.0 | .450110 03 | .452299 03 | .455194 03 | .458559 03 | .462333 03 | .466413 03 | .470796 03 | .475476 03 | .480368 03 | .485513 03 |
| 371.5 | .450840 03 | .453029 03 | .455924 03 | .459289 03 | .463063 03 | .467143 03 | .471526 03 | .476206 03 | .481098 03 | .486243 03 |
| 372.0 | .451570 03 | .453759 03 | .456654 03 | .460019 03 | .463793 03 | .467873 03 | .472256 03 | .476936 03 | .481828 03 | .486973 03 |
| 372.5 | .452300 03 | .454489 03 | .457384 03 | .460749 03 | .464523 03 | .468603 03 | .472986 03 | .477666 03 | .482558 03 | .487703 03 |
| 373.0 | .453030 03 | .455219 03 | .458114 03 | .461479 03 | .465253 03 | .469333 03 | .473716 03 | .478396 03 | .483288 03 | .488433 03 |
| 373.5 | .453760 03 | .455949 03 | .458844 03 | .462209 03 | .465983 03 | .470063 03 | .474446 03 | .479126 03 | .484018 03 | .489163 03 |
| 374.0 | .454490 03 | .456679 03 | .459574 03 | .462939 03 | .466713 03 | .470793 03 | .475176 03 | .479856 03 | .484748 03 | .489893 03 |
| 374.5 | .455220 03 | .457409 03 | .460304 03 | .463669 03 | .467443 03 | .471523 03 | .475906 03 | .480586 03 | .485478 03 | .490623 03 |
| 375.0 | .455950 03 | .458139 03 | .461034 03 | .464399 03 | .468173 03 | .472253 03 | .476636 03 | .481316 03 | .486208 03 | .491353 03 |
| 375.5 | .456680 03 | .458869 03 | .461764 03 | .465129 03 | .468903 03 | .472983 03 | .477366 03 | .482046 03 | .486938 03 | .492083 03 |
| 376.0 | .457410 03 | .459599 03 | .462494 03 | .465859 03 | .469633 03 | .473713 03 | .478096 03 | .482776 03 | .487668 03 | .492813 03 |
| 376.5 | .458140 03 | .460329 03 | .463224 03 | .466589 03 | .470363 03 | .474443 03 | .478826 03 | .483506 03 | .488398 03 | .493543 03 |
| 377.0 | .458870 03 | .461059 03 | .463954 03 | .467319 03 | .471093 03 | .475173 03 | .479556 03 | .484236 03 | .489128 03 | .494273 03 |
| 377.5 | .459600 03 | .461789 03 | .464684 03 | .468049 03 | .471823 03 | .475903 03 | .480286 03 | .484966 03 | .489858 03 | .494903 03 |
| 378.0 | .460330 03 | .462519 03 | .465414 03 | .468779 03 | .472553 03 | .476633 03 | .481016 03 | .485696 03 | .490588 03 | .495733 03 |
| 378.5 | .461060 03 | .463249 03 | .466144 03 | .469509 03 | .473283 03 | .477363 03 | .481746 03 | .486426 03 | .491318 03 | .496463 03 |
| 379.0 | .461790 03 | .463979 03 | .466874 03 | .470239 03 | .474013 03 | .478093 03 | .482476 03 | .487156 03 | .492048 03 | .497193 03 |
| 379.5 | .462520 03 | .464709 03 | .467604 03 | .470969 03 | .474743 03 | .478823 03 | .483206 03 | .487886 03 | .492778 03 | .497923 03 |
| 380.0 | .463250 03 | .465439 03 | .468334 03 | .471699 03 | .475473 03 | .479553 03 | .483936 03 | .488616 03 | .493508 03 | .498653 03 |
| 380.5 | .463980 03 | .466169 03 | .469064 03 | .472429 03 | .476203 03 | .480283 03 | .484666 03 | .489346 03 | .494238 03 | .499383 03 |
| 381.0 | .464710 03 | .466899 03 | .469794 03 | .473159 03 | .476933 03 | .480913 03 | .485296 03 | .490076 03 | .495068 03 | .500213 03 |
| 381.5 | .465440 03 | .467629 03 | .470524 03 | .473889 03 | .477663 03 | .481743 03 | .486126 03 | .490806 03 | .495798 03 | .500943 03 |
| 382.0 | .466170 03 | .468359 03 | .471254 03 | .474619 03 | .478393 03 | .482473 03 | .486856 03 | .491536 03 | .496528 03 | .501673 03 |
| 382.5 | .466900 03 | .469089 03 | .471984 03 | .475349 03 | .479123 03 | .483203 03 | .487586 03 | .492266 03 | .497258 03 | .502403 03 |
| 383.0 | .467630 03 | .469819 03 | .472714 03 | .476079 03 | .479853 03 | .483933 03 | .488316 03 | .492996 03 | .497988 03 | .503133 03 |
| 383.5 | .468360 03 | .470549 03 | .473444 03 | .476809 03 | .480583 03 | .484663 03 | .489046 03 | .493726 03 | .498718 03 | .503863 03 |
| 384.0 | .469090 03 | .471279 03 | .474174 03 | .477539 03 | .481313 03 | .485393 03 | .489776 03 | .494456 03 | .499448 03 | .504593 03 |
| 384.5 | .469820 03 | .471999 03 | .474894 03 | .478259 03 | .482033 03 | .486113 03 | .490496 03 | .495176 03 | .500168 03 | .505313 03 |
| 385.0 | .470550 03 | .472729 03 | .475624 03 | .478989 03 | .482763 03 | .486843 03 | .491226 03 | .495906 03 | .500898 03 | .506043 03 |
| 385.5 | .471280 03 | .473459 03 | .476354 03 | .479719 03 | .483493 03 | .487573 03 | .491956 03 | .496636 03 | .501628 03 | .506773 03 |
| 386.0 | .472010 03 | .474189 03 | .477084 03 | .480449 03 | .484223 03 | .488303 03 | .492686 03 | .497366 03 | .502358 03 | .507503 03 |
| 386.5 | .472740 03 | .474919 03 | .477814 03 | .481179 03 | .484953 03 | .488933 03 | .493316 03 | .497996 03 | .502988 03 | .508133 03 |
| 387.0 | .473470 03 | .475649 03 | .478544 03 | .481909 03 | .485683 03 | .489763 03 | .494146 03 | .498826 03 | .503818 03 | .508963 03 |

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu/Q$ | .05000  | .06000  | .07000  | .08000  | .09000  | .10000  | .12500  | .15000  | .17500  | .20000  | .25000  | .30000  | .35000  | .40000  | .45000  | .50000  | .55000  | .60000  | .65000  | .70000  | .75000  | .80000  | .85000  | .90000  | .95000  | 1.00000 |         |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 367.5   | .434929 | .435919 | .436909 | .437899 | .438889 | .439879 | .440869 | .441859 | .442849 | .443839 | .444829 | .445819 | .446809 | .447799 | .448789 | .449779 | .450769 | .451759 | .452749 | .453739 | .454729 | .455719 | .456709 | .457699 | .458689 | .459679 | .460669 |
| 368.5   | .435458 | .436448 | .437438 | .438428 | .439418 | .440408 | .441398 | .442388 | .443378 | .444368 | .445358 | .446348 | .447338 | .448328 | .449318 | .450308 | .451298 | .452288 | .453278 | .454268 | .455258 | .456248 | .457238 | .458228 | .459218 | .460208 | .461198 |
| 369.5   | .435988 | .436978 | .437968 | .438958 | .439948 | .440938 | .441928 | .442918 | .443908 | .444898 | .445888 | .446878 | .447868 | .448858 | .449848 | .450838 | .451828 | .452818 | .453808 | .454798 | .455788 | .456778 | .457768 | .458758 | .459748 | .460738 | .461728 |
| 370.5   | .436517 | .437507 | .438497 | .439487 | .440477 | .441467 | .442457 | .443447 | .444437 | .445427 | .446417 | .447407 | .448397 | .449387 | .450377 | .451367 | .452357 | .453347 | .454337 | .455327 | .456317 | .457307 | .458297 | .459287 | .460277 | .461267 | .462257 |
| 371.5   | .437047 | .438037 | .439027 | .440017 | .441007 | .441997 | .442987 | .443977 | .444967 | .445957 | .446947 | .447937 | .448927 | .449917 | .450907 | .451897 | .452887 | .453877 | .454867 | .455857 | .456847 | .457837 | .458827 | .459817 | .460807 | .461797 | .462787 |
| 372.5   | .437576 | .438566 | .439556 | .440546 | .441536 | .442526 | .443516 | .444506 | .445496 | .446486 | .447476 | .448466 | .449456 | .450446 | .451436 | .452426 | .453416 | .454406 | .455396 | .456386 | .457376 | .458366 | .459356 | .460346 | .461336 | .462326 | .463316 |
| 373.5   | .438106 | .439096 | .440086 | .441076 | .442066 | .443056 | .444046 | .445036 | .446026 | .447016 | .448006 | .448996 | .449986 | .450976 | .451966 | .452956 | .453946 | .454936 | .455926 | .456916 | .457906 | .458896 | .459886 | .460876 | .461866 | .462856 | .463846 |
| 374.5   | .438635 | .439625 | .440615 | .441605 | .442595 | .443585 | .444575 | .445565 | .446555 | .447545 | .448535 | .449525 | .450515 | .451505 | .452495 | .453485 | .454475 | .455465 | .456455 | .457445 | .458435 | .459425 | .460415 | .461405 | .462395 | .463385 | .464375 |
| 375.5   | .439165 | .440155 | .441145 | .442135 | .443125 | .444115 | .445105 | .446095 | .447085 | .448075 | .449065 | .450055 | .451045 | .452035 | .453025 | .454015 | .455005 | .455995 | .456985 | .457975 | .458965 | .459955 | .460945 | .461935 | .462925 | .463915 | .464905 |
| 376.5   | .439694 | .440684 | .441674 | .442664 | .443654 | .444644 | .445634 | .446624 | .447614 | .448604 | .449594 | .450584 | .451574 | .452564 | .453554 | .454544 | .455534 | .456524 | .457514 | .458504 | .459494 | .460484 | .461474 | .462464 | .463454 | .464444 | .465434 |
| 377.5   | .440223 | .441213 | .442203 | .443193 | .444183 | .445173 | .446163 | .447153 | .448143 | .449133 | .450123 | .451113 | .452103 | .453093 | .454083 | .455073 | .456063 | .457053 | .458043 | .459033 | .460023 | .461013 | .462003 | .462993 | .463983 | .464973 | .465963 |
| 378.5   | .440753 | .441743 | .442733 | .443723 | .444713 | .445703 | .446693 | .447683 | .448673 | .449663 | .450653 | .451643 | .452633 | .453623 | .454613 | .455603 | .456593 | .457583 | .458573 | .459563 | .460553 | .461543 | .462533 | .463523 | .464513 | .465503 | .466493 |
| 379.5   | .441282 | .442272 | .443262 | .444252 | .445242 | .446232 | .447222 | .448212 | .449202 | .450192 | .451182 | .452172 | .453162 | .454152 | .455142 | .456132 | .457122 | .458112 | .459102 | .460092 | .461082 | .462072 | .463062 | .464052 | .465042 | .466032 | .467022 |
| 380.5   | .441811 | .442801 | .443791 | .444781 | .445771 | .446761 | .447751 | .448741 | .449731 | .450721 | .451711 | .452701 | .453691 | .454681 | .455671 | .456661 | .457651 | .458641 | .459631 | .460621 | .461611 | .462601 | .463591 | .464581 | .465571 | .466561 | .467551 |
| 381.5   | .442341 | .443331 | .444321 | .445311 | .446301 | .447291 | .448281 | .449271 | .450261 | .451251 | .452241 | .453231 | .454221 | .455211 | .456201 | .457191 | .458181 | .459171 | .460161 | .461151 | .462141 | .463131 | .464121 | .465111 | .466101 | .467091 | .468081 |
| 382.5   | .442870 | .443860 | .444850 | .445840 | .446830 | .447820 | .448810 | .449800 | .450790 | .451780 | .452770 | .453760 | .454750 | .455740 | .456730 | .457720 | .458710 | .459700 | .460690 | .461680 | .462670 | .463660 | .464650 | .465640 | .466630 | .467620 | .468610 |
| 383.5   | .443400 | .444390 | .445380 | .446370 | .447360 | .448350 | .449340 | .450330 | .451320 | .452310 | .453300 | .454290 | .455280 | .456270 | .457260 | .458250 | .459240 | .460230 | .461220 | .462210 | .463200 | .464190 | .465180 | .466170 | .467160 | .468150 | .469140 |
| 384.5   | .443929 | .444919 | .445909 | .446899 | .447889 | .448879 | .449869 | .450859 | .451849 | .452839 | .453829 | .454819 | .455809 | .456799 | .457789 | .458779 | .459769 | .460759 | .461749 | .462739 | .463729 | .464719 | .465709 | .466699 | .467689 | .468679 | .469669 |
| 385.5   | .444458 | .445448 | .446438 | .447428 | .448418 | .449408 | .450398 | .451388 | .452378 | .453368 | .454358 | .455348 | .456338 | .457328 | .458318 | .459308 | .460298 | .461288 | .462278 | .463268 | .464258 | .465248 | .466238 | .467228 | .468218 | .469208 | .470198 |
| 386.5   | .444987 | .445977 | .446967 | .447957 | .448947 | .449937 | .450927 | .451917 | .452907 | .453897 | .454887 | .455877 | .456867 | .457857 | .458847 | .459837 | .460827 | .461817 | .462807 | .463797 | .464787 | .465777 | .466767 | .467757 | .468747 | .469737 | .470727 |
| 387.5   | .445516 | .446506 | .447496 | .448486 | .449476 | .450466 | .451456 | .452446 | .453436 | .454426 | .455416 | .456406 | .457396 | .458386 | .459376 | .460366 | .461356 | .462346 | .463336 | .464326 | .465316 | .466306 | .467296 | .468286 | .469276 | .470266 | .471256 |
| 388.5   | .446045 | .447035 | .448025 | .449015 | .450005 | .450995 | .451985 | .452975 | .453965 | .454955 | .455945 | .456935 | .457925 | .458915 | .459905 | .460895 | .461885 | .462875 | .463865 | .464855 | .465845 | .466835 | .467825 | .468815 | .469805 | .470795 | .471785 |
| 389.5   | .446574 | .447564 | .448554 | .449544 | .450534 | .451524 | .452514 | .453504 | .454494 | .455484 | .456474 | .457464 | .458454 | .459444 | .460434 | .461424 | .462414 | .463404 | .464394 | .465384 | .466374 | .467364 | .468354 | .469344 | .470334 | .471324 | .472314 |
| 390.5   | .447103 | .448093 | .449083 | .450073 | .451063 | .452053 | .453043 | .454033 | .455023 | .456013 | .457003 | .457993 | .458983 | .459973 | .460963 | .461953 | .462943 | .463933 | .464923 | .465913 | .466903 | .467893 | .468883 | .469873 | .470863 | .471853 | .472843 |
| 391.5   | .447632 | .448622 | .449612 | .450602 | .451592 | .452582 | .453572 | .454562 | .455552 | .456542 | .457532 | .458522 | .459512 | .460502 | .461492 | .462482 | .463472 | .464462 | .465452 | .466442 | .467432 | .468422 | .469412 | .470402 | .471392 | .472382 | .473372 |
| 392.5   | .448161 | .449151 | .450141 | .451131 | .452121 | .453111 | .454101 | .455091 | .456081 | .457071 | .458061 | .459051 | .460041 | .461031 | .462021 | .463011 | .464001 | .464991 | .465981 | .466971 | .467961 | .468951 | .469941 | .470931 | .471921 | .472911 | .473901 |
| 393.5   | .448690 | .449680 | .450670 | .451660 | .452650 | .453640 | .454630 | .455620 | .456610 | .457600 | .458590 | .459580 | .460570 | .461560 | .462550 | .463540 | .464530 | .465520 | .466510 | .467500 | .468490 | .469480 | .470470 | .471460 | .472450 | .473440 | .474430 |
| 394.5   | .449219 | .450209 | .451199 | .452189 | .453179 | .454169 | .455159 | .456149 | .457139 | .458129 | .459119 | .460109 | .461099 | .462089 | .463079 | .464069 | .465059 | .466049 | .467039 | .468029 | .469019 | .470009 | .470999 | .471989 | .472979 | .473969 | .474959 |
| 395.5   | .449748 | .450738 | .451728 | .452718 | .453708 | .454698 | .455688 | .456678 | .457668 | .458658 | .459648 | .460638 | .461628 | .462618 | .463608 | .464598 | .465588 | .466578 | .467568 | .468558 | .469548 | .470538 | .471528 | .472518 | .473508 | .474498 | .475488 |
| 396.5   | .450277 | .451267 | .452257 | .453247 | .454237 | .455227 | .456217 | .457207 | .458197 | .459187 | .460177 | .461167 | .462157 | .463147 | .464137 | .465127 | .466117 | .467107 | .468097 | .469087 | .470077 | .471067 | .472057 | .473047 | .474037 | .475027 | .476017 |
| 397.5   | .450806 | .451796 | .452786 | .453776 | .454766 | .455756 | .456746 | .457736 | .458726 | .459716 | .460706 | .461696 | .462686 | .463676 | .464666 | .465656 | .466646 | .467636 | .468626 | .469616 | .470606 | .471596 | .472586 | .473576 | .474566 | .475556 | .476546 |
| 398.5   | .451335 | .452325 | .453315 | .454305 | .455295 | .456285 | .457275 | .458265 | .459255 | .460245 | .461235 | .462225 | .463215 | .464205 | .465195 | .466185 | .467175 | .468165 | .469155 | .470145 | .471135 | .472125 | .473115 | .474105 | .475095 | .476085 | .477075 |
| 399.5   | .451864 | .452854 | .453844 | .454834 | .455824 | .456814 | .457804 | .458794 | .459784 | .460774 | .461764 | .462754 | .463744 | .464734 | .465724 | .466714 | .467704 | .468694 | .469684 | .470674 | .471664 | .472654 | .473644 | .474634 | .475624 | .476614 | .477604 |
| 400.5   | .452393 | .453383 | .454373 | .455363 | .456353 | .457343 | .458333 | .459323 | .460313 | .461303 | .462293 | .463283 | .464273 | .465263 | .466253 | .467243 | .468233 | .469223 | .470213 | .471203 | .472193 | .473183 | .474173 | .475163 | .476153 | .477143 | .478133 |
| 401.5   | .452922 | .453912 | .454902 | .455892 | .456882 | .457872 | .458862 | .459852 | .460842 | .461832 | .462822 | .463812 | .464802 | .465792 | .466782 | .467772 | .468762 | .469752 | .470742 | .471732 | .472722 | .473712 | .474702 | .475692 | .476682 | .477672 | .478662 |
| 402.5   | .453451 | .454441 | .455431 | .456421 | .457411 | .458401 | .459391 | .460381 | .461371 | .462361 | .463351 | .464341 | .465331 | .466321 | .467311 | .468301 | .469291 | .470281 | .471271 | .472261 | .473251 | .474241 | .475231 | .476221 | .477211 | .478201 | .479191 |
| 403.5   | .453980 | .454970 | .455960 | .456950 | .457940 | .458930 | .459920 | .460910 | .461900 | .462890 | .463880 | .464870 | .465860 | .466850 | .467840 | .468830 | .469820 | .470810 | .471800 | .472790 | .473780 | .474770 | .475760 | .476750 | .477740 | .478730 | .479720 |
| 404.5   | .454509 | .455499 | .456489 | .457479 | .458469 | .459459 | .460449 | .461439 | .462429 | .463419 | .464409 | .465399 | .466389 | .467379 | .468369 | .469359 | .470349 | .471339 | .472329 | .473319 | .474309 | .475299 | .476289 | .477279 | .478269 | .479259 | .480249 |
| 405.5   | .455038 | .456028 | .457018 | .458008 | .458998 | .459988 | .460978 | .461968 | .462958 | .463948 | .464938 | .465    |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |

Percentage Points of the  $\chi^2$  -Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu \backslash Q$ | .05500     | .05700     | .06000     | .06500     | .07000     | .07500     | .08000     | .08500     | .09000     | .09500     | .10000     | .10500     | .11000     | .11500     | .12000     | .12500     | .13000     |
|--------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 412.5              | .460854 03 | .462419 03 | .464134 03 | .466039 03 | .468188 03 | .470665 03 | .473612 03 | .477284 03 | .481503 03 | .486333 03 | .491700 03 | .497644 03 | .504183 03 | .511366 03 | .519143 03 | .527566 03 | .536683 03 |
| 413.0              | .461383 03 | .462948 03 | .464665 03 | .466570 03 | .468720 03 | .471200 03 | .474148 03 | .477822 03 | .482043 03 | .486873 03 | .492240 03 | .498184 03 | .504723 03 | .511906 03 | .519683 03 | .528106 03 | .537223 03 |
| 413.5              | .461912 03 | .463478 03 | .465195 03 | .467102 03 | .469253 03 | .471734 03 | .474683 03 | .478357 03 | .482578 03 | .487408 03 | .492775 03 | .498719 03 | .505258 03 | .512441 03 | .520218 03 | .528641 03 | .537758 03 |
| 414.0              | .462440 03 | .464007 03 | .465726 03 | .467633 03 | .469786 03 | .472268 03 | .475219 03 | .478897 03 | .483118 03 | .487948 03 | .493315 03 | .499259 03 | .505798 03 | .512981 03 | .520758 03 | .529181 03 | .538298 03 |
| 414.5              | .462969 03 | .464537 03 | .466256 03 | .468165 03 | .470318 03 | .472800 03 | .475755 03 | .479433 03 | .483654 03 | .488484 03 | .493851 03 | .499795 03 | .506334 03 | .513517 03 | .521294 03 | .529717 03 | .538834 03 |
| 415.0              | .463497 03 | .465066 03 | .466785 03 | .468696 03 | .470851 03 | .473336 03 | .476290 03 | .479972 03 | .484193 03 | .488923 03 | .494290 03 | .499234 03 | .505773 03 | .512956 03 | .520733 03 | .529156 03 | .538273 03 |
| 415.5              | .464026 03 | .465596 03 | .467317 03 | .469228 03 | .471384 03 | .473870 03 | .476826 03 | .480508 03 | .484729 03 | .489459 03 | .494826 03 | .499770 03 | .506309 03 | .513492 03 | .521269 03 | .529692 03 | .538809 03 |
| 416.0              | .464554 03 | .466125 03 | .467847 03 | .469759 03 | .471916 03 | .474404 03 | .477362 03 | .481048 03 | .485269 03 | .489999 03 | .495366 03 | .499310 03 | .505849 03 | .513032 03 | .520809 03 | .529232 03 | .538349 03 |
| 416.5              | .465083 03 | .466654 03 | .468378 03 | .470291 03 | .472449 03 | .474938 03 | .477897 03 | .481585 03 | .485806 03 | .490536 03 | .495480 03 | .499424 03 | .505963 03 | .513146 03 | .520923 03 | .529346 03 | .538463 03 |
| 417.0              | .465611 03 | .467184 03 | .468908 03 | .470822 03 | .472982 03 | .475472 03 | .478433 03 | .482123 03 | .486344 03 | .491074 03 | .495118 03 | .499062 03 | .505601 03 | .512784 03 | .520561 03 | .528984 03 | .538101 03 |
| 417.5              | .466140 03 | .467713 03 | .469438 03 | .471353 03 | .473514 03 | .476006 03 | .478968 03 | .482661 03 | .486882 03 | .491612 03 | .495656 03 | .499600 03 | .506139 03 | .513322 03 | .521099 03 | .529522 03 | .538639 03 |
| 418.0              | .466668 03 | .468243 03 | .469968 03 | .471885 03 | .473947 03 | .476440 03 | .479403 03 | .483100 03 | .487321 03 | .492051 03 | .496095 03 | .499939 03 | .506478 03 | .513661 03 | .521438 03 | .529861 03 | .538978 03 |
| 418.5              | .467197 03 | .468772 03 | .470499 03 | .472416 03 | .474479 03 | .476974 03 | .480039 03 | .483736 03 | .487957 03 | .492687 03 | .496731 03 | .499575 03 | .506114 03 | .513297 03 | .521074 03 | .529497 03 | .538614 03 |
| 419.0              | .467725 03 | .469301 03 | .471029 03 | .472947 03 | .475012 03 | .477507 03 | .480575 03 | .484273 03 | .488494 03 | .493224 03 | .497268 03 | .499912 03 | .506451 03 | .513634 03 | .521411 03 | .529834 03 | .538951 03 |
| 419.5              | .468254 03 | .469830 03 | .471559 03 | .473479 03 | .475544 03 | .478041 03 | .481110 03 | .484811 03 | .489032 03 | .493762 03 | .497806 03 | .499450 03 | .505989 03 | .513172 03 | .520949 03 | .529372 03 | .538489 03 |
| 420.0              | .468782 03 | .470360 03 | .472090 03 | .474010 03 | .476075 03 | .478572 03 | .481646 03 | .485348 03 | .489569 03 | .494300 03 | .498344 03 | .499988 03 | .506527 03 | .513710 03 | .521487 03 | .529910 03 | .539027 03 |
| 420.5              | .469310 03 | .470889 03 | .472620 03 | .474541 03 | .476609 03 | .479109 03 | .482181 03 | .485885 03 | .490106 03 | .494836 03 | .498880 03 | .499524 03 | .506063 03 | .513246 03 | .521023 03 | .529446 03 | .538563 03 |
| 421.0              | .469839 03 | .471418 03 | .473150 03 | .475072 03 | .477242 03 | .479743 03 | .482717 03 | .486423 03 | .490644 03 | .495374 03 | .499418 03 | .499962 03 | .506501 03 | .513684 03 | .521461 03 | .529884 03 | .539001 03 |
| 421.5              | .470367 03 | .471947 03 | .473680 03 | .475604 03 | .477774 03 | .480276 03 | .483252 03 | .486960 03 | .491181 03 | .495911 03 | .499955 03 | .499999 03 | .506538 03 | .513721 03 | .521498 03 | .529921 03 | .539038 03 |
| 422.0              | .470895 03 | .472477 03 | .474210 03 | .476135 03 | .478306 03 | .480810 03 | .483787 03 | .487498 03 | .491719 03 | .496449 03 | .499493 03 | .499937 03 | .506476 03 | .513659 03 | .521436 03 | .529859 03 | .538976 03 |
| 422.5              | .471424 03 | .473006 03 | .474740 03 | .476666 03 | .478839 03 | .481344 03 | .484323 03 | .488035 03 | .492256 03 | .496986 03 | .499930 03 | .499974 03 | .506513 03 | .513696 03 | .521473 03 | .529896 03 | .539013 03 |
| 423.0              | .471952 03 | .473535 03 | .475270 03 | .477197 03 | .479371 03 | .481878 03 | .484858 03 | .488570 03 | .492791 03 | .497521 03 | .499465 03 | .499909 03 | .506448 03 | .513631 03 | .521408 03 | .529831 03 | .538948 03 |
| 423.5              | .472480 03 | .474063 03 | .475801 03 | .477728 03 | .479903 03 | .482411 03 | .485393 03 | .489105 03 | .493326 03 | .497956 03 | .499900 03 | .499944 03 | .506483 03 | .513666 03 | .521443 03 | .529866 03 | .538983 03 |
| 424.0              | .473009 03 | .474593 03 | .476331 03 | .478260 03 | .480436 03 | .482945 03 | .485929 03 | .489641 03 | .493862 03 | .498592 03 | .499536 03 | .499980 03 | .506519 03 | .513702 03 | .521479 03 | .529902 03 | .539019 03 |
| 424.5              | .473537 03 | .475122 03 | .476861 03 | .478791 03 | .480968 03 | .483479 03 | .486464 03 | .490176 03 | .494400 03 | .499130 03 | .499074 03 | .499518 03 | .506057 03 | .513240 03 | .521017 03 | .529440 03 | .538557 03 |
| 425.0              | .474065 03 | .475652 03 | .477391 03 | .479322 03 | .481500 03 | .484012 03 | .486999 03 | .490711 03 | .494935 03 | .499665 03 | .499609 03 | .499053 03 | .505592 03 | .512775 03 | .520552 03 | .528975 03 | .538092 03 |
| 425.5              | .474593 03 | .476181 03 | .477921 03 | .479853 03 | .482033 03 | .484546 03 | .487535 03 | .491247 03 | .495471 03 | .499201 03 | .499145 03 | .498589 03 | .505128 03 | .512311 03 | .520088 03 | .528511 03 | .537628 03 |
| 426.0              | .475122 03 | .476710 03 | .478451 03 | .480384 03 | .482565 03 | .485078 03 | .488070 03 | .491782 03 | .495996 03 | .499726 03 | .499670 03 | .499114 03 | .505653 03 | .512836 03 | .520613 03 | .529036 03 | .538153 03 |
| 426.5              | .475650 03 | .477239 03 | .478981 03 | .480915 03 | .483097 03 | .485613 03 | .488605 03 | .492317 03 | .496531 03 | .499261 03 | .499205 03 | .498649 03 | .505188 03 | .512371 03 | .520148 03 | .528571 03 | .537688 03 |
| 427.0              | .476178 03 | .477768 03 | .479511 03 | .481446 03 | .483629 03 | .486147 03 | .489140 03 | .492870 03 | .497084 03 | .499814 03 | .499758 03 | .499202 03 | .505741 03 | .512924 03 | .520701 03 | .529124 03 | .538241 03 |
| 427.5              | .476706 03 | .478297 03 | .480041 03 | .481977 03 | .484161 03 | .486680 03 | .489675 03 | .493407 03 | .497621 03 | .499351 03 | .499295 03 | .498739 03 | .505278 03 | .512461 03 | .520238 03 | .528661 03 | .537778 03 |
| 428.0              | .477234 03 | .478826 03 | .480571 03 | .482508 03 | .484694 03 | .487214 03 | .490210 03 | .493942 03 | .498156 03 | .499886 03 | .499830 03 | .499274 03 | .505813 03 | .512996 03 | .520773 03 | .529196 03 | .538313 03 |
| 428.5              | .477762 03 | .479355 03 | .481101 03 | .483039 03 | .485226 03 | .487747 03 | .490745 03 | .494482 03 | .498696 03 | .499426 03 | .499370 03 | .498814 03 | .505353 03 | .512536 03 | .520313 03 | .528736 03 | .537853 03 |
| 429.0              | .478290 03 | .479884 03 | .481631 03 | .483570 03 | .485758 03 | .488281 03 | .491281 03 | .495019 03 | .499233 03 | .499963 03 | .499907 03 | .499351 03 | .505890 03 | .513073 03 | .520850 03 | .529273 03 | .538390 03 |
| 429.5              | .478818 03 | .480413 03 | .482160 03 | .484101 03 | .486290 03 | .488814 03 | .491816 03 | .495556 03 | .499770 03 | .499500 03 | .499444 03 | .498888 03 | .505427 03 | .512610 03 | .520387 03 | .528810 03 | .537927 03 |
| 430.0              | .479347 03 | .480942 03 | .482690 03 | .484632 03 | .486822 03 | .489348 03 | .492351 03 | .496093 03 | .499307 03 | .499037 03 | .498981 03 | .498425 03 | .504964 03 | .512147 03 | .519924 03 | .528347 03 | .537464 03 |
| 430.5              | .479875 03 | .481470 03 | .483220 03 | .485163 03 | .487354 03 | .489881 03 | .492886 03 | .496630 03 | .499844 03 | .499574 03 | .499518 03 | .498962 03 | .505501 03 | .512684 03 | .520461 03 | .528884 03 | .538001 03 |
| 431.0              | .480403 03 | .481999 03 | .483750 03 | .485693 03 | .487886 03 | .490414 03 | .493421 03 | .497167 03 | .499381 03 | .499111 03 | .499055 03 | .498499 03 | .505038 03 | .512221 03 | .520000 03 | .528423 03 | .537540 03 |
| 431.5              | .480931 03 | .482528 03 | .484280 03 | .486224 03 | .488418 03 | .490946 03 | .493955 03 | .497704 03 | .499918 03 | .499648 03 | .499592 03 | .499036 03 | .505575 03 | .512758 03 | .520535 03 | .528958 03 | .538075 03 |
| 432.0              | .481459 03 | .483057 03 | .484810 03 | .486755 03 | .488950 03 | .491481 03 | .494491 03 | .498241 03 | .499455 03 | .499185 03 | .499129 03 | .498573 03 | .505112 03 | .512295 03 | .520072 03 | .528495 03 | .537612 03 |
| 432.5              | .481987 03 | .483586 03 | .485339 03 | .487286 03 | .489482 03 | .492015 03 | .495025 03 | .498777 03 | .499991 03 | .499721 03 | .499665 03 | .499109 03 | .505648 03 | .512831 03 | .520608 03 | .529031 03 | .538148 03 |
| 433.0              | .482515 03 | .484115 03 | .485869 03 | .487817 03 | .490014 03 | .492548 03 | .495560 03 | .499314 03 | .499528 03 | .499258 03 | .499202 03 | .498646 03 | .505185 03 | .512368 03 | .520145 03 | .528568 03 | .537685 03 |
| 433.5              | .483043 03 | .484644 03 | .486399 03 | .488348 03 | .490546 03 | .493081 03 | .496095 03 | .499851 03 | .499565 03 | .499495 03 | .498939 03 | .505478 03 | .512661 03 | .520438 03 | .528861 03 | .537978 03 | .538095 03 |
| 434.0              | .483571 03 | .485172 03 | .486929 03 | .488878 03 | .491076 03 | .493611 03 | .496630 03 | .500386 03 | .499600 03 | .499530 03 | .498974 03 | .505513 03 | .512696 03 | .520473 03 | .528896 03 | .538013 03 | .538130 03 |
| 434.5              | .484099 03 | .485701 03 | .487458 03 | .489409 03 | .491610 03 | .494148 03 | .497165 03 | .500925 03 | .499639 03 | .499569 03 | .499013 03 | .505552 03 | .512735 03 | .520512 03 | .528935 03 | .538052 03 | .538169 03 |
| 435.0              | .484626 03 | .486228 03 | .487985 03 | .489936 03 | .492142 03 | .494681 03 | .497698 03 | .501458 03 | .499672 03 | .499602 03 | .499046 03 | .505585 03 | .512768 03 | .520545 03 | .528968 03 | .538085 03 | .538202 03 |
| 435.5              | .485154 03 | .486756 03 | .488513 03 | .490464 03 | .492670 03 | .495209 03 | .498226 03 | .502000 03 | .499614 03 | .499544 03 | .498988 03 | .505527 03 | .512710 03 | .520487 03 | .528910 03 | .538027 03 | .538144 03 |
| 436.0              | .485682 03 | .487284 03 | .489041 03 | .491001 03 | .493206 03 | .495745 03 | .498762 03 | .502540 03 | .499654 03 | .499584 03 | .499028 03 | .505567 03 | .512750 03 |            |            |            |            |

### Percentage Points of the $\chi^2$ -Distribution Values of $\chi^2$ in Terms of $Q$ and $\nu$

|       | .010000 | .012500 | .015000 | .020000 | .025000 | .030000 | .040000 | .045000 | .050000 | .055000 | .060000 | .065000 | .070000 | .075000 | .080000 | .085000 | .090000 | .095000 | .100000 |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 437.5 | 509240  | 508667  | 508145  | 507374  | 506347  | 505051  | 503481  | 501610  | 499458  | 497029  | 494324  | 491366  | 488153  | 484695  | 480999  | 476974  | 472620  | 467947  | 462956  |
| 438.0 | 509780  | 509207  | 508682  | 508008  | 507081  | 505933  | 504533  | 502820  | 500948  | 498853  | 496512  | 493926  | 491095  | 487928  | 484424  | 480592  | 476434  | 471957  | 467162  |
| 438.5 | 510319  | 509746  | 509219  | 508545  | 507618  | 506470  | 505070  | 503357  | 501485  | 499390  | 496949  | 494263  | 491332  | 488165  | 484661  | 480829  | 476671  | 472194  | 467399  |
| 439.0 | 510858  | 510285  | 509758  | 509084  | 508157  | 506999  | 505599  | 503886  | 501914  | 499819  | 497378  | 494592  | 491561  | 488294  | 484790  | 480958  | 476800  | 472323  | 467528  |
| 439.5 | 511398  | 510825  | 510298  | 509624  | 508697  | 507539  | 506139  | 504426  | 502454  | 500359  | 497918  | 495132  | 492001  | 488734  | 485230  | 481398  | 477240  | 472763  | 467968  |
| 440.0 | 511937  | 511364  | 510837  | 510163  | 509236  | 508078  | 506678  | 504965  | 502993  | 500898  | 498457  | 495671  | 492540  | 489273  | 485769  | 481937  | 477779  | 473302  | 468507  |
| 440.5 | 512476  | 511903  | 511376  | 510702  | 509775  | 508617  | 507217  | 505504  | 503532  | 501437  | 499096  | 496310  | 493179  | 489912  | 486408  | 482576  | 478418  | 473941  | 469146  |
| 441.0 | 513015  | 512442  | 511915  | 511241  | 510314  | 509156  | 507756  | 506043  | 504071  | 501976  | 499635  | 496849  | 493718  | 490451  | 486947  | 483115  | 478957  | 474480  | 469685  |
| 441.5 | 513554  | 512981  | 512454  | 511780  | 510853  | 509695  | 508295  | 506582  | 504610  | 502515  | 500174  | 497388  | 494257  | 490990  | 487486  | 483654  | 479496  | 475019  | 470224  |
| 442.0 | 514094  | 513521  | 512994  | 512320  | 511393  | 510235  | 508835  | 507122  | 505150  | 503055  | 500714  | 497928  | 494797  | 491530  | 488026  | 484194  | 479936  | 475459  | 470664  |
| 442.5 | 514633  | 514060  | 513533  | 512859  | 511932  | 510774  | 509374  | 507661  | 505689  | 503594  | 501253  | 498467  | 495336  | 492069  | 488565  | 484733  | 480475  | 475998  | 471203  |
| 443.0 | 515172  | 514599  | 514072  | 513400  | 512473  | 511315  | 509915  | 508202  | 506230  | 504135  | 501794  | 499008  | 495877  | 492610  | 489106  | 485274  | 481016  | 476539  | 471744  |
| 443.5 | 515711  | 515138  | 514611  | 513937  | 513010  | 511852  | 510452  | 508739  | 506767  | 504672  | 502331  | 499545  | 496414  | 493147  | 489643  | 485811  | 481553  | 477076  | 472281  |
| 444.0 | 516250  | 515677  | 515150  | 514476  | 513549  | 512391  | 510991  | 509278  | 507306  | 505211  | 502870  | 500084  | 496953  | 493686  | 490182  | 486350  | 482092  | 477615  | 472820  |
| 444.5 | 516789  | 516216  | 515689  | 515015  | 514088  | 512930  | 511530  | 509817  | 507845  | 505750  | 503409  | 500623  | 497492  | 494225  | 490721  | 486889  | 482631  | 478154  | 473359  |
| 445.0 | 517328  | 516755  | 516228  | 515554  | 514627  | 513469  | 512069  | 510356  | 508384  | 506289  | 503948  | 501162  | 497976  | 494709  | 491205  | 487373  | 483115  | 478638  | 473843  |
| 445.5 | 517867  | 517294  | 516767  | 516093  | 515166  | 514008  | 512608  | 510895  | 508923  | 506828  | 504487  | 501701  | 498515  | 495248  | 491744  | 487912  | 483654  | 479177  | 474382  |
| 446.0 | 518406  | 517833  | 517306  | 516632  | 515705  | 514547  | 513147  | 511547  | 509847  | 508047  | 506147  | 504147  | 502147  | 500147  | 498147  | 496147  | 494147  | 492147  | 490147  |
| 446.5 | 518945  | 518372  | 517845  | 517171  | 516244  | 515086  | 513686  | 512086  | 510386  | 508586  | 506686  | 504686  | 502686  | 500686  | 498686  | 496686  | 494686  | 492686  | 490686  |
| 447.0 | 519484  | 518911  | 518384  | 517710  | 516783  | 515625  | 514225  | 512625  | 510925  | 509125  | 507225  | 505225  | 503225  | 501225  | 499225  | 497225  | 495225  | 493225  | 491225  |
| 447.5 | 520023  | 519450  | 518923  | 518249  | 517322  | 516164  | 514764  | 513164  | 511464  | 509664  | 507764  | 505764  | 503764  | 501764  | 499764  | 497764  | 495764  | 493764  | 491764  |
| 448.0 | 520562  | 519989  | 519462  | 518788  | 517861  | 516703  | 515303  | 513703  | 512003  | 510203  | 508303  | 506303  | 504303  | 502303  | 500303  | 498303  | 496303  | 494303  | 492303  |
| 448.5 | 521101  | 520528  | 519999  | 519325  | 518400  | 517242  | 515842  | 514242  | 512542  | 510742  | 508842  | 506842  | 504842  | 502842  | 500842  | 498842  | 496842  | 494842  | 492842  |
| 449.0 | 521640  | 521067  | 520540  | 519866  | 518939  | 517781  | 516381  | 514781  | 513081  | 511281  | 509381  | 507381  | 505381  | 503381  | 501381  | 499381  | 497381  | 495381  | 493381  |
| 449.5 | 522178  | 521605  | 521078  | 520404  | 519477  | 518319  | 516919  | 515319  | 513619  | 511819  | 509919  | 507919  | 505919  | 503919  | 501919  | 499919  | 497919  | 495919  | 493919  |
| 450.0 | 522717  | 522144  | 521617  | 520943  | 519916  | 518758  | 517358  | 515758  | 514058  | 512258  | 510358  | 508358  | 506358  | 504358  | 502358  | 500358  | 498358  | 496358  | 494358  |
| 450.5 | 523256  | 522683  | 522156  | 521482  | 520555  | 519397  | 517997  | 516397  | 514697  | 512897  | 511097  | 509197  | 507197  | 505197  | 503197  | 501197  | 499197  | 497197  | 495197  |
| 451.0 | 523794  | 523221  | 522694  | 522020  | 521093  | 519935  | 518535  | 516935  | 515235  | 513435  | 511535  | 509535  | 507535  | 505535  | 503535  | 501535  | 499535  | 497535  | 495535  |
| 451.5 | 524333  | 523760  | 523233  | 522559  | 521632  | 520474  | 519074  | 517474  | 515774  | 513974  | 512074  | 510174  | 508174  | 506174  | 504174  | 502174  | 500174  | 498174  | 496174  |
| 452.0 | 524872  | 524299  | 523772  | 523100  | 522173  | 520915  | 519515  | 517915  | 516215  | 514415  | 512515  | 510515  | 508515  | 506515  | 504515  | 502515  | 500515  | 498515  | 496515  |
| 452.5 | 525410  | 524837  | 524310  | 523636  | 522709  | 521551  | 520151  | 518551  | 516851  | 515051  | 513151  | 511151  | 509151  | 507151  | 505151  | 503151  | 501151  | 499151  | 497151  |
| 453.0 | 525949  | 525376  | 524849  | 524175  | 523248  | 522090  | 520690  | 519090  | 517390  | 515590  | 513690  | 511690  | 509690  | 507690  | 505690  | 503690  | 501690  | 499690  | 497690  |
| 453.5 | 526488  | 525915  | 525388  | 524714  | 523787  | 522629  | 521229  | 519629  | 517929  | 516129  | 514229  | 512229  | 510229  | 508229  | 506229  | 504229  | 502229  | 500229  | 498229  |
| 454.0 | 527026  | 526453  | 525926  | 525252  | 524325  | 523167  | 521767  | 520167  | 518467  | 516667  | 514767  | 512767  | 510767  | 508767  | 506767  | 504767  | 502767  | 500767  | 498767  |
| 454.5 | 527565  | 526992  | 526465  | 525791  | 524864  | 523706  | 522306  | 520706  | 519006  | 517206  | 515306  | 513306  | 511306  | 509306  | 507306  | 505306  | 503306  | 501306  | 499306  |
| 455.0 | 528104  | 527531  | 526999  | 526325  | 525400  | 524242  | 522842  | 521242  | 519542  | 517742  | 515842  | 513842  | 511842  | 509842  | 507842  | 505842  | 503842  | 501842  | 499842  |
| 455.5 | 528642  | 528069  | 527542  | 526868  | 525941  | 524783  | 523383  | 521783  | 520083  | 518283  | 516383  | 514383  | 512383  | 510383  | 508383  | 506383  | 504383  | 502383  | 500383  |
| 456.0 | 529181  | 528608  | 528081  | 527407  | 526480  | 525322  | 523922  | 522322  | 520622  | 518822  | 516922  | 514922  | 512922  | 510922  | 508922  | 506922  | 504922  | 502922  | 500922  |
| 456.5 | 529719  | 529146  | 528619  | 527945  | 527018  | 525860  | 524460  | 522860  | 521160  | 519360  | 517460  | 515460  | 513460  | 511460  | 509460  | 507460  | 505460  | 503460  | 501460  |
| 457.0 | 530258  | 529685  | 529158  | 528484  | 527557  | 526399  | 524999  | 523399  | 521699  | 519899  | 518099  | 516199  | 514199  | 512199  | 510199  | 508199  | 506199  | 504199  | 502199  |
| 457.5 | 530796  | 530223  | 529696  | 529022  | 528095  | 526937  | 525537  | 523937  | 522237  | 520437  | 518537  | 516537  | 514537  | 512537  | 510537  | 508537  | 506537  | 504537  | 502537  |
| 458.0 | 531335  | 530762  | 530235  | 529561  | 528634  | 527476  | 526076  | 524476  | 522776  | 520976  | 519076  | 517076  | 515076  | 513076  | 511076  | 509076  | 507076  | 505076  | 503076  |
| 458.5 | 531873  | 531300  | 530773  | 530100  | 529173  | 528015  | 526615  | 525015  | 523315  | 521515  | 519615  | 517615  | 515615  | 513615  | 511615  | 509615  | 507615  | 505615  | 503615  |
| 459.0 | 532411  | 531838  | 531311  | 530638  | 529711  | 528553  | 527153  | 525553  | 523853  | 522053  | 520153  | 518153  | 516153  | 514153  | 512153  | 510153  | 508153  | 506153  | 504153  |
| 459.5 | 532950  | 532377  | 531850  | 531177  | 530250  | 529092  | 527692  | 526092  | 524392  | 522592  | 520692  | 518692  | 516692  | 514692  | 512692  | 510692  | 508692  | 506692  | 504692  |
| 460.0 | 533488  | 532915  | 532388  | 531715  | 530788  | 529630  | 528230  | 526630  | 524930  | 523130  | 521230  | 519230  | 517230  | 515230  | 513230  | 511230  | 509230  | 507230  | 505230  |
| 460.5 | 534027  | 533454  | 532927  | 532254  | 531327  | 530169  | 528769  | 527169  | 525469  | 523669  | 521769  | 519769  | 517769  | 515769  | 513769  | 511769  | 509769  | 507769  | 505769  |
| 461.0 | 534565  | 533992  | 533465  | 532792  | 531865  | 530707  | 529307  | 527707  | 526007  | 524207  | 522307  | 520307  | 518307  | 516307  | 514307  | 512307  | 510307  | 508307  | 506307  |
| 461.5 | 535104  | 534531  | 534004  | 533331  | 532404  | 531246  | 529846  | 528246  | 526546  | 524746  | 522846  | 520846  | 518846  | 516846  | 514846  | 512846  | 510846  | 508846  | 506846  |
| 462.0 | 535643  | 535070  | 534543  | 533870  | 532943  | 531785  | 530385  | 528785  | 527085  | 525285  | 523385  | 521385  | 519385  | 517385  | 515385  | 513385  | 511385  | 509385  | 507385  |
| 462.5 | 536182  | 535609  | 535082  | 534409  | 533482  | 532324  | 530924  | 529324  | 527624  | 525824  | 523924  | 521924  | 519924  | 517924  | 515924  | 513924  | 511924  | 509924  | 507924  |
| 463.0 | 536721  | 536148  | 535621  | 534948  | 534021  | 532863  | 531463  | 529863  | 528163  | 526363  | 524463  | 522463  | 520463  | 518463  | 516463  | 514463  | 512463  | 510463  | 508463  |
| 463.5 | 537260  | 536687  | 536160  | 535487  | 534560  | 533402  | 532002  | 530402  | 528702  | 526902  | 525002  | 523002  | 521002  | 519002  | 517002  | 515002  | 513002  | 511002  | 509002  |
| 464.0 | 537800  | 537227  | 536699  | 536026  | 535100  | 533942  | 532542  | 530942  | 529242  | 527442  | 525542  | 523542  | 521542  | 519542  | 517542  | 515542  | 513542  | 511542  | 509542  |
| 464.5 | 538339  | 537766  | 537239  | 536566  | 535640  | 534482  | 533082  | 531482  | 529782  | 527982  |         |         |         |         |         |         |         |         |         |

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $Q$   | .05000     | .04500     | .04000     | .03500     | .03000     | .02500     | .02000     | .01500     | .01250     | .01000     |
|-------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 462.5 | .513637 03 | .515287 03 | .517896 03 | .519104 03 | .521369 03 | .523981 03 | .527086 03 | .530955 03 | .533335 03 | .536180 03 |
| 463.0 | .514164 03 | .515815 03 | .517625 03 | .519334 03 | .521900 03 | .524513 03 | .527620 03 | .531490 03 | .533872 03 | .536718 03 |
| 463.5 | .514691 03 | .516342 03 | .518152 03 | .519861 03 | .522427 03 | .525040 03 | .528145 03 | .532014 03 | .534396 03 | .537242 03 |
| 464.0 | .515218 03 | .516869 03 | .518679 03 | .520388 03 | .522954 03 | .525567 03 | .528672 03 | .532541 03 | .534923 03 | .537769 03 |
| 464.5 | .515745 03 | .517396 03 | .519206 03 | .520915 03 | .523481 03 | .526094 03 | .529199 03 | .533068 03 | .535450 03 | .538296 03 |
| 465.0 | .516272 03 | .517923 03 | .519733 03 | .521442 03 | .524008 03 | .526621 03 | .529726 03 | .533595 03 | .535977 03 | .538823 03 |
| 465.5 | .516799 03 | .518450 03 | .520260 03 | .521969 03 | .524535 03 | .527148 03 | .530253 03 | .534122 03 | .536504 03 | .539350 03 |
| 466.0 | .517326 03 | .518977 03 | .520787 03 | .522496 03 | .525062 03 | .527675 03 | .530780 03 | .534649 03 | .537031 03 | .539877 03 |
| 466.5 | .517853 03 | .519504 03 | .521314 03 | .523023 03 | .525589 03 | .528202 03 | .531307 03 | .535176 03 | .537558 03 | .540404 03 |
| 467.0 | .518380 03 | .520031 03 | .521841 03 | .523550 03 | .526116 03 | .528729 03 | .531834 03 | .535703 03 | .538085 03 | .540931 03 |
| 467.5 | .518907 03 | .520558 03 | .522368 03 | .524077 03 | .526643 03 | .529256 03 | .532361 03 | .536230 03 | .538612 03 | .541458 03 |
| 468.0 | .519434 03 | .521085 03 | .522895 03 | .524604 03 | .527170 03 | .529783 03 | .532888 03 | .536757 03 | .539139 03 | .541985 03 |
| 468.5 | .519961 03 | .521612 03 | .523422 03 | .525131 03 | .527697 03 | .530310 03 | .533415 03 | .537284 03 | .539666 03 | .542512 03 |
| 469.0 | .520488 03 | .522139 03 | .523949 03 | .525658 03 | .528224 03 | .530837 03 | .533942 03 | .537811 03 | .540193 03 | .543039 03 |
| 469.5 | .521015 03 | .522666 03 | .524476 03 | .526185 03 | .528751 03 | .531364 03 | .534469 03 | .538338 03 | .540720 03 | .543566 03 |
| 470.0 | .521542 03 | .523193 03 | .525003 03 | .526712 03 | .529278 03 | .531891 03 | .535006 03 | .538875 03 | .541257 03 | .544103 03 |
| 470.5 | .522069 03 | .523720 03 | .525530 03 | .527239 03 | .529805 03 | .532418 03 | .535533 03 | .539402 03 | .541784 03 | .544630 03 |
| 471.0 | .522596 03 | .524247 03 | .526057 03 | .527766 03 | .530332 03 | .532945 03 | .536060 03 | .540029 03 | .542411 03 | .545257 03 |
| 471.5 | .523123 03 | .524774 03 | .526584 03 | .528293 03 | .530859 03 | .533472 03 | .536587 03 | .540556 03 | .542938 03 | .545784 03 |
| 472.0 | .523650 03 | .525301 03 | .527111 03 | .528820 03 | .531386 03 | .534000 03 | .537115 03 | .541084 03 | .543466 03 | .546312 03 |
| 472.5 | .524177 03 | .525828 03 | .527638 03 | .529347 03 | .531913 03 | .534526 03 | .537641 03 | .541610 03 | .543992 03 | .546838 03 |
| 473.0 | .524704 03 | .526355 03 | .528165 03 | .529874 03 | .532440 03 | .535053 03 | .538168 03 | .542137 03 | .544519 03 | .547365 03 |
| 473.5 | .525231 03 | .526882 03 | .528692 03 | .530401 03 | .532967 03 | .535580 03 | .538695 03 | .542664 03 | .545046 03 | .547892 03 |
| 474.0 | .525758 03 | .527409 03 | .529219 03 | .530928 03 | .533494 03 | .536107 03 | .539222 03 | .543191 03 | .545573 03 | .548419 03 |
| 474.5 | .526285 03 | .527936 03 | .529746 03 | .531455 03 | .534021 03 | .536634 03 | .539749 03 | .543718 03 | .546100 03 | .548946 03 |
| 475.0 | .526812 03 | .528463 03 | .530273 03 | .531982 03 | .534548 03 | .537161 03 | .540276 03 | .544245 03 | .546627 03 | .549473 03 |
| 475.5 | .527339 03 | .528990 03 | .530800 03 | .532509 03 | .535075 03 | .537688 03 | .540803 03 | .544772 03 | .547154 03 | .550000 03 |
| 476.0 | .527866 03 | .529517 03 | .531327 03 | .533036 03 | .535602 03 | .538215 03 | .541330 03 | .545299 03 | .547681 03 | .550527 03 |
| 476.5 | .528393 03 | .530044 03 | .531854 03 | .533563 03 | .536129 03 | .538742 03 | .541857 03 | .545826 03 | .548208 03 | .551054 03 |
| 477.0 | .528920 03 | .530571 03 | .532381 03 | .534090 03 | .536656 03 | .539269 03 | .542384 03 | .546353 03 | .548735 03 | .551581 03 |
| 477.5 | .529447 03 | .531098 03 | .532908 03 | .534617 03 | .537183 03 | .539796 03 | .542911 03 | .546880 03 | .549262 03 | .552108 03 |
| 478.0 | .529974 03 | .531625 03 | .533435 03 | .535144 03 | .537710 03 | .540323 03 | .543438 03 | .547407 03 | .549789 03 | .552635 03 |
| 478.5 | .530501 03 | .532152 03 | .533962 03 | .535671 03 | .538237 03 | .540850 03 | .543965 03 | .547934 03 | .550316 03 | .553162 03 |
| 479.0 | .531028 03 | .532679 03 | .534489 03 | .536198 03 | .538764 03 | .541377 03 | .544492 03 | .548461 03 | .550843 03 | .553689 03 |
| 479.5 | .531555 03 | .533206 03 | .535016 03 | .536725 03 | .539291 03 | .541904 03 | .545019 03 | .548988 03 | .551370 03 | .554216 03 |
| 480.0 | .532082 03 | .533733 03 | .535543 03 | .537252 03 | .539818 03 | .542431 03 | .545546 03 | .549515 03 | .551897 03 | .554743 03 |
| 480.5 | .532609 03 | .534260 03 | .536070 03 | .537779 03 | .540345 03 | .542958 03 | .546073 03 | .550042 03 | .552424 03 | .555270 03 |
| 481.0 | .533136 03 | .534787 03 | .536597 03 | .538306 03 | .540872 03 | .543485 03 | .546600 03 | .550569 03 | .552951 03 | .555797 03 |
| 481.5 | .533663 03 | .535314 03 | .537124 03 | .538833 03 | .541400 03 | .544013 03 | .547128 03 | .551097 03 | .553479 03 | .556325 03 |
| 482.0 | .534190 03 | .535841 03 | .537651 03 | .539360 03 | .541926 03 | .544539 03 | .547654 03 | .551623 03 | .554005 03 | .556851 03 |
| 482.5 | .534717 03 | .536368 03 | .538178 03 | .539887 03 | .542453 03 | .545066 03 | .548181 03 | .552150 03 | .554532 03 | .557378 03 |
| 483.0 | .535244 03 | .536895 03 | .538705 03 | .540414 03 | .542980 03 | .545593 03 | .548708 03 | .552677 03 | .555059 03 | .557905 03 |
| 483.5 | .535771 03 | .537422 03 | .539232 03 | .540941 03 | .543507 03 | .546120 03 | .549235 03 | .553204 03 | .555586 03 | .558432 03 |
| 484.0 | .536298 03 | .537949 03 | .539759 03 | .541468 03 | .544034 03 | .546647 03 | .549762 03 | .553731 03 | .556113 03 | .558959 03 |
| 484.5 | .536825 03 | .538476 03 | .540286 03 | .541995 03 | .544561 03 | .547174 03 | .550289 03 | .554258 03 | .556640 03 | .559486 03 |
| 485.0 | .537352 03 | .539003 03 | .540813 03 | .542522 03 | .545088 03 | .547701 03 | .550816 03 | .554785 03 | .557167 03 | .560013 03 |
| 485.5 | .537879 03 | .539530 03 | .541340 03 | .543049 03 | .545615 03 | .548228 03 | .551343 03 | .555312 03 | .557694 03 | .560540 03 |
| 486.0 | .538406 03 | .540057 03 | .541867 03 | .543576 03 | .546142 03 | .548755 03 | .551870 03 | .555839 03 | .558221 03 | .561067 03 |
| 486.5 | .538933 03 | .540584 03 | .542394 03 | .544103 03 | .546669 03 | .549282 03 | .552397 03 | .556366 03 | .558748 03 | .561594 03 |
| 487.0 | .539460 03 | .541111 03 | .542921 03 | .544630 03 | .547196 03 | .549809 03 | .552924 03 | .556893 03 | .559275 03 | .562121 03 |
| 487.5 | .539987 03 | .541638 03 | .543448 03 | .545157 03 | .547723 03 | .550336 03 | .553451 03 | .557420 03 | .559802 03 | .562648 03 |
| 488.0 | .540514 03 | .542165 03 | .543975 03 | .545684 03 | .548250 03 | .550863 03 | .553978 03 | .557947 03 | .560329 03 | .563175 03 |
| 488.5 | .541041 03 | .542692 03 | .544502 03 | .546211 03 | .548777 03 | .551390 03 | .554505 03 | .558474 03 | .560856 03 | .563702 03 |
| 489.0 | .541568 03 | .543219 03 | .545029 03 | .546738 03 | .549304 03 | .551917 03 | .555032 03 | .558991 03 | .561373 03 | .564219 03 |
| 489.5 | .542095 03 | .543746 03 | .545556 03 | .547265 03 | .549831 03 | .552444 03 | .555559 03 | .559528 03 | .561910 03 | .564756 03 |
| 490.0 | .542622 03 | .544273 03 | .546083 03 | .547792 03 | .550358 03 | .552971 03 | .556086 03 | .560055 03 | .562437 03 | .565283 03 |
| 490.5 | .543149 03 | .544800 03 | .546610 03 | .548319 03 | .550885 03 | .553498 03 | .556613 03 | .560582 03 | .562964 03 | .565810 03 |
| 491.0 | .543676 03 | .545327 03 | .547137 03 | .548846 03 | .551412 03 | .554025 03 | .557140 03 | .561109 03 | .563491 03 | .566337 03 |
| 491.5 | .544203 03 | .545854 03 | .547664 03 | .549373 03 | .551939 03 | .554552 03 | .557667 03 | .561636 03 | .564018 03 | .566864 03 |
| 492.0 | .544730 03 | .546381 03 | .548191 03 | .549900 03 | .552466 03 | .555079 03 | .558194 03 | .562163 03 | .564545 03 | .567391 03 |
| 492.5 | .545257 03 | .546908 03 | .548718 03 | .550427 03 | .552993 03 | .555606 03 | .558721 03 | .562690 03 | .565072 03 | .567918 03 |
| 493.0 | .545784 03 | .547435 03 | .549245 03 | .550954 03 | .553520 03 | .556133 03 | .559248 03 | .563217 03 | .565599 03 | .568445 03 |
| 493.5 | .546311 03 | .547962 03 | .549772 03 | .551481 03 | .554047 03 | .556660 03 | .559775 03 | .563744 03 | .566126 03 | .568972 03 |
| 494.0 | .546838 03 | .548489 03 | .550299 03 | .552008 03 | .554574 03 | .557187 03 | .560302 03 | .564271 03 | .566653 03 | .569500 03 |
| 494.5 | .547365 03 | .549016 03 | .550826 03 | .552535 03 | .555101 03 | .557714 03 | .560829 03 | .564798 03 | .567180 03 | .570026 03 |
| 495.0 | .547892 03 | .549543 03 | .551353 03 | .553062 03 | .555628 03 | .558241 03 | .561356 03 | .565325 03 | .567707 03 | .570553 03 |
| 495.5 | .548419 03 | .550070 03 | .551880 03 | .553589 03 | .556155 03 | .558768 03 | .561883 03 | .565852 03 | .568234 03 | .571080 03 |
| 496.0 | .548946 03 | .550597 03 | .552407 03 | .554116 03 | .556682 03 | .559295 03 | .562410 03 | .566379 03 | .568761 03 | .571607 03 |
| 496.5 | .549473 03 | .551124 03 | .552934 03 | .554643 03 | .557209 03 | .559822 03 | .562937 03 | .566906 03 | .569288 03 | .572134 03 |
| 497.0 | .549999 03 | .551650 03 | .553460 03 | .555169 03 | .557735 03 | .560348 03 | .563463 03 | .567432 03 | .569814 03 | .572660 03 |
| 497.5 | .550526 03 | .552177 03 | .553987 03 | .555696 03 | .558262 03 | .560875 03 | .563990 03 | .567959 03 | .570341 03 | .573187 03 |
| 498.0 | .551053 03 | .552704 03 | .554514 03 | .556223 03 | .558789 03 | .561402 03 | .564517 03 | .568486 03 | .570868 03 | .573714 03 |
| 498.5 | .551580 03 | .553231 03 | .555041 03 | .556750 03 | .559316 03 | .561929 03 | .565044 03 | .569013 03 | .571395 03 | .574241 03 |
| 499.0 | .552107 03 | .553758 03 | .555568 03 | .557277 03 | .559843 03 | .562456 03 | .565571 03 | .569540 03 | .571922 03 | .574768 03 |
| 499.5 | .552634 03 | .554285 03 | .556095 03 | .557804 03 | .560370 03 | .562983 03 | .566098 03 | .570067 03 | .572449 03 | .575295 03 |
| 500.0 | .553161 03 | .554812 03 | .556622 03 | .558331 03 | .560897 03 | .563510 03 | .566625 03 | .570594 03 | .572976 03 | .575822 03 |

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu$ | $Q = .05$ | $Q = .10$ | $Q = .20$ | $Q = .30$ | $Q = .40$ | $Q = .50$ | $Q = .60$ | $Q = .70$ | $Q = .80$ | $Q = .90$ | $Q = 1.00$ | $Q = 1.25$ | $Q = 1.50$ | $Q = 2.00$ | $Q = 2.50$ | $Q = 3.00$ | $Q = 4.00$ | $Q = 5.00$ | $Q = 6.00$ | $Q = 7.00$ | $Q = 8.00$ | $Q = 9.00$ | $Q = 10.00$ | $Q = 12.50$ | $Q = 15.00$ | $Q = 20.00$ | $Q = 25.00$ | $Q = 30.00$ | $Q = 40.00$ | $Q = 50.00$ | $Q = 60.00$ | $Q = 70.00$ | $Q = 80.00$ | $Q = 90.00$ | $Q = 100.00$ |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
|-------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1     | 3.84      | 2.71      | 2.00      | 1.64      | 1.39      | 1.20      | 1.07      | 0.96      | 0.87      | 0.80      | 0.74       | 0.68       | 0.63       | 0.58       | 0.54       | 0.50       | 0.46       | 0.42       | 0.39       | 0.36       | 0.33       | 0.31       | 0.29        | 0.27        | 0.25        | 0.23        | 0.21        | 0.19        | 0.17        | 0.15        | 0.13        | 0.11        | 0.10        | 0.09        | 0.08         | 0.07  | 0.06  | 0.05  | 0.04  | 0.03  | 0.02  | 0.01  |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 2     | 5.99      | 4.61      | 3.84      | 3.44      | 3.22      | 3.08      | 2.95      | 2.83      | 2.72      | 2.62      | 2.53       | 2.44       | 2.36       | 2.28       | 2.20       | 2.13       | 2.05       | 1.98       | 1.91       | 1.84       | 1.78       | 1.72       | 1.66        | 1.61        | 1.55        | 1.50        | 1.44        | 1.39        | 1.34        | 1.29        | 1.24        | 1.19        | 1.14        | 1.10        | 1.05         | 1.01  | 0.97  | 0.93  | 0.89  | 0.85  | 0.82  | 0.78  | 0.75  | 0.71  | 0.68  | 0.64  | 0.61  | 0.58  | 0.55  | 0.52  | 0.49  | 0.46  | 0.43  | 0.40  | 0.37  | 0.34  | 0.31  | 0.28  | 0.25  | 0.22  | 0.19 | 0.16 | 0.13 | 0.10 | 0.07 | 0.04 | 0.01 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 3     | 7.88      | 6.25      | 5.02      | 4.61      | 4.43      | 4.29      | 4.16      | 4.04      | 3.93      | 3.83      | 3.74       | 3.65       | 3.56       | 3.48       | 3.40       | 3.32       | 3.24       | 3.17       | 3.10       | 3.03       | 2.96       | 2.90       | 2.84        | 2.78        | 2.72        | 2.66        | 2.60        | 2.54        | 2.48        | 2.42        | 2.36        | 2.30        | 2.24        | 2.18        | 2.12         | 2.06  | 2.00  | 1.94  | 1.88  | 1.82  | 1.76  | 1.70  | 1.64  | 1.58  | 1.52  | 1.46  | 1.40  | 1.34  | 1.28  | 1.22  | 1.16  | 1.10  | 1.04  | 0.98  | 0.92  | 0.86  | 0.80  | 0.74  | 0.68  | 0.62  | 0.56 | 0.50 | 0.44 | 0.38 | 0.32 | 0.26 | 0.20 | 0.14 | 0.08 | 0.02 | 0.00 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 4     | 9.49      | 7.78      | 6.35      | 5.99      | 5.80      | 5.66      | 5.53      | 5.42      | 5.31      | 5.21      | 5.12       | 5.03       | 4.94       | 4.85       | 4.76       | 4.67       | 4.58       | 4.50       | 4.41       | 4.33       | 4.24       | 4.16       | 4.08        | 4.00        | 3.92        | 3.84        | 3.76        | 3.68        | 3.60        | 3.52        | 3.44        | 3.36        | 3.28        | 3.20        | 3.12         | 3.04  | 2.96  | 2.88  | 2.80  | 2.72  | 2.64  | 2.56  | 2.48  | 2.40  | 2.32  | 2.24  | 2.16  | 2.08  | 2.00  | 1.92  | 1.84  | 1.76  | 1.68  | 1.60  | 1.52  | 1.44  | 1.36  | 1.28  | 1.20  | 1.12  | 1.04 | 0.96 | 0.88 | 0.80 | 0.72 | 0.64 | 0.56 | 0.48 | 0.40 | 0.32 | 0.24 | 0.16 | 0.08 | 0.00 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 5     | 10.83     | 9.35      | 7.78      | 7.38      | 7.18      | 7.04      | 6.91      | 6.80      | 6.69      | 6.59      | 6.50       | 6.41       | 6.32       | 6.23       | 6.14       | 6.05       | 5.96       | 5.87       | 5.78       | 5.69       | 5.60       | 5.51       | 5.42        | 5.33        | 5.24        | 5.15        | 5.06        | 4.97        | 4.88        | 4.79        | 4.70        | 4.61        | 4.52        | 4.43        | 4.34         | 4.25  | 4.16  | 4.07  | 3.98  | 3.89  | 3.80  | 3.71  | 3.62  | 3.53  | 3.44  | 3.35  | 3.26  | 3.17  | 3.08  | 2.99  | 2.90  | 2.81  | 2.72  | 2.63  | 2.54  | 2.45  | 2.36  | 2.27  | 2.18  | 2.09  | 2.00 | 1.91 | 1.82 | 1.73 | 1.64 | 1.55 | 1.46 | 1.37 | 1.28 | 1.19 | 1.10 | 1.01 | 0.92 | 0.83 | 0.74 | 0.65 | 0.56 | 0.47 | 0.38 | 0.29 | 0.20 | 0.11 | 0.02 | 0.00 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 6     | 12.15     | 10.59     | 8.91      | 8.51      | 8.31      | 8.16      | 8.03      | 7.92      | 7.81      | 7.71      | 7.62       | 7.53       | 7.44       | 7.35       | 7.26       | 7.17       | 7.08       | 6.99       | 6.90       | 6.81       | 6.72       | 6.63       | 6.54        | 6.45        | 6.36        | 6.27        | 6.18        | 6.09        | 6.00        | 5.91        | 5.82        | 5.73        | 5.64        | 5.55        | 5.46         | 5.37  | 5.28  | 5.19  | 5.10  | 5.01  | 4.92  | 4.83  | 4.74  | 4.65  | 4.56  | 4.47  | 4.38  | 4.29  | 4.20  | 4.11  | 4.02  | 3.93  | 3.84  | 3.75  | 3.66  | 3.57  | 3.48  | 3.39  | 3.30  | 3.21  | 3.12 | 3.03 | 2.94 | 2.85 | 2.76 | 2.67 | 2.58 | 2.49 | 2.40 | 2.31 | 2.22 | 2.13 | 2.04 | 1.95 | 1.86 | 1.77 | 1.68 | 1.59 | 1.50 | 1.41 | 1.32 | 1.23 | 1.14 | 1.05 | 0.96 | 0.87 | 0.78 | 0.69 | 0.60 | 0.51 | 0.42 | 0.33 | 0.24 | 0.15 | 0.06 | 0.00 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 7     | 13.44     | 11.83     | 10.05     | 9.65      | 9.45      | 9.30      | 9.17      | 9.06      | 8.95      | 8.85      | 8.76       | 8.67       | 8.58       | 8.49       | 8.40       | 8.31       | 8.22       | 8.13       | 8.04       | 7.95       | 7.86       | 7.77       | 7.68        | 7.59        | 7.50        | 7.41        | 7.32        | 7.23        | 7.14        | 7.05        | 6.96        | 6.87        | 6.78        | 6.69        | 6.60         | 6.51  | 6.42  | 6.33  | 6.24  | 6.15  | 6.06  | 5.97  | 5.88  | 5.79  | 5.70  | 5.61  | 5.52  | 5.43  | 5.34  | 5.25  | 5.16  | 5.07  | 4.98  | 4.89  | 4.80  | 4.71  | 4.62  | 4.53  | 4.44  | 4.35  | 4.26 | 4.17 | 4.08 | 3.99 | 3.90 | 3.81 | 3.72 | 3.63 | 3.54 | 3.45 | 3.36 | 3.27 | 3.18 | 3.09 | 3.00 | 2.91 | 2.82 | 2.73 | 2.64 | 2.55 | 2.46 | 2.37 | 2.28 | 2.19 | 2.10 | 2.01 | 1.92 | 1.83 | 1.74 | 1.65 | 1.56 | 1.47 | 1.38 | 1.29 | 1.20 | 1.11 | 1.02 | 0.93 | 0.84 | 0.75 | 0.66 | 0.57 | 0.48 | 0.39 | 0.30 | 0.21 | 0.12 | 0.03 | 0.00 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 8     | 14.69     | 13.12     | 11.22     | 10.82     | 10.62     | 10.47     | 10.34     | 10.23     | 10.12     | 10.02     | 9.93       | 9.84       | 9.75       | 9.66       | 9.57       | 9.48       | 9.39       | 9.30       | 9.21       | 9.12       | 9.03       | 8.94       | 8.85        | 8.76        | 8.67        | 8.58        | 8.49        | 8.40        | 8.31        | 8.22        | 8.13        | 8.04        | 7.95        | 7.86        | 7.77         | 7.68  | 7.59  | 7.50  | 7.41  | 7.32  | 7.23  | 7.14  | 7.05  | 6.96  | 6.87  | 6.78  | 6.69  | 6.60  | 6.51  | 6.42  | 6.33  | 6.24  | 6.15  | 6.06  | 5.97  | 5.88  | 5.79  | 5.70  | 5.61  | 5.52  | 5.43 | 5.34 | 5.25 | 5.16 | 5.07 | 4.98 | 4.89 | 4.80 | 4.71 | 4.62 | 4.53 | 4.44 | 4.35 | 4.26 | 4.17 | 4.08 | 3.99 | 3.90 | 3.81 | 3.72 | 3.63 | 3.54 | 3.45 | 3.36 | 3.27 | 3.18 | 3.09 | 3.00 | 2.91 | 2.82 | 2.73 | 2.64 | 2.55 | 2.46 | 2.37 | 2.28 | 2.19 | 2.10 | 2.01 | 1.92 | 1.83 | 1.74 | 1.65 | 1.56 | 1.47 | 1.38 | 1.29 | 1.20 | 1.11 | 1.02 | 0.93 | 0.84 | 0.75 | 0.66 | 0.57 | 0.48 | 0.39 | 0.30 | 0.21 | 0.12 | 0.03 | 0.00 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 9     | 15.90     | 14.26     | 12.34     | 11.94     | 11.74     | 11.59     | 11.46     | 11.35     | 11.24     | 11.14     | 11.05      | 10.96      | 10.87      | 10.78      | 10.69      | 10.60      | 10.51      | 10.42      | 10.33      | 10.24      | 10.15      | 10.06      | 9.97        | 9.88        | 9.79        | 9.70        | 9.61        | 9.52        | 9.43        | 9.34        | 9.25        | 9.16        | 9.07        | 8.98        | 8.89         | 8.80  | 8.71  | 8.62  | 8.53  | 8.44  | 8.35  | 8.26  | 8.17  | 8.08  | 7.99  | 7.90  | 7.81  | 7.72  | 7.63  | 7.54  | 7.45  | 7.36  | 7.27  | 7.18  | 7.09  | 7.00  | 6.91  | 6.82  | 6.73  | 6.64  | 6.55 | 6.46 | 6.37 | 6.28 | 6.19 | 6.10 | 6.01 | 5.92 | 5.83 | 5.74 | 5.65 | 5.56 | 5.47 | 5.38 | 5.29 | 5.20 | 5.11 | 5.02 | 4.93 | 4.84 | 4.75 | 4.66 | 4.57 | 4.48 | 4.39 | 4.30 | 4.21 | 4.12 | 4.03 | 3.94 | 3.85 | 3.76 | 3.67 | 3.58 | 3.49 | 3.40 | 3.31 | 3.22 | 3.13 | 3.04 | 2.95 | 2.86 | 2.77 | 2.68 | 2.59 | 2.50 | 2.41 | 2.32 | 2.23 | 2.14 | 2.05 | 1.96 | 1.87 | 1.78 | 1.69 | 1.60 | 1.51 | 1.42 | 1.33 | 1.24 | 1.15 | 1.06 | 0.97 | 0.88 | 0.79 | 0.70 | 0.61 | 0.52 | 0.43 | 0.34 | 0.25 | 0.16 | 0.07 | 0.00 |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| 10    | 17.16     | 15.48     | 13.57     | 13.17     | 12.97     | 12.82     | 12.69     | 12.58     | 12.47     | 12.37     | 12.28      | 12.19      | 12.10      | 12.01      | 11.92      | 11.83      | 11.74      | 11.65      | 11.56      | 11.47      | 11.38      | 11.29      | 11.20       | 11.11       | 11.02       | 10.93       | 10.84       | 10.75       | 10.66       | 10.57       | 10.48       | 10.39       | 10.30       | 10.21       | 10.12        | 10.03 | 9.94  | 9.85  | 9.76  | 9.67  | 9.58  | 9.49  | 9.40  | 9.31  | 9.22  | 9.13  | 9.04  | 8.95  | 8.86  | 8.77  | 8.68  | 8.59  | 8.50  | 8.41  | 8.32  | 8.23  | 8.14  | 8.05  | 7.96  | 7.87  | 7.78 | 7.69 | 7.60 | 7.51 | 7.42 | 7.33 | 7.24 | 7.15 | 7.06 | 6.97 | 6.88 | 6.79 | 6.70 | 6.61 | 6.52 | 6.43 | 6.34 | 6.25 | 6.16 | 6.07 | 5.98 | 5.89 | 5.80 | 5.71 | 5.62 | 5.53 | 5.44 | 5.35 | 5.26 | 5.17 | 5.08 | 4.99 | 4.90 | 4.81 | 4.72 | 4.63 | 4.54 | 4.45 | 4.36 | 4.27 | 4.18 | 4.09 | 4.00 | 3.91 | 3.82 | 3.73 | 3.64 | 3.55 | 3.46 | 3.37 | 3.28 | 3.19 | 3.10 | 3.01 | 2.92 | 2.83 | 2.74 | 2.65 | 2.56 | 2.47 | 2.38 | 2.29 | 2.20 | 2.11 | 2.02 | 1.93 | 1.84 | 1.75 | 1.66 | 1.57 | 1.48 | 1.39 | 1.30 | 1.21 | 1.12 | 1.03 | 0.94 | 0.85 | 0.76 | 0.67 | 0.58 | 0.49 | 0.40 | 0.31 | 0.22 | 0.13 | 0.04 | 0.00 |      |      |      |      |      |      |      |      |      |      |      |      |
| 11    | 18.31     | 16.59     | 14.67     | 14.27     | 14.07     | 13.92     | 13.79     | 13.68     | 13.57     | 13.47     | 13.38      | 13.29      | 13.20      | 13.11      | 13.02      | 12.93      | 12.84      | 12.75      | 12.66      | 12.57      | 12.48      | 12.39      | 12.30       | 12.21       | 12.12       | 12.03       | 11.94       | 11.85       | 11.76       | 11.67       | 11.58       | 11.49       | 11.40       | 11.31       | 11.22        | 11.13 | 11.04 | 10.95 | 10.86 | 10.77 | 10.68 | 10.59 | 10.50 | 10.41 | 10.32 | 10.23 | 10.14 | 10.05 | 9.96  | 9.87  | 9.78  | 9.69  | 9.60  | 9.51  | 9.42  | 9.33  | 9.24  | 9.15  | 9.06  | 8.97  | 8.88 | 8.79 | 8.70 | 8.61 | 8.52 | 8.43 | 8.34 | 8.25 | 8.16 | 8.07 | 7.98 | 7.89 | 7.80 | 7.71 | 7.62 | 7.53 | 7.44 | 7.35 | 7.26 | 7.17 | 7.08 | 6.99 | 6.90 | 6.81 | 6.72 | 6.63 | 6.54 | 6.45 | 6.36 | 6.27 | 6.18 | 6.09 | 6.00 | 5.91 | 5.82 | 5.73 | 5.64 | 5.55 | 5.46 | 5.37 | 5.28 | 5.19 | 5.10 | 5.01 | 4.92 | 4.83 | 4.74 | 4.65 | 4.56 | 4.47 | 4.38 | 4.29 | 4.20 | 4.11 | 4.02 | 3.93 | 3.84 | 3.75 | 3.66 | 3.57 | 3.48 | 3.39 | 3.30 | 3.21 | 3.12 | 3.03 | 2.94 | 2.85 | 2.76 | 2.67 | 2.58 | 2.49 | 2.40 | 2.31 | 2.22 | 2.13 | 2.04 | 1.95 | 1.86 | 1.77 | 1.68 | 1.59 | 1.50 | 1.41 | 1.32 | 1.23 | 1.14 | 1.05 | 0.96 | 0.87 | 0.78 | 0.69 | 0.60 | 0.51 | 0.42 | 0.33 | 0.24 | 0.15 | 0.06 | 0.00 |
| 12    | 19.43     | 17.67     | 15.74     | 15.34     | 15.14     | 14.99     | 14.86     | 14.75     | 14.64     | 14.54     | 14.45      | 14.36      | 14.27      | 14.18      | 14.09      | 14.00      | 13.91      | 13.82      | 13.73      | 13.64      | 13.55      | 13.46      | 13.37       | 13.28       | 13.19       | 13.10       | 13.01       | 12.92       | 12.83       | 12.74       | 12.65       | 12.56       | 12.47       | 12.38       | 12.29        | 12.20 | 12.11 | 12.02 | 11.93 | 11.84 | 11.75 | 11.66 | 11.57 | 11.48 | 11.39 | 11.30 | 11.21 | 11.12 | 11.03 | 10.94 | 10.85 | 10.76 | 10.67 | 10.58 | 10.49 | 10.40 | 10.31 | 10.22 | 10.13 | 10.04 | 9.95 | 9.86 | 9.77 | 9.68 | 9.59 | 9.50 | 9.41 | 9.32 | 9.23 | 9.14 | 9.05 | 8.96 | 8.87 | 8.78 | 8.69 | 8.60 | 8.51 | 8.42 | 8.33 | 8.24 | 8.15 | 8.06 | 7.97 | 7.88 | 7.79 | 7.70 | 7.61 | 7.52 | 7.43 | 7.34 | 7.25 | 7.16 | 7.07 | 6.98 | 6.89 | 6.80 | 6.71 | 6.62 | 6.53 | 6.44 | 6.35 | 6.26 | 6.17 | 6.08 | 5.99 | 5.90 | 5.81 | 5.72 | 5.63 | 5.54 | 5.45 | 5.36 | 5.27 | 5.18 | 5.09 | 5.00 | 4.91 | 4.82 | 4.73 | 4.64 | 4.55 | 4.46 | 4.37 | 4.28 | 4.19 | 4.10 | 4.01 | 3.92 | 3.83 | 3.74 | 3.65 | 3.56 | 3.47 | 3.38 | 3.29 | 3.20 | 3.11 | 3.02 | 2.93 | 2.84 | 2.75 | 2.66 | 2.57 | 2.48 | 2.39 | 2.30 | 2.21 | 2.12 | 2.03 | 1.94 | 1.85 | 1.76 | 1.67 | 1.58 | 1.49 | 1.40 | 1.31 | 1.22 | 1.   |      |

[illegible]

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu \backslash Q$ | .007500    | .005000    | .002500    | .001000    | .000500    | .000100    | .000050    | .000010    | .000005    | .000001    |
|--------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 5.1                | .159535 02 | .169330 02 | .185759 02 | .207135 02 | .223095 02 | .259608 02 | .275143 02 | .310866 02 | .326123 02 | .361309 02 |
| 5.2                | .163377 02 | .171156 02 | .187652 02 | .209109 02 | .225126 02 | .261756 02 | .277336 02 | .313156 02 | .328453 02 | .363722 02 |
| 5.3                | .163352 02 | .172973 02 | .189536 02 | .211074 02 | .227146 02 | .263893 02 | .279519 02 | .315435 02 | .330770 02 | .366122 02 |
| 5.4                | .164019 02 | .174782 02 | .191412 02 | .213030 02 | .229157 02 | .266019 02 | .281690 02 | .317702 02 | .333075 02 | .368509 02 |
| 5.5                | .165078 02 | .176583 02 | .193279 02 | .214976 02 | .231158 02 | .268134 02 | .283850 02 | .319957 02 | .335368 02 | .370884 02 |
| 5.6                | .166433 02 | .178376 02 | .195138 02 | .216913 02 | .233150 02 | .270240 02 | .285999 02 | .322201 02 | .337650 02 | .373246 02 |
| 5.7                | .171375 02 | .183162 02 | .199988 02 | .218942 02 | .235132 02 | .272335 02 | .288138 02 | .324434 02 | .339920 02 | .375590 02 |
| 5.8                | .171913 02 | .183940 02 | .200831 02 | .220762 02 | .237106 02 | .274420 02 | .290268 02 | .326657 02 | .342179 02 | .377937 02 |
| 5.9                | .173644 02 | .185711 02 | .202666 02 | .222674 02 | .239071 02 | .276496 02 | .292387 02 | .328869 02 | .344428 02 | .380266 02 |
| 6.0                | .175369 02 | .187476 02 | .204494 02 | .224577 02 | .241020 02 | .278563 02 | .294497 02 | .331071 02 | .346667 02 | .382583 02 |
| 6.1                | .177087 02 | .189234 02 | .206315 02 | .226474 02 | .242977 02 | .280621 02 | .296598 02 | .333263 02 | .348895 02 | .384890 02 |
| 6.2                | .178799 02 | .190955 02 | .208020 02 | .228362 02 | .244917 02 | .282671 02 | .298690 02 | .335445 02 | .351114 02 | .387187 02 |
| 6.3                | .180505 02 | .192730 02 | .209735 02 | .230243 02 | .246880 02 | .284711 02 | .300773 02 | .337618 02 | .353323 02 | .389474 02 |
| 6.4                | .182205 02 | .194468 02 | .211523 02 | .232117 02 | .248775 02 | .286744 02 | .302847 02 | .339782 02 | .355522 02 | .391751 02 |
| 6.5                | .183899 02 | .196201 02 | .213523 02 | .233984 02 | .250693 02 | .288768 02 | .304913 02 | .341937 02 | .357713 02 | .394018 02 |
| 6.6                | .185588 02 | .197927 02 | .215516 02 | .235844 02 | .252637 02 | .290785 02 | .306971 02 | .344083 02 | .359894 02 | .396276 02 |
| 6.7                | .187271 02 | .199648 02 | .217507 02 | .237698 02 | .254577 02 | .292793 02 | .309021 02 | .346221 02 | .362067 02 | .398525 02 |
| 6.8                | .188948 02 | .193363 02 | .216072 02 | .239544 02 | .256404 02 | .294795 02 | .311063 02 | .348351 02 | .364232 02 | .400765 02 |
| 6.9                | .190621 02 | .201273 02 | .218841 02 | .241385 02 | .258294 02 | .296788 02 | .313097 02 | .350472 02 | .366338 02 | .402956 02 |
| 7.0                | .192288 02 | .202777 02 | .220554 02 | .243213 02 | .260178 02 | .298775 02 | .315124 02 | .352585 02 | .368535 02 | .405218 02 |
| 7.1                | .193950 02 | .204476 02 | .222152 02 | .245047 02 | .262055 02 | .300755 02 | .317144 02 | .354691 02 | .370675 02 | .407432 02 |
| 7.2                | .195608 02 | .206170 02 | .223834 02 | .246869 02 | .263925 02 | .302727 02 | .319157 02 | .356789 02 | .372807 02 | .409638 02 |
| 7.3                | .197260 02 | .207859 02 | .225560 02 | .248685 02 | .265790 02 | .304693 02 | .321162 02 | .358879 02 | .374932 02 | .411816 02 |
| 7.4                | .198908 02 | .209543 02 | .227432 02 | .250496 02 | .267649 02 | .306652 02 | .323161 02 | .360963 02 | .377048 02 | .413926 02 |
| 7.5                | .200552 02 | .211224 02 | .229338 02 | .252311 02 | .269501 02 | .308605 02 | .325153 02 | .363039 02 | .379158 02 | .416028 02 |
| 7.6                | .202191 02 | .212897 02 | .230869 02 | .254100 02 | .271348 02 | .310552 02 | .327138 02 | .365107 02 | .381260 02 | .418183 02 |
| 7.7                | .203825 02 | .214567 02 | .232395 02 | .255894 02 | .273190 02 | .312492 02 | .329117 02 | .367170 02 | .383356 02 | .420351 02 |
| 7.8                | .205455 02 | .216232 02 | .234016 02 | .257683 02 | .275035 02 | .314426 02 | .331093 02 | .369225 02 | .385444 02 | .422510 02 |
| 7.9                | .207083 02 | .217893 02 | .235633 02 | .259466 02 | .276886 02 | .316354 02 | .333057 02 | .371274 02 | .387525 02 | .424663 02 |
| 8.0                | .208713 02 | .219550 02 | .237245 02 | .261245 02 | .278690 02 | .318276 02 | .335017 02 | .373316 02 | .389610 02 | .426809 02 |
| 8.1                | .210341 02 | .221222 02 | .238852 02 | .263016 02 | .280510 02 | .320193 02 | .336972 02 | .375352 02 | .391669 02 | .428948 02 |
| 8.2                | .211955 02 | .222850 02 | .241135 02 | .264787 02 | .282315 02 | .322104 02 | .338923 02 | .377381 02 | .393731 02 | .431080 02 |
| 8.3                | .213545 02 | .224494 02 | .242853 02 | .266551 02 | .284124 02 | .324009 02 | .340863 02 | .379405 02 | .395786 02 | .433206 02 |
| 8.4                | .215131 02 | .226134 02 | .244547 02 | .268310 02 | .285929 02 | .325909 02 | .342811 02 | .381422 02 | .397836 02 | .435325 02 |
| 8.5                | .216715 02 | .227770 02 | .246237 02 | .270065 02 | .287729 02 | .327803 02 | .344732 02 | .383434 02 | .399879 02 | .437439 02 |
| 8.6                | .218298 02 | .229402 02 | .247933 02 | .271815 02 | .289524 02 | .329693 02 | .346653 02 | .385440 02 | .401917 02 | .439544 02 |
| 8.7                | .219879 02 | .231031 02 | .249624 02 | .273561 02 | .291310 02 | .331577 02 | .348580 02 | .387440 02 | .403939 02 | .441645 02 |
| 8.8                | .221458 02 | .232655 02 | .251242 02 | .275302 02 | .293110 02 | .333456 02 | .350496 02 | .389434 02 | .405974 02 | .443739 02 |
| 8.9                | .223036 02 | .234276 02 | .252855 02 | .277133 02 | .294881 02 | .335330 02 | .352446 02 | .391423 02 | .407995 02 | .445827 02 |
| 9.0                | .224611 02 | .235894 02 | .254425 02 | .278972 02 | .296668 02 | .337199 02 | .354312 02 | .393407 02 | .410009 02 | .447913 02 |
| 9.1                | .226182 02 | .237517 02 | .256091 02 | .280800 02 | .298451 02 | .339064 02 | .356212 02 | .395385 02 | .412018 02 | .450000 02 |
| 9.2                | .227750 02 | .239128 02 | .257753 02 | .282625 02 | .300239 02 | .340924 02 | .358118 02 | .397358 02 | .414022 02 | .452087 02 |
| 9.3                | .229315 02 | .240735 02 | .259451 02 | .284445 02 | .302025 02 | .342779 02 | .359999 02 | .399325 02 | .416021 02 | .454172 02 |
| 9.4                | .230878 02 | .242338 02 | .261154 02 | .286262 02 | .303809 02 | .344629 02 | .361885 02 | .401288 02 | .418014 02 | .456255 02 |
| 9.5                | .232439 02 | .243937 02 | .262857 02 | .288075 02 | .305592 02 | .346475 02 | .363767 02 | .403246 02 | .420002 02 | .458337 02 |
| 9.6                | .233998 02 | .245532 02 | .264559 02 | .289884 02 | .307374 02 | .348317 02 | .365644 02 | .405198 02 | .421985 02 | .460418 02 |
| 9.7                | .235555 02 | .247124 02 | .266260 02 | .291689 02 | .309155 02 | .350154 02 | .367516 02 | .407146 02 | .423953 02 | .462500 02 |
| 9.8                | .237110 02 | .248713 02 | .267959 02 | .293489 02 | .310935 02 | .351987 02 | .369384 02 | .409089 02 | .425917 02 | .464582 02 |
| 9.9                | .238663 02 | .250300 02 | .269656 02 | .295284 02 | .312714 02 | .353816 02 | .371247 02 | .411028 02 | .427895 02 | .466662 02 |
| 10.0               | .240214 02 | .251843 02 | .271352 02 | .297074 02 | .314492 02 | .355640 02 | .373117 02 | .412962 02 | .429869 02 | .468741 02 |

### Percentage Points of the $\chi^2$ Distribution Values of $\chi^2$ in Terms of $Q$ and $\nu$

[illegible]

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu$ | .00000  | .00500  | .01000  | .02500  | .05000  | .10000  | .20000  | .30000  | .40000  | .50000  | .60000  | .70000  | .80000  | .90000  | 1.00000 |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 17.00 | 3.46623 | 3.52772 | 3.58921 | 3.71224 | 3.83527 | 3.95830 | 4.11741 | 4.27652 | 4.43563 | 4.59474 | 4.75385 | 4.91296 | 5.07207 | 5.23118 | 5.39029 |
| 17.25 | 3.47400 | 3.53549 | 3.59698 | 3.71992 | 3.84295 | 3.96598 | 4.12509 | 4.28420 | 4.44331 | 4.60242 | 4.76153 | 4.92064 | 5.07975 | 5.23886 | 5.39797 |
| 17.50 | 3.48177 | 3.54326 | 3.60475 | 3.72770 | 3.85073 | 3.97376 | 4.13287 | 4.29198 | 4.45109 | 4.61020 | 4.76931 | 4.92842 | 5.08753 | 5.24664 | 5.40575 |
| 17.75 | 3.48954 | 3.55103 | 3.61252 | 3.73547 | 3.85850 | 3.98153 | 4.14064 | 4.29975 | 4.45886 | 4.61797 | 4.77708 | 4.93619 | 5.09530 | 5.25441 | 5.41352 |
| 18.00 | 3.49731 | 3.55880 | 3.62029 | 3.74332 | 3.86635 | 3.98938 | 4.14875 | 4.30786 | 4.46697 | 4.62608 | 4.78519 | 4.94430 | 5.10341 | 5.26252 | 5.42163 |
| 18.25 | 3.50508 | 3.56657 | 3.62806 | 3.75117 | 3.87720 | 3.99923 | 4.15686 | 4.31597 | 4.47508 | 4.63419 | 4.79330 | 4.95241 | 5.11152 | 5.27063 | 5.42974 |
| 18.50 | 3.51285 | 3.57434 | 3.63583 | 3.75928 | 3.88531 | 4.00734 | 4.16497 | 4.32408 | 4.48319 | 4.64230 | 4.80141 | 4.96052 | 5.11963 | 5.27874 | 5.43785 |
| 18.75 | 3.52062 | 3.58211 | 3.64360 | 3.76739 | 3.89342 | 4.01537 | 4.17308 | 4.33219 | 4.49130 | 4.65041 | 4.80952 | 4.96863 | 5.12774 | 5.28685 | 5.44596 |
| 19.00 | 3.52839 | 3.58988 | 3.65137 | 3.77550 | 3.90153 | 4.02356 | 4.18167 | 4.34028 | 4.49939 | 4.65850 | 4.81761 | 4.97672 | 5.13583 | 5.29494 | 5.45407 |
| 19.25 | 3.53616 | 3.59765 | 3.65914 | 3.78361 | 3.90964 | 4.03167 | 4.18978 | 4.34839 | 4.50750 | 4.66661 | 4.82572 | 4.98483 | 5.14394 | 5.30305 | 5.46218 |
| 19.50 | 3.54393 | 3.60542 | 3.66691 | 3.79172 | 3.91775 | 4.03970 | 4.19781 | 4.35650 | 4.51561 | 4.67472 | 4.83383 | 4.99294 | 5.15205 | 5.31116 | 5.47029 |
| 19.75 | 3.55170 | 3.61319 | 3.67468 | 3.80003 | 3.92586 | 4.04773 | 4.20592 | 4.36461 | 4.52372 | 4.68283 | 4.84194 | 5.00105 | 5.16016 | 5.31927 | 5.47840 |
| 20.00 | 3.55947 | 3.62096 | 3.68245 | 3.80814 | 3.93397 | 4.05576 | 4.21403 | 4.37272 | 4.53183 | 4.69094 | 4.85005 | 5.00916 | 5.16827 | 5.32738 | 5.48651 |
| 20.25 | 3.56724 | 3.62873 | 3.69022 | 3.81625 | 3.94208 | 4.06385 | 4.22214 | 4.38083 | 4.54094 | 4.69905 | 4.85816 | 5.01727 | 5.17638 | 5.33549 | 5.49462 |
| 20.50 | 3.57501 | 3.63650 | 3.69799 | 3.82436 | 3.95019 | 4.07194 | 4.23025 | 4.38894 | 4.54905 | 4.70716 | 4.86627 | 5.02538 | 5.18449 | 5.34360 | 5.50273 |
| 20.75 | 3.58278 | 3.64427 | 3.70576 | 3.83247 | 3.95830 | 4.08003 | 4.23836 | 4.39705 | 4.55716 | 4.71527 | 4.87338 | 5.03349 | 5.19260 | 5.35171 | 5.51084 |
| 21.00 | 3.59055 | 3.65204 | 3.71353 | 3.84058 | 3.96641 | 4.08812 | 4.24647 | 4.40516 | 4.56527 | 4.72338 | 4.88149 | 5.04160 | 5.20071 | 5.35982 | 5.51895 |
| 21.25 | 3.59832 | 3.65981 | 3.72130 | 3.84869 | 3.97452 | 4.09623 | 4.25458 | 4.41327 | 4.57338 | 4.73149 | 4.88960 | 5.04971 | 5.20882 | 5.36793 | 5.52706 |
| 21.50 | 3.60609 | 3.66758 | 3.72907 | 3.85680 | 3.98263 | 4.10434 | 4.26269 | 4.42138 | 4.58149 | 4.73960 | 4.89771 | 5.05782 | 5.21693 | 5.37604 | 5.53517 |
| 21.75 | 3.61386 | 3.67535 | 3.73684 | 3.86491 | 3.99074 | 4.11245 | 4.27080 | 4.42949 | 4.58960 | 4.74771 | 4.90582 | 5.06593 | 5.22504 | 5.38415 | 5.54328 |
| 22.00 | 3.62163 | 3.68312 | 3.74461 | 3.87302 | 4.00085 | 4.12056 | 4.27891 | 4.43760 | 4.59771 | 4.75582 | 4.91393 | 5.07404 | 5.23315 | 5.39226 | 5.55139 |
| 22.25 | 3.62940 | 3.69089 | 3.75238 | 3.88113 | 4.00896 | 4.12867 | 4.28702 | 4.44571 | 4.60582 | 4.76393 | 4.92204 | 5.08215 | 5.24126 | 5.40037 | 5.55950 |
| 22.50 | 3.63717 | 3.69866 | 3.76015 | 3.88924 | 4.01707 | 4.13678 | 4.29513 | 4.45382 | 4.61393 | 4.77204 | 4.93015 | 5.09026 | 5.24937 | 5.40848 | 5.56761 |
| 22.75 | 3.64494 | 3.70643 | 3.76792 | 3.89735 | 4.02518 | 4.14489 | 4.30324 | 4.46193 | 4.62204 | 4.78015 | 4.93826 | 5.09837 | 5.25748 | 5.41659 | 5.57572 |
| 23.00 | 3.65271 | 3.71420 | 3.77569 | 3.90546 | 4.03329 | 4.15290 | 4.31135 | 4.47004 | 4.63015 | 4.78826 | 4.94637 | 5.10648 | 5.26559 | 5.42470 | 5.58383 |
| 23.25 | 3.66048 | 3.72197 | 3.78346 | 3.91357 | 4.04140 | 4.16101 | 4.31946 | 4.47815 | 4.63826 | 4.79637 | 4.95448 | 5.11459 | 5.27370 | 5.43281 | 5.59194 |
| 23.50 | 3.66825 | 3.72974 | 3.79123 | 3.92168 | 4.04951 | 4.16912 | 4.32757 | 4.48626 | 4.64637 | 4.80448 | 4.96259 | 5.12270 | 5.28181 | 5.44092 | 5.60005 |
| 23.75 | 3.67602 | 3.73751 | 3.79900 | 3.92979 | 4.05762 | 4.17723 | 4.33568 | 4.49437 | 4.65448 | 4.81259 | 4.97070 | 5.13081 | 5.28992 | 5.44903 | 5.60816 |
| 24.00 | 3.68379 | 3.74528 | 3.80677 | 3.93790 | 4.06573 | 4.18534 | 4.34379 | 4.50248 | 4.66259 | 4.82070 | 4.97881 | 5.13892 | 5.29803 | 5.45714 | 5.61627 |
| 24.25 | 3.69156 | 3.75305 | 3.81454 | 3.94601 | 4.07384 | 4.19345 | 4.35190 | 4.51059 | 4.67070 | 4.82881 | 4.98692 | 5.14703 | 5.30614 | 5.46525 | 5.62438 |
| 24.50 | 3.69933 | 3.76082 | 3.82231 | 3.95412 | 4.08195 | 4.20156 | 4.36001 | 4.51870 | 4.67881 | 4.83692 | 4.99503 | 5.15514 | 5.31426 | 5.47336 | 5.63249 |
| 24.75 | 3.70710 | 3.76859 | 3.83008 | 3.96223 | 4.09006 | 4.20967 | 4.36812 | 4.52681 | 4.68692 | 4.84503 | 4.99914 | 5.16325 | 5.32237 | 5.48147 | 5.64060 |
| 25.00 | 3.71487 | 3.77636 | 3.83785 | 3.97034 | 4.09817 | 4.21778 | 4.37623 | 4.53492 | 4.69503 | 4.85314 | 4.99925 | 5.17136 | 5.33048 | 5.48958 | 5.64871 |
| 25.25 | 3.72264 | 3.78413 | 3.84562 | 3.97845 | 4.10628 | 4.22589 | 4.38434 | 4.54303 | 4.70314 | 4.86125 | 4.99936 | 5.17947 | 5.33859 | 5.49769 | 5.65682 |
| 25.50 | 3.73041 | 3.79190 | 3.85339 | 3.98656 | 4.11439 | 4.23400 | 4.39245 | 4.55114 | 4.71125 | 4.86936 | 4.99947 | 5.18758 | 5.34670 | 5.50580 | 5.66493 |
| 25.75 | 3.73818 | 3.79967 | 3.86116 | 3.99467 | 4.12250 | 4.24211 | 4.40056 | 4.55925 | 4.71936 | 4.87747 | 4.99958 | 5.19569 | 5.35481 | 5.51391 | 5.67304 |
| 26.00 | 3.74595 | 3.80744 | 3.86893 | 4.00278 | 4.13061 | 4.25022 | 4.40867 | 4.56736 | 4.72747 | 4.88558 | 4.99969 | 5.20380 | 5.36292 | 5.52202 | 5.68115 |
| 26.25 | 3.75372 | 3.81521 | 3.87670 | 4.01089 | 4.13872 | 4.25833 | 4.41678 | 4.57547 | 4.73558 | 4.89369 | 4.99980 | 5.21191 | 5.37103 | 5.53013 | 5.68926 |
| 26.50 | 3.76149 | 3.82298 | 3.88447 | 4.01900 | 4.14683 | 4.26644 | 4.42489 | 4.58358 | 4.74369 | 4.90180 | 4.99991 | 5.22002 | 5.37914 | 5.53824 | 5.69737 |
| 26.75 | 3.76926 | 3.83075 | 3.89224 | 4.02711 | 4.15494 | 4.27455 | 4.43300 | 4.59169 | 4.75180 | 4.90991 | 4.99992 | 5.22813 | 5.38725 | 5.54635 | 5.70548 |
| 27.00 | 3.77703 | 3.83852 | 3.90001 | 4.03522 | 4.16305 | 4.28266 | 4.44111 | 4.60000 | 4.75991 | 4.91802 | 4.99993 | 5.23624 | 5.39536 | 5.55446 | 5.71359 |
| 27.25 | 3.78480 | 3.84629 | 3.90778 | 4.04333 | 4.17116 | 4.29077 | 4.44922 | 4.60811 | 4.76802 | 4.92613 | 4.99994 | 5.24435 | 5.40347 | 5.56257 | 5.72170 |
| 27.50 | 3.79257 | 3.85406 | 3.91555 | 4.05144 | 4.17927 | 4.29888 | 4.45733 | 4.61622 | 4.77613 | 4.93424 | 4.99995 | 5.25246 | 5.41158 | 5.57068 | 5.72981 |
| 27.75 | 3.80034 | 3.86183 | 3.92332 | 4.05955 | 4.18738 | 4.30699 | 4.46544 | 4.62433 | 4.78424 | 4.94235 | 4.99996 | 5.26057 | 5.41969 | 5.57879 | 5.73792 |
| 28.00 | 3.80811 | 3.86960 | 3.93109 | 4.06766 | 4.19549 | 4.31510 | 4.47355 | 4.63244 | 4.79235 | 4.95046 | 4.99997 | 5.26868 | 5.42780 | 5.58690 | 5.74603 |
| 28.25 | 3.81588 | 3.87737 | 3.93886 | 4.07577 | 4.20360 | 4.32321 | 4.48166 | 4.64055 | 4.80046 | 4.95857 | 4.99998 | 5.27679 | 5.43591 | 5.59501 | 5.75414 |
| 28.50 | 3.82365 | 3.88514 | 3.94663 | 4.08388 | 4.21171 | 4.33132 | 4.48977 | 4.64866 | 4.80857 | 4.96668 | 4.99999 | 5.28490 | 5.44402 | 5.60312 | 5.76225 |
| 28.75 | 3.83142 | 3.89291 | 3.95440 | 4.09199 | 4.21982 | 4.33943 | 4.49788 | 4.65677 | 4.81668 | 4.97479 | 4.99999 | 5.29301 | 5.45213 | 5.61123 | 5.77036 |
| 29.00 | 3.83919 | 3.90068 | 3.96217 | 4.10010 | 4.22793 | 4.34754 | 4.50599 | 4.66488 | 4.82479 | 4.98290 | 4.99999 | 5.30112 | 5.46024 | 5.61934 | 5.77847 |
| 29.25 | 3.84696 | 3.90845 | 3.96994 | 4.10821 | 4.23604 | 4.35565 | 4.51410 | 4.67299 | 4.83290 | 4.99101 | 4.99999 | 5.30923 | 5.46835 | 5.62745 | 5.78658 |
| 29.50 | 3.85473 | 3.91622 | 3.97773 | 4.11632 | 4.24415 | 4.36376 | 4.52221 | 4.68110 | 4.84101 | 4.99912 | 4.99999 | 5.31734 | 5.47646 | 5.63556 | 5.79469 |
| 29.75 | 3.86250 | 3.92400 | 3.98552 | 4.12443 | 4.25226 | 4.37187 | 4.53032 | 4.68921 | 4.84912 | 4.99923 | 4.99999 | 5.32545 | 5.48457 | 5.64367 | 5.80280 |
| 30.00 | 3.87027 | 3.93177 | 3.99323 | 4.13254 | 4.26037 | 4.38000 | 4.53843 | 4.69732 | 4.85723 | 4.99934 | 4.99999 | 5.33356 | 5.49268 | 5.65178 | 5.81091 |
| 30.25 | 3.87804 | 3.93954 | 4.00099 | 4.14065 | 4.26848 | 4.38811 | 4.54654 | 4.70543 | 4.86534 | 4.99945 | 4.99999 | 5.34167 | 5.50079 | 5.65989 | 5.81902 |
| 30.50 | 3.88581 | 3.94731 | 4.00876 | 4.14876 | 4.27659 | 4.39622 | 4.55465 | 4.71354 | 4.87345 | 4.99956 | 4.99999 | 5.34978 | 5.50890 | 5.66800 | 5.82713 |
| 30.75 | 3.89358 | 3.95508 | 4.01653 | 4.15687 | 4.28470 | 4.40433 | 4.56276 | 4.72165 | 4.88156 | 4.99967 | 4.99999 | 5.35789 | 5.51701 | 5.67611 | 5.83524 |
| 31.00 | 3.90135 | 3.96285 | 4.02430 | 4.16498 | 4.29281 | 4.41244 | 4.57087 | 4.72976 | 4.88967 | 4.99978 | 4.99999 | 5.36600 | 5.52512 | 5.68422 | 5.84335 |
| 31.25 | 3.90912 | 3.97062 | 4.03207 | 4.17309 | 4.30092 | 4.42055 | 4.57898 | 4.73787 | 4.89778 | 4.99989 | 4.99999 | 5.37411 | 5.53323 | 5.69233 | 5.85146 |
| 31.50 | 3.91689 | 3.97839 | 4.03984 | 4.18120 | 4.30903 | 4.42866 | 4.58709 | 4.74598 | 4.90589 | 4.99999 | 4.99999 | 5.38222 | 5.54134 | 5.70044 | 5.85957 |
| 31.75 | 3.92466 | 3.98616 | 4.04761 | 4.18931 | 4.31714 | 4.43677 | 4.59520 | 4.75409 | 4.91400 | 4.99999 | 4.99999 | 5.39033 | 5.54945 | 5.70855 | 5.86768 |
| 32.00 | 3.93243 | 3.99393 | 4.05538 | 4.19742 | 4.32525 | 4.44488 | 4.60331 | 4.76220 | 4.92211 | 4.99999 | 4.99999 | 5.39844 | 5.55756 | 5.71666 | 5.87579 |
| 32.25 | 3.94020 | 4.00170 | 4.06315 | 4.20553 | 4.33336 | 4.45299 | 4.61142 | 4.77031 | 4.93022 | 4.99999 | 4.99999 | 5.      |         |         |         |

### Percentage Points of the $\chi^2$ Distribution Values of $\chi^2$ in Terms of $Q$ and $\nu$

[illegible]

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $v$

| $v$ | .01 | .02 | .03 | .04 | .05 | .06 | .07 | .08 | .09 | .10 | .11 | .12 | .13 | .14 | .15 | .16 | .17 | .18 | .19 | .20 | .21 | .22 | .23 | .24 | .25 | .26 | .27 | .28 | .29 | .30 | .31 | .32 | .33 | .34 | .35 | .36 | .37 | .38 | .39 | .40 | .41 | .42 | .43 | .44 | .45 | .46 | .47 | .48 | .49 | .50 | .51 | .52 | .53 | .54 | .55 | .56 | .57 | .58 | .59 | .60 | .61 | .62 | .63 | .64 | .65 | .66 | .67 | .68 | .69 | .70 | .71 | .72 | .73 | .74 | .75 | .76 | .77 | .78 | .79 | .80 | .81 | .82 | .83 | .84 | .85 | .86 | .87 | .88 | .89 | .90 | .91 | .92 | .93 | .94 | .95 | .96 | .97 | .98 | .99 | 1.00 | 1.01 | 1.02 | 1.03 | 1.04 | 1.05 | 1.06 | 1.07 | 1.08 | 1.09 | 1.10 | 1.11 | 1.12 | 1.13 | 1.14 | 1.15 | 1.16 | 1.17 | 1.18 | 1.19 | 1.20 | 1.21 | 1.22 | 1.23 | 1.24 | 1.25 | 1.26 | 1.27 | 1.28 | 1.29 | 1.30 | 1.31 | 1.32 | 1.33 | 1.34 | 1.35 | 1.36 | 1.37 | 1.38 | 1.39 | 1.40 | 1.41 | 1.42 | 1.43 | 1.44 | 1.45 | 1.46 | 1.47 | 1.48 | 1.49 | 1.50 | 1.51 | 1.52 | 1.53 | 1.54 | 1.55 | 1.56 | 1.57 | 1.58 | 1.59 | 1.60 | 1.61 | 1.62 | 1.63 | 1.64 | 1.65 | 1.66 | 1.67 | 1.68 | 1.69 | 1.70 | 1.71 | 1.72 | 1.73 | 1.74 | 1.75 | 1.76 | 1.77 | 1.78 | 1.79 | 1.80 | 1.81 | 1.82 | 1.83 | 1.84 | 1.85 | 1.86 | 1.87 | 1.88 | 1.89 | 1.90 | 1.91 | 1.92 | 1.93 | 1.94 | 1.95 | 1.96 | 1.97 | 1.98 | 1.99 | 2.00 | 2.01 | 2.02 | 2.03 | 2.04 | 2.05 | 2.06 | 2.07 | 2.08 | 2.09 | 2.10 | 2.11 | 2.12 | 2.13 | 2.14 | 2.15 | 2.16 | 2.17 | 2.18 | 2.19 | 2.20 | 2.21 | 2.22 | 2.23 | 2.24 | 2.25 | 2.26 | 2.27 | 2.28 | 2.29 | 2.30 | 2.31 | 2.32 | 2.33 | 2.34 | 2.35 | 2.36 | 2.37 | 2.38 | 2.39 | 2.40 | 2.41 | 2.42 | 2.43 | 2.44 | 2.45 | 2.46 | 2.47 | 2.48 | 2.49 | 2.50 | 2.51 | 2.52 | 2.53 | 2.54 | 2.55 | 2.56 | 2.57 | 2.58 | 2.59 | 2.60 | 2.61 | 2.62 | 2.63 | 2.64 | 2.65 | 2.66 | 2.67 | 2.68 | 2.69 | 2.70 | 2.71 | 2.72 | 2.73 | 2.74 | 2.75 | 2.76 | 2.77 | 2.78 | 2.79 | 2.80 | 2.81 | 2.82 | 2.83 | 2.84 | 2.85 | 2.86 | 2.87 | 2.88 | 2.89 | 2.90 | 2.91 | 2.92 | 2.93 | 2.94 | 2.95 | 2.96 | 2.97 | 2.98 | 2.99 | 3.00 | 3.01 | 3.02 | 3.03 | 3.04 | 3.05 | 3.06 | 3.07 | 3.08 | 3.09 | 3.10 | 3.11 | 3.12 | 3.13 | 3.14 | 3.15 | 3.16 | 3.17 | 3.18 | 3.19 | 3.20 | 3.21 | 3.22 | 3.23 | 3.24 | 3.25 | 3.26 | 3.27 | 3.28 | 3.29 | 3.30 | 3.31 | 3.32 | 3.33 | 3.34 | 3.35 | 3.36 | 3.37 | 3.38 | 3.39 | 3.40 | 3.41 | 3.42 | 3.43 | 3.44 | 3.45 | 3.46 | 3.47 | 3.48 | 3.49 | 3.50 | 3.51 | 3.52 | 3.53 | 3.54 | 3.55 | 3.56 | 3.57 | 3.58 | 3.59 | 3.60 | 3.61 | 3.62 | 3.63 | 3.64 | 3.65 | 3.66 | 3.67 | 3.68 | 3.69 | 3.70 | 3.71 | 3.72 | 3.73 | 3.74 | 3.75 | 3.76 | 3.77 | 3.78 | 3.79 | 3.80 | 3.81 | 3.82 | 3.83 | 3.84 | 3.85 | 3.86 | 3.87 | 3.88 | 3.89 | 3.90 | 3.91 | 3.92 | 3.93 | 3.94 | 3.95 | 3.96 | 3.97 | 3.98 | 3.99 | 4.00 | 4.01 | 4.02 | 4.03 | 4.04 | 4.05 | 4.06 | 4.07 | 4.08 | 4.09 | 4.10 | 4.11 | 4.12 | 4.13 | 4.14 | 4.15 | 4.16 | 4.17 | 4.18 | 4.19 | 4.20 | 4.21 | 4.22 | 4.23 | 4.24 | 4.25 | 4.26 | 4.27 | 4.28 | 4.29 | 4.30 | 4.31 | 4.32 | 4.33 | 4.34 | 4.35 | 4.36 | 4.37 | 4.38 | 4.39 | 4.40 | 4.41 | 4.42 | 4.43 | 4.44 | 4.45 | 4.46 | 4.47 | 4.48 | 4.49 | 4.50 | 4.51 | 4.52 | 4.53 | 4.54 | 4.55 | 4.56 | 4.57 | 4.58 | 4.59 | 4.60 | 4.61 | 4.62 | 4.63 | 4.64 | 4.65 | 4.66 | 4.67 | 4.68 | 4.69 | 4.70 | 4.71 | 4.72 | 4.73 | 4.74 | 4.75 | 4.76 | 4.77 | 4.78 | 4.79 | 4.80 | 4.81 | 4.82 | 4.83 | 4.84 | 4.85 | 4.86 | 4.87 | 4.88 | 4.89 | 4.90 | 4.91 | 4.92 | 4.93 | 4.94 | 4.95 | 4.96 | 4.97 | 4.98 | 4.99 | 5.00 | 5.01 | 5.02 | 5.03 | 5.04 | 5.05 | 5.06 | 5.07 | 5.08 | 5.09 | 5.10 | 5.11 | 5.12 | 5.13 | 5.14 | 5.15 | 5.16 | 5.17 | 5.18 | 5.19 | 5.20 | 5.21 | 5.22 | 5.23 | 5.24 | 5.25 | 5.26 | 5.27 | 5.28 | 5.29 | 5.30 | 5.31 | 5.32 | 5.33 | 5.34 | 5.35 | 5.36 | 5.37 | 5.38 | 5.39 | 5.40 | 5.41 | 5.42 | 5.43 | 5.44 | 5.45 | 5.46 | 5.47 | 5.48 | 5.49 | 5.50 | 5.51 | 5.52 | 5.53 | 5.54 | 5.55 | 5.56 | 5.57 | 5.58 | 5.59 | 5.60 | 5.61 | 5.62 | 5.63 | 5.64 | 5.65 | 5.66 | 5.67 | 5.68 | 5.69 | 5.70 | 5.71 | 5.72 | 5.73 | 5.74 | 5.75 | 5.76 | 5.77 | 5.78 | 5.79 | 5.80 | 5.81 | 5.82 | 5.83 | 5.84 | 5.85 | 5.86 | 5.87 | 5.88 | 5.89 | 5.90 | 5.91 | 5.92 | 5.93 | 5.94 | 5.95 | 5.96 | 5.97 | 5.98 | 5.99 | 6.00 | 6.01 | 6.02 | 6.03 | 6.04 | 6.05 | 6.06 | 6.07 | 6.08 | 6.09 | 6.10 | 6.11 | 6.12 | 6.13 | 6.14 | 6.15 | 6.16 | 6.17 | 6.18 | 6.19 | 6.20 | 6.21 | 6.22 | 6.23 | 6.24 | 6.25 | 6.26 | 6.27 | 6.28 | 6.29 | 6.30 | 6.31 | 6.32 | 6.33 | 6.34 | 6.35 | 6.36 | 6.37 | 6.38 | 6.39 | 6.40 | 6.41 | 6.42 | 6.43 | 6.44 | 6.45 | 6.46 | 6.47 | 6.48 | 6.49 | 6.50 | 6.51 | 6.52 | 6.53 | 6.54 | 6.55 | 6.56 | 6.57 | 6.58 | 6.59 | 6.60 | 6.61 | 6.62 | 6.63 | 6.64 | 6.65 | 6.66 | 6.67 | 6.68 | 6.69 | 6.70 | 6.71 | 6.72 | 6.73 | 6.74 | 6.75 | 6.76 | 6.77 | 6.78 | 6.79 | 6.80 | 6.81 | 6.82 | 6.83 | 6.84 | 6.85 | 6.86 | 6.87 | 6.88 | 6.89 | 6.90 | 6.91 | 6.92 | 6.93 | 6.94 | 6.95 | 6.96 | 6.97 | 6.98 | 6.99 | 7.00 | 7.01 | 7.02 | 7.03 | 7.04 | 7.05 | 7.06 | 7.07 | 7.08 | 7.09 | 7.10 | 7.11 | 7.12 | 7.13 | 7.14 | 7.15 | 7.16 | 7.17 | 7.18 | 7.19 | 7.20 | 7.21 | 7.22 | 7.23 | 7.24 | 7.25 | 7.26 | 7.27 | 7.28 | 7.29 | 7.30 | 7.31 | 7.32 | 7.33 | 7.34 | 7.35 | 7.36 | 7.37 | 7.38 | 7.39 | 7.40 | 7.41 | 7.42 | 7.43 | 7.44 | 7.45 | 7.46 | 7.47 | 7.48 | 7.49 | 7.50 | 7.51 | 7.52 | 7.53 | 7.54 | 7.55 | 7.56 | 7.57 | 7.58 | 7.59 | 7.60 | 7.61 | 7.62 | 7.63 | 7.64 | 7.65 | 7.66 | 7.67 | 7.68 | 7.69 | 7.70 | 7.71 | 7.72 | 7.73 | 7.74 | 7.75 | 7.76 | 7.77 | 7.78 | 7.79 | 7.80 | 7.81 | 7.82 | 7.83 | 7.84 | 7.85 | 7.86 | 7.87 | 7.88 | 7.89 | 7.90 | 7.91 | 7.92 | 7.93 | 7.94 | 7.95 | 7.96 | 7.97 | 7.98 | 7.99 | 8.00 | 8.01 | 8.02 | 8.03 | 8.04 | 8.05 | 8.06 | 8.07 | 8.08 | 8.09 | 8.10 | 8.11 | 8.12 | 8.13 | 8.14 | 8.15 | 8.16 | 8.17 | 8.18 | 8.19 | 8.20 | 8.21 | 8.22 | 8.23 | 8.24 | 8.25 | 8.26 | 8.27 | 8.28 | 8.29 | 8.30 | 8.31 | 8.32 | 8.33 | 8.34 | 8.35 | 8.36 | 8.37 | 8.38 | 8.39 | 8.40 | 8.41 | 8.42 | 8.43 | 8.44 | 8.45 | 8.46 | 8.47 | 8.48 | 8.49 | 8.50 | 8.51 | 8.52 | 8.53 | 8.54 | 8.55 | 8.56 | 8.57 | 8.58 | 8.59 | 8.60 | 8.61 | 8.62 | 8.63 | 8.64 | 8.65 | 8.66 | 8.67 | 8.68 | 8.69 | 8.70 | 8.71 | 8.72 | 8.73 | 8.74 | 8.75 | 8.76 | 8.77 | 8.78 | 8.79 | 8.80 | 8.81 | 8.82 | 8.83 | 8.84 | 8.85 | 8.86 | 8.87 | 8.88 | 8.89 | 8.90 | 8.91 | 8.92 | 8.93 | 8.94 | 8.95 | 8.96 | 8.97 | 8.98 | 8.99 | 9.00 | 9.01 | 9.02 | 9.03 | 9.04 | 9.05 | 9.06 | 9.07 | 9.08 | 9.09 | 9.10 | 9.11 | 9.12 | 9.13 | 9.14 | 9.15 | 9.16 | 9.17 | 9.18 | 9.19 | 9.20 | 9.21 | 9.22 | 9.23 | 9.24 | 9.25 | 9.26 | 9.27 | 9.28 | 9.29 | 9.30 | 9.31 | 9.32 | 9.33 | 9.34 | 9.35 | 9.36 | 9.37 | 9.38 | 9.39 | 9.40 | 9.41 | 9.42 | 9.43 | 9.44 | 9.45 | 9.46 | 9.47 | 9.48 | 9.49 | 9.50 | 9.51 | 9.52 | 9.53 | 9.54 | 9.55 | 9.56 | 9.57 | 9.58 | 9.59 | 9.60 | 9.61 | 9.62 | 9.63 | 9.64 | 9.65 | 9.66 | 9.67 | 9.68 | 9.69 | 9.70 | 9.71 | 9.72 | 9.73 | 9.74 | 9.75 | 9.76 | 9.77 | 9.78 | 9.79 | 9.80 | 9.81 | 9.82 | 9.83 | 9.84 | 9.85 | 9.86 | 9.87 | 9.88 | 9.89 | 9.90 | 9.91 | 9.92 | 9.93 | 9.94 | 9.95 | 9.96 | 9.97 | 9.98 | 9.99 | 10.00 | 10.01 | 10.02 | 10.03 | 10.04 | 10.05 | 10.06 | 10.07 | 10.08 | 10.09 | 10.10 | 10.11 | 10.12 | 10.13 | 10.14 | 10.15 | 10.16 | 10.17 | 10.18 | 10.19 | 10.20 | 10.21 | 10.22 | 10.23 | 10.24 | 10.25 | 10.26 | 10.27 | 10.28 | 10.29 | 10.30 | 10.31 | 10.32 | 10.33 | 10.34 | 10.35 | 10.36 | 10.37 | 10.38 | 10.39 | 10.40 | 10.41 | 10.42 | 10.43 | 10.44 | 10.45 | 10.46 | 10.47 | 10.48 | 10.49 | 10.50 | 10.51 | 10.52 | 10.53 | 10.54 | 10.55 | 10.56 | 10.57 | 10.58 | 10.59 | 10.60 | 10.61 | 10.62 | 10.63 | 10.64 | 10.65 | 10.66 | 10.67 | 10.68 | 10.69 | 10.70 | 10.71 | 10.72 | 10.73 | 10.74 | 10.75 | 10.76 | 10.77 | 10.78 | 10.79 | 10.80 | 10.81 | 10.82 | 10.83 | 10.84 | 10.85 | 10.86 | 10.87 | 10.88 | 10.89 | 10.90 | 10.91 | 10.92 | 10.93 | 10.94 | 10.95 | 10.96 | 10.97 | 10.98 | 10.99 | 11.00 | 11.01 | 11.02 | 11.03 | 11.04 | 11.05 | 11.06 | 11.07 | 11.08 | 11.09 | 11.10 | 11.11 | 11.12 | 11.13 | 11.14 | 11.15 | 11.16 | 11.17 | 11.18 | 11.19 | 11.20 | 11.21 | 11.22 | 11.23 | 11.24 | 11.25 | 11.26 | 11.27 | 11.28 | 11.29 | 11.30 | 11.31 | 11.32 | 11.33 | 11.34 | 11.35 | 11.36 | 11.37 | 11.38 | 11.39 | 11.40 | 11.41 | 11.42 | 11.43 | 11.44 | 11.45 | 11.46 | 11.47 | 11.48 | 11.49 | 11.50 | 11.51 | 11.52 | 11.53 | 11.54 | 11.55 | 11.56 | 11.57 | 11.58 | 11.59 | 11.60 | 11.61 | 11.62 | 11.63 | 11.64 | 11.65 | 11.66 | 11.67 | 11.68 | 11.69 | 11.70 | 11.71 | 11.72 | 11.73 | 11.74 | 11.75 | 11.76 | 11.77 | 11.78 | 11.79 | 11.80 | 11.81 | 11.82 | 11.83 | 11.84 | 11.85 | 11.86 | 11.87 | 11.88 | 11.89 | 11.90 | 11.91 | 11.92 | 11.93 | 11.94 | 11.95 | 11.96 | 11.97 | 11.98 | 11.99 | 12.00 | 12.01 | 12.02 | 12.03 | 12.04 | 12.05 | 12.06 | 12.07 | 12.08 | 12.09 | 12.10 | 12.11 | 12.12 | 12.13 | 12.14 | 12.15 | 12.16 | 12.17 | 12.18 | 12.19 | 12.20 | 12.21 | 12.22 | 12.23 | 12.24 | 12.25 | 12.26 | 12.27 | 12.28 | 12.29 | 12.30 | 12.31 | 12.32 | 12.33 | 12.34 | 12.35 | 12.36 | 12.37 | 12.38 | 12.39 | 12.40 | 12.41 | 12.42 | 12.43 | 12.44 | 12.45 | 12.46 | 12.47 | 12.48 | 12.49 | 12.50 | 12.51 | 12.52 | 12.53 | 12.54 | 12.55 | 12.56 | 12.57 | 12.58 | 12.59 | 12.60 | 12.61 | 12.62 | 12.63 | 12.64 | 12.65 | 12.66 | 12.67 | 12.68 | 12.69 | 12.70 | 12.71 | 12.72 | 12.73 | 12.74 | 12.75 | 12.76 | 12.77 | 12.78 | 12.79 | 12.80 | 12.81 | 12.82 | 12.83 | 12.84 | 12.85 | 12.86 | 12.87 | 12.88 | 12.89 | 12.90 | 12.91 | 12.92 | 12.93 | 12.94 | 12.95 | 12.96 | 12.97 | 12.98 | 12.99 | 13.00 | 13.01 | 13.02 | 13.03 | 13.04 | 13.05 | 13.06 | 13.07 | 13.08 | 13.09 | 13.10 | 13.11 | 13.12 | 13.13 | 13.14 | 13.15 | 13.16 | 13.17 | 13.18 | 13.19 | 13.20 | 13.21 | 13.22 | 13.23 | 13.24 | 13.25 | 13.26 | 13.27 | 13.28 | 13.29 | 13.30 | 13.31 | 13.32 | 13.33 | 13.34 | 13.35 | 13.36 | 13.37 | 13.38 | 13.39 | 13.40 | 13.41 | 13.42 | 13.43 | 13.44 | 13.45 | 13.46 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---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Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $v$

| $\chi^2/Q$ | .00500  | .01000  | .02000  | .05000  | .10000  | .20000  | .50000  | 1.00000 | 2.00000 | 5.00000 | 10.00000 | 20.00000 | 50.00000 | 100.00000 |
|------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|----------|----------|----------|-----------|
| 87.5       | .122926 | .123115 | .123299 | .123486 | .123676 | .123869 | .124064 | .124261 | .124460 | .124661 | .124864  | .125069  | .125275  | .125482   |
| 88.0       | .123516 | .123705 | .123895 | .124086 | .124279 | .124474 | .124670 | .124868 | .125067 | .125267 | .125468  | .125670  | .125873  | .126077   |
| 88.5       | .124000 | .124189 | .124379 | .124571 | .124764 | .124958 | .125153 | .125349 | .125546 | .125744 | .125942  | .126141  | .126341  | .126541   |
| 89.0       | .124484 | .124673 | .124863 | .125054 | .125246 | .125438 | .125631 | .125824 | .126018 | .126212 | .126407  | .126602  | .126798  | .126994   |
| 89.5       | .124968 | .125157 | .125347 | .125538 | .125730 | .125922 | .126115 | .126308 | .126502 | .126696 | .126891  | .127086  | .127282  | .127478   |
| 90.0       | .125452 | .125641 | .125831 | .126022 | .126214 | .126406 | .126599 | .126792 | .126986 | .127180 | .127375  | .127570  | .127766  | .127962   |
| 90.5       | .125936 | .126125 | .126315 | .126506 | .126697 | .126889 | .127081 | .127274 | .127467 | .127660 | .127854  | .128048  | .128243  | .128438   |
| 91.0       | .126420 | .126609 | .126799 | .126990 | .127181 | .127373 | .127565 | .127758 | .127951 | .128144 | .128338  | .128532  | .128727  | .128922   |
| 91.5       | .126904 | .127093 | .127283 | .127474 | .127665 | .127857 | .128049 | .128242 | .128435 | .128628 | .128822  | .129016  | .129211  | .129406   |
| 92.0       | .127388 | .127577 | .127767 | .127958 | .128149 | .128341 | .128533 | .128726 | .128919 | .129112 | .129306  | .129500  | .129694  | .129889   |
| 92.5       | .127872 | .128061 | .128251 | .128442 | .128633 | .128825 | .129017 | .129209 | .129402 | .129595 | .129788  | .129981  | .130175  | .130369   |
| 93.0       | .128356 | .128545 | .128735 | .128926 | .129117 | .129308 | .129500 | .129692 | .129885 | .130077 | .130270  | .130463  | .130656  | .130850   |
| 93.5       | .128840 | .129029 | .129219 | .129410 | .129601 | .129792 | .129984 | .130176 | .130368 | .130561 | .130753  | .130946  | .131139  | .131332   |
| 94.0       | .129324 | .129513 | .129703 | .129894 | .130085 | .130276 | .130468 | .130659 | .130851 | .131043 | .131235  | .131427  | .131620  | .131812   |
| 94.5       | .129808 | .130000 | .130191 | .130382 | .130573 | .130764 | .130956 | .131147 | .131339 | .131531 | .131723  | .131915  | .132107  | .132299   |
| 95.0       | .130292 | .130483 | .130674 | .130865 | .131056 | .131247 | .131438 | .131629 | .131821 | .132012 | .132204  | .132396  | .132588  | .132780   |
| 95.5       | .130776 | .130967 | .131158 | .131349 | .131540 | .131731 | .131922 | .132113 | .132304 | .132495 | .132686  | .132877  | .133068  | .133259   |
| 96.0       | .131260 | .131451 | .131642 | .131833 | .132024 | .132215 | .132406 | .132597 | .132788 | .132979 | .133170  | .133361  | .133552  | .133743   |
| 96.5       | .131744 | .131935 | .132126 | .132317 | .132508 | .132699 | .132890 | .133081 | .133272 | .133463 | .133654  | .133845  | .134036  | .134227   |
| 97.0       | .132228 | .132419 | .132610 | .132801 | .132992 | .133183 | .133374 | .133565 | .133756 | .133947 | .134138  | .134329  | .134520  | .134711   |
| 97.5       | .132712 | .132903 | .133094 | .133285 | .133476 | .133667 | .133858 | .134049 | .134240 | .134431 | .134622  | .134813  | .135004  | .135195   |
| 98.0       | .133196 | .133387 | .133578 | .133769 | .133960 | .134151 | .134342 | .134533 | .134724 | .134915 | .135106  | .135297  | .135488  | .135679   |
| 98.5       | .133680 | .133871 | .134062 | .134253 | .134444 | .134635 | .134826 | .135017 | .135208 | .135399 | .135590  | .135781  | .135972  | .136163   |
| 99.0       | .134164 | .134355 | .134546 | .134737 | .134928 | .135119 | .135310 | .135501 | .135692 | .135883 | .136074  | .136265  | .136456  | .136647   |
| 99.5       | .134648 | .134839 | .135030 | .135221 | .135412 | .135603 | .135794 | .135985 | .136176 | .136367 | .136558  | .136749  | .136940  | .137131   |
| 100.0      | .135132 | .135323 | .135514 | .135705 | .135896 | .136087 | .136278 | .136469 | .136660 | .136851 | .137042  | .137233  | .137424  | .137615   |
| 100.5      | .135616 | .135807 | .135998 | .136189 | .136380 | .136571 | .136762 | .136953 | .137144 | .137335 | .137526  | .137717  | .137908  | .138099   |
| 101.0      | .136100 | .136291 | .136482 | .136673 | .136864 | .137055 | .137246 | .137437 | .137628 | .137819 | .138010  | .138201  | .138392  | .138583   |
| 101.5      | .136584 | .136775 | .136966 | .137157 | .137348 | .137539 | .137730 | .137921 | .138112 | .138303 | .138494  | .138685  | .138876  | .139067   |
| 102.0      | .137068 | .137259 | .137450 | .137641 | .137832 | .138023 | .138214 | .138405 | .138596 | .138787 | .138978  | .139169  | .139360  | .139551   |
| 102.5      | .137552 | .137743 | .137934 | .138125 | .138316 | .138507 | .138698 | .138889 | .139080 | .139271 | .139462  | .139653  | .139844  | .140035   |
| 103.0      | .138036 | .138227 | .138418 | .138609 | .138800 | .138991 | .139182 | .139373 | .139564 | .139755 | .139946  | .140137  | .140328  | .140519   |
| 103.5      | .138520 | .138711 | .138902 | .139093 | .139284 | .139475 | .139666 | .139857 | .140048 | .140239 | .140430  | .140621  | .140812  | .141003   |
| 104.0      | .139004 | .139195 | .139386 | .139577 | .139768 | .139959 | .140150 | .140341 | .140532 | .140723 | .140914  | .141105  | .141296  | .141487   |
| 104.5      | .139488 | .139679 | .139870 | .140061 | .140252 | .140443 | .140634 | .140825 | .141016 | .141207 | .141398  | .141589  | .141780  | .141971   |
| 105.0      | .140000 | .140191 | .140382 | .140573 | .140764 | .140955 | .141146 | .141337 | .141528 | .141719 | .141910  | .142101  | .142292  | .142483   |
| 105.5      | .140484 | .140675 | .140866 | .141057 | .141248 | .141439 | .141630 | .141821 | .142012 | .142203 | .142394  | .142585  | .142776  | .142967   |
| 106.0      | .140968 | .141159 | .141350 | .141541 | .141732 | .141923 | .142114 | .142305 | .142496 | .142687 | .142878  | .143069  | .143260  | .143451   |
| 106.5      | .141452 | .141643 | .141834 | .142025 | .142216 | .142407 | .142598 | .142789 | .142980 | .143171 | .143362  | .143553  | .143744  | .143935   |
| 107.0      | .141936 | .142127 | .142318 | .142509 | .142700 | .142891 | .143082 | .143273 | .143464 | .143655 | .143846  | .144037  | .144228  | .144419   |
| 107.5      | .142420 | .142611 | .142802 | .142993 | .143184 | .143375 | .143566 | .143757 | .143948 | .144139 | .144330  | .144521  | .144712  | .144903   |
| 108.0      | .142904 | .143095 | .143286 | .143477 | .143668 | .143859 | .144050 | .144241 | .144432 | .144623 | .144814  | .145005  | .145196  | .145387   |
| 108.5      | .143388 | .143579 | .143770 | .143961 | .144152 | .144343 | .144534 | .144725 | .144916 | .145107 | .145298  | .145489  | .145680  | .145871   |
| 109.0      | .143872 | .144063 | .144254 | .144445 | .144636 | .144827 | .145018 | .145209 | .145400 | .145591 | .145782  | .145973  | .146164  | .146355   |
| 109.5      | .144356 | .144547 | .144738 | .144929 | .145120 | .145311 | .145502 | .145693 | .145884 | .146075 | .146266  | .146457  | .146648  | .146839   |
| 110.0      | .144840 | .145031 | .145222 | .145413 | .145604 | .145795 | .145986 | .146177 | .146368 | .146559 | .146750  | .146941  | .147132  | .147323   |
| 110.5      | .145324 | .145515 | .145706 | .145897 | .146088 | .146279 | .146470 | .146661 | .146852 | .147043 | .147234  | .147425  | .147616  | .147807   |
| 111.0      | .145808 | .146000 | .146191 | .146382 | .146573 | .146764 | .146955 | .147146 | .147337 | .147528 | .147719  | .147910  | .148101  | .148292   |
| 111.5      | .146292 | .146483 | .146674 | .146865 | .147056 | .147247 | .147438 | .147629 | .147820 | .148011 | .148202  | .148393  | .148584  | .148775   |
| 112.0      | .146776 | .146967 | .147158 | .147349 | .147540 | .147731 | .147922 | .148113 | .148304 | .148495 | .148686  | .148877  | .149068  | .149259   |

Percentage Points of the  $\chi^2$ -Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu \backslash Q$ | .00500     | .00250     | .00100     | .00050     | .00010     | .00005     | .00001     |
|--------------------|------------|------------|------------|------------|------------|------------|------------|
| 112.5              | .152238 03 | .159201 03 | .164590 03 | .168486 03 | .177001 03 | .180486 03 | .190679 03 |
| 113.0              | .152820 03 | .159794 03 | .165201 03 | .169096 03 | .177624 03 | .181115 03 | .191337 03 |
| 113.5              | .153400 03 | .160388 03 | .165804 03 | .169705 03 | .178248 03 | .181744 03 | .191994 03 |
| 114.0              | .153981 03 | .160981 03 | .166406 03 | .170314 03 | .178871 03 | .182373 03 | .193050 03 |
| 114.5              | .154562 03 | .161573 03 | .167008 03 | .170922 03 | .179493 03 | .183001 03 | .193707 03 |
| 115.0              | .155142 03 | .162166 03 | .167610 03 | .171531 03 | .180116 03 | .183629 03 | .194363 03 |
| 115.5              | .155722 03 | .162759 03 | .168212 03 | .172139 03 | .180738 03 | .184257 03 | .195020 03 |
| 116.0              | .156302 03 | .163351 03 | .168813 03 | .172747 03 | .181360 03 | .184884 03 | .195677 03 |
| 116.5              | .156882 03 | .163943 03 | .169415 03 | .173355 03 | .181982 03 | .185512 03 | .196329 03 |
| 117.0              | .157462 03 | .164535 03 | .170016 03 | .173962 03 | .182603 03 | .186139 03 | .196983 03 |
| 117.5              | .158041 03 | .165126 03 | .170616 03 | .174570 03 | .183224 03 | .186765 03 | .197638 03 |
| 118.0              | .158620 03 | .165718 03 | .171217 03 | .175177 03 | .183845 03 | .187392 03 | .198292 03 |
| 118.5              | .159200 03 | .166309 03 | .171817 03 | .175784 03 | .184466 03 | .188018 03 | .198945 03 |
| 119.0              | .159779 03 | .166900 03 | .172418 03 | .176390 03 | .185086 03 | .188644 03 | .199598 03 |
| 119.5              | .160357 03 | .167491 03 | .173019 03 | .176997 03 | .185706 03 | .189269 03 | .200250 03 |
| 120.0              | .160936 03 | .168082 03 | .173617 03 | .177633 03 | .186326 03 | .189895 03 | .200903 03 |
| 120.5              | .161514 03 | .168672 03 | .174217 03 | .178209 03 | .186946 03 | .190520 03 | .201557 03 |
| 121.0              | .162093 03 | .169263 03 | .174816 03 | .178815 03 | .187565 03 | .191145 03 | .202210 03 |
| 121.5              | .162671 03 | .169853 03 | .175416 03 | .179420 03 | .188184 03 | .191759 03 | .202863 03 |
| 122.0              | .163249 03 | .170443 03 | .176014 03 | .180025 03 | .188803 03 | .192393 03 | .203516 03 |
| 122.5              | .163827 03 | .171032 03 | .176613 03 | .180631 03 | .189422 03 | .193017 03 | .204169 03 |
| 123.0              | .164404 03 | .171622 03 | .177212 03 | .181235 03 | .190040 03 | .193641 03 | .204822 03 |
| 123.5              | .164982 03 | .172211 03 | .177810 03 | .181840 03 | .190658 03 | .194255 03 | .205475 03 |
| 124.0              | .165559 03 | .172801 03 | .178408 03 | .182445 03 | .191276 03 | .194868 03 | .206128 03 |
| 124.5              | .166137 03 | .173390 03 | .179006 03 | .183049 03 | .191894 03 | .195481 03 | .206781 03 |
| 125.0              | .166714 03 | .173978 03 | .179604 03 | .183653 03 | .192511 03 | .196134 03 | .207434 03 |
| 125.5              | .167290 03 | .174567 03 | .180202 03 | .184257 03 | .193129 03 | .196757 03 | .208087 03 |
| 126.0              | .167867 03 | .175156 03 | .180799 03 | .184861 03 | .193746 03 | .197379 03 | .208740 03 |
| 126.5              | .168444 03 | .175744 03 | .181396 03 | .185464 03 | .194362 03 | .198001 03 | .209393 03 |
| 127.0              | .169020 03 | .176332 03 | .181993 03 | .186067 03 | .194979 03 | .198623 03 | .210046 03 |
| 127.5              | .169597 03 | .176920 03 | .182590 03 | .186670 03 | .195595 03 | .199244 03 | .210699 03 |
| 128.0              | .170173 03 | .177508 03 | .183186 03 | .187273 03 | .196211 03 | .199866 03 | .211352 03 |
| 128.5              | .170749 03 | .178095 03 | .183783 03 | .187875 03 | .196827 03 | .200487 03 | .212005 03 |
| 129.0              | .171325 03 | .178683 03 | .184379 03 | .188478 03 | .197443 03 | .201108 03 | .212658 03 |
| 129.5              | .171901 03 | .179270 03 | .184975 03 | .189080 03 | .198058 03 | .201729 03 | .213311 03 |
| 130.0              | .172476 03 | .179857 03 | .185571 03 | .189682 03 | .198673 03 | .202349 03 | .213964 03 |
| 130.5              | .173051 03 | .180444 03 | .186167 03 | .190284 03 | .199280 03 | .202969 03 | .214617 03 |
| 131.0              | .173626 03 | .181031 03 | .186762 03 | .190886 03 | .199903 03 | .203589 03 | .215270 03 |
| 131.5              | .174202 03 | .181618 03 | .187357 03 | .191487 03 | .200518 03 | .204209 03 | .215923 03 |
| 132.0              | .174777 03 | .182204 03 | .187953 03 | .192088 03 | .201132 03 | .204828 03 | .216576 03 |
| 132.5              | .175351 03 | .182790 03 | .188548 03 | .192689 03 | .201746 03 | .205448 03 | .217229 03 |
| 133.0              | .175926 03 | .183377 03 | .189142 03 | .193290 03 | .202360 03 | .206067 03 | .217882 03 |
| 133.5              | .176501 03 | .183963 03 | .189737 03 | .193891 03 | .202973 03 | .206686 03 | .218535 03 |
| 134.0              | .177076 03 | .184548 03 | .190331 03 | .194491 03 | .203587 03 | .207304 03 | .219188 03 |
| 134.5              | .177651 03 | .185134 03 | .190926 03 | .195092 03 | .204200 03 | .207923 03 | .219841 03 |
| 135.0              | .178226 03 | .185720 03 | .191520 03 | .195692 03 | .204813 03 | .208541 03 | .220494 03 |
| 135.5              | .178801 03 | .186305 03 | .192113 03 | .196282 03 | .205426 03 | .209159 03 | .221147 03 |
| 136.0              | .179376 03 | .186890 03 | .192707 03 | .196871 03 | .206039 03 | .209777 03 | .221800 03 |
| 136.5              | .179951 03 | .187475 03 | .193301 03 | .197461 03 | .206651 03 | .210394 03 | .222453 03 |
| 137.0              | .180526 03 | .188060 03 | .193894 03 | .198050 03 | .207263 03 | .211012 03 | .223106 03 |

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu$ | 0.00500    | 0.05000    | 0.01000    | 0.00500    | 0.00100    | 0.00050    | 0.00010    | 0.00005    | 0.00001    |
|-------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 137.5 | .181092 03 | .183960 03 | .194407 03 | .198589 03 | .207875 03 | .211629 03 | .219960 03 | .223420 03 | .231164 03 |
| 138.0 | .181665 03 | .184538 03 | .195080 03 | .199269 03 | .208487 03 | .212246 03 | .220596 03 | .224052 03 | .231807 03 |
| 138.5 | .182239 03 | .185115 03 | .195657 03 | .199847 03 | .209099 03 | .212862 03 | .221223 03 | .224684 03 | .232449 03 |
| 139.0 | .182812 03 | .185693 03 | .196235 03 | .200426 03 | .209710 03 | .213479 03 | .221851 03 | .225316 03 | .233091 03 |
| 139.5 | .183385 03 | .186270 03 | .196812 03 | .201004 03 | .210321 03 | .214095 03 | .222478 03 | .225948 03 | .233733 03 |
| 140.0 | .183957 03 | .186847 03 | .197384 03 | .201583 03 | .210932 03 | .214711 03 | .223105 03 | .226580 03 | .234374 03 |
| 140.5 | .184530 03 | .187424 03 | .197943 03 | .202181 03 | .211543 03 | .215327 03 | .223732 03 | .227211 03 | .235015 03 |
| 141.0 | .185103 03 | .188001 03 | .198515 03 | .202779 03 | .212154 03 | .215943 03 | .224359 03 | .227842 03 | .235656 03 |
| 141.5 | .185675 03 | .188577 03 | .199087 03 | .203377 03 | .212764 03 | .216558 03 | .224985 03 | .228473 03 | .236297 03 |
| 142.0 | .186247 03 | .189154 03 | .199659 03 | .203974 03 | .213374 03 | .217173 03 | .225612 03 | .229104 03 | .236937 03 |
| 142.5 | .186819 03 | .189730 03 | .200220 03 | .204572 03 | .213984 03 | .217780 03 | .226238 03 | .229734 03 | .237578 03 |
| 143.0 | .187391 03 | .190306 03 | .200782 03 | .205269 03 | .214594 03 | .218403 03 | .226863 03 | .230365 03 | .238218 03 |
| 143.5 | .187963 03 | .190882 03 | .201363 03 | .205866 03 | .215204 03 | .219018 03 | .227469 03 | .230985 03 | .238857 03 |
| 144.0 | .188535 03 | .191458 03 | .201943 03 | .206463 03 | .215813 03 | .219632 03 | .228114 03 | .231624 03 | .239497 03 |
| 144.5 | .189107 03 | .192034 03 | .202527 03 | .207060 03 | .216422 03 | .220247 03 | .228739 03 | .232254 03 | .240136 03 |
| 145.0 | .189678 03 | .192610 03 | .203115 03 | .207656 03 | .217032 03 | .220861 03 | .229364 03 | .232883 03 | .240775 03 |
| 145.5 | .190250 03 | .193186 03 | .203693 03 | .208233 03 | .217640 03 | .221475 03 | .229989 03 | .233512 03 | .241414 03 |
| 146.0 | .190821 03 | .193761 03 | .204204 03 | .208749 03 | .218249 03 | .222088 03 | .230613 03 | .234141 03 | .242052 03 |
| 146.5 | .191392 03 | .194336 03 | .204744 03 | .209291 03 | .218858 03 | .222702 03 | .231238 03 | .234770 03 | .242691 03 |
| 147.0 | .191963 03 | .194912 03 | .205277 03 | .210045 03 | .219466 03 | .223315 03 | .231862 03 | .235398 03 | .243329 03 |
| 147.5 | .192534 03 | .195487 03 | .205837 03 | .210837 03 | .220074 03 | .223928 03 | .232486 03 | .236026 03 | .243967 03 |
| 148.0 | .193105 03 | .196062 03 | .206397 03 | .211233 03 | .220482 03 | .224351 03 | .233109 03 | .236654 03 | .244604 03 |
| 148.5 | .193675 03 | .196636 03 | .207046 03 | .211828 03 | .221290 03 | .225154 03 | .233733 03 | .237282 03 | .245242 03 |
| 149.0 | .194246 03 | .197211 03 | .207686 03 | .212423 03 | .221897 03 | .225766 03 | .234356 03 | .237910 03 | .245879 03 |
| 149.5 | .194816 03 | .197786 03 | .208253 03 | .213016 03 | .222505 03 | .226378 03 | .234979 03 | .238537 03 | .246516 03 |
| 150.0 | .195387 03 | .198360 03 | .208820 03 | .213583 03 | .223112 03 | .226991 03 | .235602 03 | .239164 03 | .247153 03 |
| 150.5 | .195957 03 | .198935 03 | .209385 03 | .214153 03 | .223719 03 | .227603 03 | .236224 03 | .239791 03 | .247789 03 |
| 151.0 | .196527 03 | .199509 03 | .210043 03 | .214728 03 | .224326 03 | .228214 03 | .236847 03 | .240418 03 | .248425 03 |
| 151.5 | .197097 03 | .200083 03 | .210631 03 | .215219 03 | .224933 03 | .228826 03 | .237469 03 | .241045 03 | .249061 03 |
| 152.0 | .197667 03 | .200657 03 | .211162 03 | .215752 03 | .225539 03 | .229437 03 | .238091 03 | .241671 03 | .249697 03 |
| 152.5 | .198237 03 | .201231 03 | .211729 03 | .216326 03 | .226146 03 | .230049 03 | .238713 03 | .242297 03 | .250333 03 |
| 153.0 | .198806 03 | .201804 03 | .212297 03 | .216896 03 | .226752 03 | .230660 03 | .239334 03 | .242923 03 | .250968 03 |
| 153.5 | .199376 03 | .202376 03 | .212853 03 | .217454 03 | .227358 03 | .231270 03 | .239956 03 | .243549 03 | .251603 03 |
| 154.0 | .199945 03 | .202951 03 | .213413 03 | .217968 03 | .227964 03 | .231881 03 | .240577 03 | .244174 03 | .252238 03 |
| 154.5 | .200514 03 | .203525 03 | .213973 03 | .218538 03 | .228569 03 | .232492 03 | .241198 03 | .244799 03 | .252873 03 |
| 155.0 | .201084 03 | .204098 03 | .214549 03 | .219119 03 | .229175 03 | .233102 03 | .241819 03 | .245424 03 | .253507 03 |
| 155.5 | .201653 03 | .204671 03 | .215126 03 | .219696 03 | .229780 03 | .233712 03 | .242440 03 | .246049 03 | .254142 03 |
| 156.0 | .202222 03 | .205244 03 | .215634 03 | .220204 03 | .230385 03 | .234322 03 | .243061 03 | .246674 03 | .254776 03 |
| 156.5 | .202790 03 | .205817 03 | .216141 03 | .220711 03 | .230990 03 | .234932 03 | .243680 03 | .247299 03 | .255410 03 |
| 157.0 | .203359 03 | .206390 03 | .216699 03 | .221267 03 | .231595 03 | .235542 03 | .244300 03 | .247923 03 | .256043 03 |
| 157.5 | .203928 03 | .206963 03 | .217269 03 | .221839 03 | .232200 03 | .236151 03 | .244920 03 | .248547 03 | .256677 03 |
| 158.0 | .204496 03 | .207535 03 | .217838 03 | .222409 03 | .232804 03 | .236760 03 | .245540 03 | .249171 03 | .257310 03 |
| 158.5 | .205065 03 | .208107 03 | .218403 03 | .222980 03 | .233409 03 | .237369 03 | .246159 03 | .249795 03 | .257943 03 |
| 159.0 | .205633 03 | .208678 03 | .218968 03 | .223551 03 | .234013 03 | .237973 03 | .246679 03 | .250318 03 | .258576 03 |
| 159.5 | .206201 03 | .209249 03 | .219533 03 | .224119 03 | .234617 03 | .238587 03 | .247398 03 | .251041 03 | .259208 03 |
| 160.0 | .206769 03 | .209820 03 | .220109 03 | .224696 03 | .235221 03 | .239196 03 | .248017 03 | .251665 03 | .259841 03 |
| 160.5 | .207337 03 | .210390 03 | .220685 03 | .225273 03 | .235824 03 | .239804 03 | .248635 03 | .252287 03 | .260473 03 |
| 161.0 | .207905 03 | .210960 03 | .221191 03 | .225784 03 | .236428 03 | .240412 03 | .249254 03 | .252910 03 | .261105 03 |
| 161.5 | .208473 03 | .211533 03 | .221777 03 | .226366 03 | .237031 03 | .241025 03 | .249872 03 | .253533 03 | .261737 03 |
| 162.0 | .209040 03 | .212111 03 | .222363 03 | .226947 03 | .237634 03 | .241628 03 | .250491 03 | .254155 03 | .262368 03 |

Percentage Points of the  $\chi^2$ -Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

|       | .007500    | .005000    | .002500    | .001000    | .000500    | .000100    | .000010    | .000005    | .000001    |
|-------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 162.5 | .209608 03 | .212683 03 | .217700 03 | .223943 03 | .228138 03 | .238237 03 | .251109 03 | .254777 03 | .263000 03 |
| 163.0 | .210175 03 | .213250 03 | .218277 03 | .224535 03 | .229030 03 | .238840 03 | .251726 03 | .255399 03 | .263631 03 |
| 163.5 | .210743 03 | .213825 03 | .218855 03 | .225120 03 | .229626 03 | .239443 03 | .252344 03 | .256021 03 | .264262 03 |
| 164.0 | .211310 03 | .214396 03 | .219433 03 | .225705 03 | .230211 03 | .240046 03 | .252962 03 | .256643 03 | .264892 03 |
| 164.5 | .211877 03 | .214968 03 | .220010 03 | .226291 03 | .230802 03 | .240668 03 | .253579 03 | .257264 03 | .265523 03 |
| 165.0 | .212444 03 | .215539 03 | .220587 03 | .226876 03 | .231393 03 | .241250 03 | .254196 03 | .257885 03 | .266153 03 |
| 165.5 | .213011 03 | .216109 03 | .221165 03 | .227461 03 | .231983 03 | .241852 03 | .254813 03 | .258507 03 | .266784 03 |
| 166.0 | .213578 03 | .216680 03 | .221742 03 | .228045 03 | .232573 03 | .242454 03 | .255430 03 | .259127 03 | .267814 03 |
| 166.5 | .214145 03 | .217251 03 | .222319 03 | .228630 03 | .233163 03 | .243056 03 | .256046 03 | .259748 03 | .268443 03 |
| 167.0 | .214711 03 | .217821 03 | .222895 03 | .229215 03 | .233753 03 | .243658 03 | .256663 03 | .260369 03 | .268973 03 |
| 167.5 | .215278 03 | .218392 03 | .223472 03 | .229799 03 | .234343 03 | .244259 03 | .257279 03 | .260989 03 | .269602 03 |
| 168.0 | .215844 03 | .218962 03 | .224049 03 | .230383 03 | .234933 03 | .244861 03 | .257895 03 | .261609 03 | .270232 03 |
| 168.5 | .216411 03 | .219532 03 | .224625 03 | .230968 03 | .235523 03 | .245462 03 | .258511 03 | .262229 03 | .270861 03 |
| 169.0 | .216977 03 | .220102 03 | .225202 03 | .231552 03 | .236112 03 | .246063 03 | .259127 03 | .262849 03 | .271490 03 |
| 169.5 | .217543 03 | .220673 03 | .225778 03 | .232135 03 | .236701 03 | .246664 03 | .259742 03 | .263469 03 | .272118 03 |
| 170.0 | .218109 03 | .221243 03 | .226354 03 | .232719 03 | .237291 03 | .247265 03 | .260358 03 | .264088 03 | .272747 03 |
| 170.5 | .218675 03 | .221812 03 | .226930 03 | .233303 03 | .237880 03 | .247865 03 | .260973 03 | .264708 03 | .273375 03 |
| 171.0 | .219241 03 | .222382 03 | .227506 03 | .233867 03 | .238459 03 | .248466 03 | .261588 03 | .265327 03 | .273994 03 |
| 171.5 | .219807 03 | .222952 03 | .228082 03 | .234470 03 | .239056 03 | .249066 03 | .262203 03 | .265946 03 | .274621 03 |
| 172.0 | .220372 03 | .223521 03 | .228658 03 | .235053 03 | .239646 03 | .249666 03 | .262818 03 | .266564 03 | .275249 03 |
| 172.5 | .220938 03 | .224090 03 | .229233 03 | .235637 03 | .240235 03 | .250266 03 | .263432 03 | .267183 03 | .275876 03 |
| 173.0 | .221503 03 | .224660 03 | .229809 03 | .236220 03 | .240823 03 | .250866 03 | .264047 03 | .267801 03 | .276504 03 |
| 173.5 | .222069 03 | .225229 03 | .230384 03 | .236983 03 | .241582 03 | .251636 03 | .264661 03 | .268420 03 | .277131 03 |
| 174.0 | .222634 03 | .225798 03 | .230959 03 | .237598 03 | .242190 03 | .252265 03 | .265275 03 | .269030 03 | .277758 03 |
| 174.5 | .223199 03 | .226367 03 | .231535 03 | .238198 03 | .242790 03 | .252889 03 | .265889 03 | .269656 03 | .278384 03 |
| 175.0 | .223764 03 | .226936 03 | .232110 03 | .238791 03 | .243376 03 | .253484 03 | .266502 03 | .270273 03 | .279011 03 |
| 175.5 | .224329 03 | .227505 03 | .232865 03 | .239573 03 | .244163 03 | .254282 03 | .267116 03 | .270891 03 | .279638 03 |
| 176.0 | .224894 03 | .228074 03 | .233420 03 | .240116 03 | .244713 03 | .254842 03 | .267729 03 | .271508 03 | .280264 03 |
| 176.5 | .225459 03 | .228642 03 | .233983 03 | .240693 03 | .245293 03 | .255421 03 | .268343 03 | .272126 03 | .280891 03 |
| 177.0 | .226024 03 | .229211 03 | .234549 03 | .241280 03 | .245882 03 | .256010 03 | .268956 03 | .272743 03 | .281518 03 |
| 177.5 | .226588 03 | .229779 03 | .235113 03 | .241862 03 | .246513 03 | .256650 03 | .269569 03 | .273360 03 | .282145 03 |
| 178.0 | .227153 03 | .230347 03 | .235658 03 | .242444 03 | .247101 03 | .257257 03 | .270182 03 | .273977 03 | .282772 03 |
| 178.5 | .227717 03 | .230916 03 | .236232 03 | .243026 03 | .247688 03 | .257855 03 | .270794 03 | .274593 03 | .283400 03 |
| 179.0 | .228282 03 | .231484 03 | .236706 03 | .243607 03 | .248275 03 | .258453 03 | .271407 03 | .275210 03 | .284027 03 |
| 179.5 | .228846 03 | .232052 03 | .237281 03 | .244189 03 | .248861 03 | .259051 03 | .272019 03 | .275826 03 | .284654 03 |
| 180.0 | .229410 03 | .232620 03 | .237855 03 | .244770 03 | .249448 03 | .259649 03 | .272631 03 | .276442 03 | .285281 03 |
| 180.5 | .229974 03 | .233198 03 | .238429 03 | .245352 03 | .250035 03 | .260247 03 | .273243 03 | .277058 03 | .285908 03 |
| 181.0 | .230538 03 | .233755 03 | .239002 03 | .245952 03 | .250641 03 | .260863 03 | .273855 03 | .277674 03 | .286535 03 |
| 181.5 | .231102 03 | .234323 03 | .239576 03 | .246514 03 | .251208 03 | .261492 03 | .274467 03 | .278289 03 | .287162 03 |
| 182.0 | .231665 03 | .234881 03 | .240150 03 | .247095 03 | .251794 03 | .262164 03 | .275078 03 | .278905 03 | .287789 03 |
| 182.5 | .232230 03 | .235456 03 | .240723 03 | .247726 03 | .252426 03 | .262837 03 | .275690 03 | .279520 03 | .288416 03 |
| 183.0 | .232793 03 | .236026 03 | .241297 03 | .248357 03 | .253066 03 | .263461 03 | .276301 03 | .280135 03 | .289047 03 |
| 183.5 | .233357 03 | .236593 03 | .241870 03 | .248931 03 | .253641 03 | .264086 03 | .276912 03 | .280750 03 | .289770 03 |
| 184.0 | .233920 03 | .237160 03 | .242483 03 | .249544 03 | .254254 03 | .264711 03 | .277523 03 | .281365 03 | .290397 03 |
| 184.5 | .234484 03 | .237727 03 | .243016 03 | .250078 03 | .254788 03 | .265336 03 | .278134 03 | .281980 03 | .291018 03 |
| 185.0 | .235047 03 | .238294 03 | .243559 03 | .250621 03 | .255331 03 | .265961 03 | .278746 03 | .282595 03 | .291640 03 |
| 185.5 | .235610 03 | .238861 03 | .244122 03 | .251193 03 | .255903 03 | .266586 03 | .279357 03 | .283209 03 | .292261 03 |
| 186.0 | .236173 03 | .239428 03 | .244695 03 | .251765 03 | .256475 03 | .267211 03 | .279968 03 | .283823 03 | .292882 03 |
| 186.5 | .236736 03 | .239995 03 | .245268 03 | .252337 03 | .257047 03 | .267836 03 | .280580 03 | .284437 03 | .293503 03 |
| 187.0 | .237299 03 | .240551 03 | .245830 03 | .252919 03 | .257629 03 | .268461 03 | .281195 03 | .285051 03 | .294124 03 |

Percentage Points of the  $\chi^2$  - Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $r/Q$ | .007500    | .005000    | .002500    | .001000    | .000500    | .000100    | .000050    | .000010    | .000005    | .000001    |
|-------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 187.5 | .237862 03 | .241128 03 | .246453 03 | .253079 03 | .257835 03 | .268202 03 | .272428 03 | .281795 03 | .285665 03 | .294330 03 |
| 188.0 | .238425 03 | .241694 03 | .247025 03 | .253659 03 | .258419 03 | .268798 03 | .273028 03 | .282405 03 | .286279 03 | .294952 03 |
| 188.5 | .238988 03 | .242261 03 | .247598 03 | .254238 03 | .259004 03 | .269393 03 | .273628 03 | .283015 03 | .286892 03 | .295574 03 |
| 189.0 | .239550 03 | .242827 03 | .248170 03 | .254818 03 | .259589 03 | .269989 03 | .274228 03 | .283624 03 | .287505 03 | .296196 03 |
| 189.5 | .240113 03 | .243393 03 | .248742 03 | .255397 03 | .260173 03 | .270584 03 | .274828 03 | .284233 03 | .288119 03 | .296818 03 |
| 190.0 | .240675 03 | .243959 03 | .249314 03 | .255976 03 | .260758 03 | .271180 03 | .275427 03 | .284843 03 | .288732 03 | .297440 03 |
| 190.5 | .241238 03 | .244525 03 | .249886 03 | .256556 03 | .261342 03 | .271775 03 | .276027 03 | .285452 03 | .289345 03 | .298061 03 |
| 191.0 | .241800 03 | .245091 03 | .250458 03 | .257135 03 | .261926 03 | .272370 03 | .276626 03 | .286060 03 | .289957 03 | .298682 03 |
| 191.5 | .242362 03 | .245657 03 | .251030 03 | .257714 03 | .262510 03 | .272965 03 | .277226 03 | .286669 03 | .290570 03 | .299303 03 |
| 192.0 | .242924 03 | .246223 03 | .251601 03 | .258292 03 | .263094 03 | .273560 03 | .277825 03 | .287278 03 | .291182 03 | .299924 03 |
| 192.5 | .243486 03 | .246789 03 | .252173 03 | .258871 03 | .263678 03 | .274154 03 | .278424 03 | .287886 03 | .291795 03 | .300545 03 |
| 193.0 | .244048 03 | .247354 03 | .252744 03 | .259450 03 | .264262 03 | .274749 03 | .279023 03 | .288495 03 | .292407 03 | .301166 03 |
| 193.5 | .244610 03 | .247920 03 | .253315 03 | .260028 03 | .264845 03 | .275343 03 | .279622 03 | .289103 03 | .293019 03 | .301786 03 |
| 194.0 | .245172 03 | .248485 03 | .253887 03 | .260607 03 | .265429 03 | .275938 03 | .280220 03 | .289711 03 | .293631 03 | .302406 03 |
| 194.5 | .245734 03 | .249051 03 | .254458 03 | .261185 03 | .266012 03 | .276532 03 | .280819 03 | .290319 03 | .294242 03 | .302827 03 |
| 195.0 | .246295 03 | .249616 03 | .255029 03 | .261763 03 | .266595 03 | .277226 03 | .281517 03 | .291027 03 | .294954 03 | .303646 03 |
| 195.5 | .246857 03 | .250181 03 | .255560 03 | .262342 03 | .267179 03 | .277720 03 | .282015 03 | .291534 03 | .295465 03 | .304266 03 |
| 196.0 | .247418 03 | .250746 03 | .256171 03 | .262920 03 | .267762 03 | .278314 03 | .282613 03 | .292142 03 | .296077 03 | .304886 03 |
| 196.5 | .247983 03 | .251311 03 | .256742 03 | .263498 03 | .268345 03 | .278908 03 | .283211 03 | .292749 03 | .296688 03 | .305506 03 |
| 197.0 | .248541 03 | .251876 03 | .257313 03 | .264075 03 | .268928 03 | .279501 03 | .283809 03 | .293356 03 | .297299 03 | .306125 03 |
| 197.5 | .249102 03 | .252441 03 | .257883 03 | .264653 03 | .269510 03 | .280095 03 | .284407 03 | .293965 03 | .297910 03 | .306744 03 |
| 198.0 | .249664 03 | .253006 03 | .258454 03 | .265231 03 | .270093 03 | .280688 03 | .285005 03 | .294570 03 | .298520 03 | .307363 03 |
| 198.5 | .250225 03 | .253571 03 | .259025 03 | .265808 03 | .270676 03 | .281281 03 | .285602 03 | .295177 03 | .299131 03 | .307982 03 |
| 199.0 | .250786 03 | .254135 03 | .259595 03 | .266386 03 | .271258 03 | .281874 03 | .286200 03 | .295784 03 | .299742 03 | .308601 03 |
| 199.5 | .251347 03 | .254700 03 | .260165 03 | .266963 03 | .271840 03 | .282467 03 | .286797 03 | .296390 03 | .300352 03 | .309220 03 |
| 200.0 | .251908 03 | .255264 03 | .260735 03 | .267541 03 | .272423 03 | .283060 03 | .287394 03 | .296997 03 | .300962 03 | .309838 03 |
| 200.5 | .252468 03 | .255829 03 | .261306 03 | .268118 03 | .273005 03 | .283653 03 | .287991 03 | .297603 03 | .301572 03 | .310456 03 |
| 201.0 | .253029 03 | .256393 03 | .261876 03 | .268695 03 | .273587 03 | .284246 03 | .288588 03 | .298209 03 | .302182 03 | .311075 03 |
| 201.5 | .253590 03 | .256957 03 | .262446 03 | .269272 03 | .274169 03 | .284838 03 | .289185 03 | .298815 03 | .302792 03 | .311693 03 |
| 202.0 | .254150 03 | .257521 03 | .263015 03 | .269849 03 | .274751 03 | .285431 03 | .289781 03 | .299421 03 | .303401 03 | .312311 03 |
| 202.5 | .254711 03 | .258085 03 | .263585 03 | .270425 03 | .275332 03 | .286023 03 | .290378 03 | .300027 03 | .304011 03 | .312928 03 |
| 203.0 | .255271 03 | .258649 03 | .264155 03 | .271002 03 | .275914 03 | .286615 03 | .290974 03 | .300633 03 | .304620 03 | .313556 03 |
| 203.5 | .255832 03 | .259213 03 | .264724 03 | .271579 03 | .276496 03 | .287207 03 | .291571 03 | .301238 03 | .305230 03 | .314183 03 |
| 204.0 | .256392 03 | .259777 03 | .265294 03 | .272155 03 | .277077 03 | .287799 03 | .292167 03 | .301843 03 | .305839 03 | .314781 03 |
| 204.5 | .256952 03 | .260341 03 | .265863 03 | .272732 03 | .277658 03 | .288391 03 | .292763 03 | .302449 03 | .306448 03 | .315398 03 |
| 205.0 | .257512 03 | .260904 03 | .266433 03 | .273308 03 | .278240 03 | .288983 03 | .293359 03 | .303054 03 | .307056 03 | .316015 03 |
| 205.5 | .258072 03 | .261468 03 | .266992 03 | .273884 03 | .278821 03 | .289575 03 | .293955 03 | .303659 03 | .307665 03 | .316632 03 |
| 206.0 | .258632 03 | .262031 03 | .267571 03 | .274460 03 | .279402 03 | .290166 03 | .294551 03 | .304264 03 | .308274 03 | .317299 03 |
| 206.5 | .259192 03 | .262595 03 | .268140 03 | .275036 03 | .279983 03 | .290757 03 | .295146 03 | .304868 03 | .308882 03 | .317805 03 |
| 207.0 | .259752 03 | .263158 03 | .268709 03 | .275612 03 | .280564 03 | .291349 03 | .295742 03 | .305473 03 | .309490 03 | .318482 03 |
| 207.5 | .260312 03 | .263721 03 | .269278 03 | .276188 03 | .281144 03 | .291940 03 | .296337 03 | .306077 03 | .310099 03 | .319098 03 |
| 208.0 | .260871 03 | .264285 03 | .269847 03 | .276764 03 | .281725 03 | .292531 03 | .296932 03 | .306682 03 | .310707 03 | .319714 03 |
| 208.5 | .261431 03 | .264848 03 | .270416 03 | .277340 03 | .282305 03 | .293122 03 | .297527 03 | .307286 03 | .311315 03 | .320330 03 |
| 209.0 | .261991 03 | .265411 03 | .270985 03 | .277915 03 | .282886 03 | .293713 03 | .298122 03 | .307890 03 | .311922 03 | .320946 03 |
| 209.5 | .262550 03 | .265974 03 | .271557 03 | .278491 03 | .283466 03 | .294304 03 | .298717 03 | .308494 03 | .312530 03 | .321562 03 |
| 210.0 | .263109 03 | .266537 03 | .272122 03 | .279066 03 | .284042 03 | .294894 03 | .299312 03 | .309098 03 | .313138 03 | .322178 03 |
| 210.5 | .263668 03 | .267099 03 | .272690 03 | .279641 03 | .284627 03 | .295485 03 | .299907 03 | .309702 03 | .313745 03 | .322793 03 |
| 211.0 | .264228 03 | .267662 03 | .273259 03 | .280217 03 | .285207 03 | .296075 03 | .300502 03 | .310305 03 | .314352 03 | .323409 03 |
| 211.5 | .264787 03 | .268225 03 | .273827 03 | .280792 03 | .285787 03 | .296666 03 | .301096 03 | .310909 03 | .314960 03 | .324024 03 |
| 212.0 | .265346 03 | .268788 03 | .274395 03 | .281367 03 | .286367 03 | .297256 03 | .301690 03 | .311512 03 | .315567 03 | .324639 03 |

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu/Q$ | .007500    | .005000    | .002500    | .001000    | .000500    | .000100    | .000050    | .000010    | .000005    | .000001    |
|---------|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| 212.5   | .265905 03 | .269350 03 | .274963 03 | .281942 03 | .286946 03 | .297846 03 | .302205 03 | .312115 03 | .316173 03 | .325254 03 |
| 213.0   | .266466 03 | .269912 03 | .275531 03 | .282517 03 | .287526 03 | .298436 03 | .302793 03 | .312719 03 | .316780 03 | .325869 03 |
| 213.5   | .267023 03 | .270475 03 | .276099 03 | .283091 03 | .288106 03 | .299026 03 | .303383 03 | .313322 03 | .317383 03 | .326473 03 |
| 214.0   | .267582 03 | .271037 03 | .276667 03 | .283666 03 | .288685 03 | .299596 03 | .303953 03 | .313892 03 | .317953 03 | .327043 03 |
| 214.5   | .268141 03 | .271599 03 | .277235 03 | .284241 03 | .289265 03 | .300186 03 | .304543 03 | .314482 03 | .318543 03 | .327633 03 |
| 215.0   | .268703 02 | .272162 03 | .277802 03 | .284815 03 | .289844 03 | .300765 03 | .305122 03 | .315061 03 | .319122 03 | .328212 03 |
| 215.5   | .269258 03 | .272724 03 | .278370 03 | .285390 03 | .290423 03 | .301344 03 | .305701 03 | .315640 03 | .319701 03 | .328791 03 |
| 216.0   | .269817 03 | .273286 03 | .278938 03 | .285964 03 | .291002 03 | .301923 03 | .306280 03 | .316219 03 | .320280 03 | .329370 03 |
| 216.5   | .270375 02 | .273848 03 | .279505 03 | .286538 03 | .291581 03 | .302502 03 | .306859 03 | .316808 03 | .320869 03 | .329959 03 |
| 217.0   | .270934 03 | .274409 03 | .280073 03 | .287112 03 | .292160 03 | .303081 03 | .307438 03 | .317387 03 | .321448 03 | .330538 03 |
| 217.5   | .271492 03 | .274971 03 | .280640 03 | .287687 03 | .292739 03 | .303660 03 | .308017 03 | .317966 03 | .322027 03 | .331117 03 |
| 218.0   | .272050 03 | .275533 03 | .281207 03 | .288261 03 | .293318 03 | .304239 03 | .308596 03 | .318545 03 | .322606 03 | .331696 03 |
| 218.5   | .272609 03 | .276095 03 | .281774 03 | .288835 03 | .293897 03 | .304818 03 | .309175 03 | .319124 03 | .323185 03 | .332265 03 |
| 219.0   | .273167 03 | .276656 03 | .282341 03 | .289408 03 | .294475 03 | .305396 03 | .309753 03 | .319702 03 | .323763 03 | .332845 03 |
| 219.5   | .273725 03 | .277218 03 | .282908 03 | .289982 03 | .295054 03 | .305975 03 | .310332 03 | .320281 03 | .324342 03 | .333427 03 |
| 220.0   | .274283 03 | .277779 03 | .283475 03 | .290556 03 | .295632 03 | .306553 03 | .310910 03 | .320859 03 | .324920 03 | .333509 03 |
| 220.5   | .274841 03 | .278341 03 | .284032 03 | .291129 03 | .296211 03 | .307132 03 | .311489 03 | .321438 03 | .325500 03 | .334091 03 |
| 221.0   | .275399 03 | .278902 03 | .284609 03 | .291713 03 | .296799 03 | .307720 03 | .312077 03 | .322026 03 | .326087 03 | .334673 03 |
| 221.5   | .275957 03 | .279463 03 | .285176 03 | .292276 03 | .297367 03 | .308288 03 | .312645 03 | .322594 03 | .326655 03 | .335255 03 |
| 222.0   | .276514 03 | .280024 03 | .285742 03 | .292850 03 | .297945 03 | .308866 03 | .313223 03 | .323172 03 | .327233 03 | .335837 03 |
| 222.5   | .277072 03 | .280585 03 | .286309 03 | .293423 03 | .298523 03 | .309444 03 | .313801 03 | .323750 03 | .327811 03 | .336419 03 |
| 223.0   | .277630 02 | .281146 03 | .286875 03 | .293996 03 | .299096 03 | .310017 03 | .314374 03 | .324323 03 | .328384 03 | .337001 03 |
| 223.5   | .278187 03 | .281707 03 | .287442 03 | .294569 03 | .299679 03 | .310590 03 | .314947 03 | .324896 03 | .328957 03 | .337583 03 |
| 224.0   | .278745 03 | .282268 03 | .288008 03 | .295142 03 | .300257 03 | .311263 03 | .315620 03 | .325569 03 | .329630 03 | .338165 03 |
| 224.5   | .279303 03 | .282829 03 | .288575 03 | .295715 03 | .300834 03 | .311834 03 | .316191 03 | .326140 03 | .330201 03 | .338747 03 |
| 225.0   | .279860 03 | .283390 03 | .289141 03 | .296288 03 | .301412 03 | .312485 03 | .316842 03 | .326791 03 | .330852 03 | .339339 03 |
| 225.5   | .280417 03 | .283951 03 | .289661 03 | .296813 03 | .301939 03 | .313012 03 | .317369 03 | .327318 03 | .331379 03 | .340001 03 |
| 226.0   | .280974 03 | .284511 03 | .290223 03 | .297373 03 | .302507 03 | .313580 03 | .317937 03 | .327886 03 | .331947 03 | .340583 03 |
| 226.5   | .281531 03 | .285072 03 | .290789 03 | .297939 03 | .303073 03 | .314156 03 | .318513 03 | .328462 03 | .332523 03 | .341165 03 |
| 227.0   | .282088 03 | .285632 03 | .291355 03 | .298505 03 | .303639 03 | .314719 03 | .319076 03 | .329025 03 | .333086 03 | .341747 03 |
| 227.5   | .282646 03 | .286193 03 | .291921 03 | .299071 03 | .304205 03 | .315288 03 | .319645 03 | .329594 03 | .333655 03 | .342329 03 |
| 228.0   | .283203 03 | .286753 03 | .292486 03 | .299636 03 | .304770 03 | .315851 03 | .320208 03 | .330157 03 | .334228 03 | .342911 03 |
| 228.5   | .283760 03 | .287313 03 | .293012 03 | .299962 03 | .305096 03 | .316134 03 | .320491 03 | .330440 03 | .334511 03 | .343493 03 |
| 229.0   | .284317 03 | .287873 03 | .293578 03 | .300528 03 | .305662 03 | .316705 03 | .321062 03 | .331011 03 | .335082 03 | .344075 03 |
| 229.5   | .284874 03 | .288433 03 | .294143 03 | .301093 03 | .306227 03 | .317268 03 | .321625 03 | .331574 03 | .335645 03 | .344657 03 |
| 230.0   | .285431 03 | .288993 03 | .294708 03 | .301658 03 | .306792 03 | .317829 03 | .322186 03 | .332156 03 | .336227 03 | .345239 03 |
| 230.5   | .285988 03 | .289553 03 | .295273 03 | .302223 03 | .307357 03 | .318390 03 | .322747 03 | .332727 03 | .336798 03 | .345821 03 |
| 231.0   | .286545 03 | .290114 03 | .295839 03 | .302789 03 | .307923 03 | .318931 03 | .323288 03 | .333307 03 | .337378 03 | .346403 03 |
| 231.5   | .287102 03 | .290675 03 | .296405 03 | .303349 03 | .308483 03 | .319491 03 | .323848 03 | .333887 03 | .337958 03 | .346985 03 |
| 232.0   | .287659 03 | .291236 03 | .296971 03 | .303913 03 | .309047 03 | .320055 03 | .324412 03 | .334497 03 | .338568 03 | .347567 03 |
| 232.5   | .288216 03 | .291797 03 | .297536 03 | .304486 03 | .309620 03 | .320612 03 | .324969 03 | .334619 03 | .338690 03 | .348149 03 |
| 233.0   | .288773 03 | .292358 03 | .298101 03 | .304859 03 | .310093 03 | .321170 03 | .325527 03 | .335181 03 | .339252 03 | .348731 03 |
| 233.5   | .289330 03 | .292915 03 | .298662 03 | .305432 03 | .310666 03 | .321727 03 | .326084 03 | .335743 03 | .339814 03 | .349313 03 |
| 234.0   | .289887 03 | .293476 03 | .299228 03 | .306005 03 | .311239 03 | .322284 03 | .326641 03 | .336305 03 | .340376 03 | .349895 03 |
| 234.5   | .290444 03 | .294039 03 | .299795 03 | .306582 03 | .311816 03 | .322841 03 | .327198 03 | .336869 03 | .340937 03 | .350477 03 |
| 235.0   | .290999 03 | .294599 03 | .300360 03 | .307157 03 | .312391 03 | .323398 03 | .327755 03 | .337329 03 | .341508 03 | .351059 03 |
| 235.5   | .291556 03 | .295161 03 | .300926 03 | .307733 03 | .312967 03 | .323955 03 | .328312 03 | .337891 03 | .341508 03 | .351641 03 |
| 236.0   | .292113 03 | .295723 03 | .301493 03 | .308309 03 | .313543 03 | .324512 03 | .328869 03 | .338449 03 | .342450 03 | .352223 03 |
| 236.5   | .292670 03 | .296284 03 | .302059 03 | .308880 03 | .314114 03 | .325071 03 | .329428 03 | .339009 03 | .342951 03 | .352805 03 |
| 237.0   | .293227 03 | .296845 03 | .302625 03 | .309451 03 | .314677 03 | .325630 03 | .330087 03 | .339669 03 | .343512 03 | .353387 03 |

Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu$ | .007500 | .005000 | .001000 | .000500 | .000100 | .000050 | .000010 | .000005 | .000001 |
|-------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 237.5 | .293774 | .297367 | .303272 | .315823 | .327225 | .331864 | .342132 | .346368 | .355840 |
| 238.0 | .293830 | .297423 | .303327 | .315878 | .327280 | .332519 | .342787 | .346999 | .356449 |
| 238.5 | .293886 | .297479 | .303383 | .315934 | .327336 | .333173 | .343441 | .347653 | .357057 |
| 239.0 | .293941 | .297534 | .303438 | .315990 | .327392 | .333829 | .344100 | .348312 | .357716 |
| 239.5 | .293997 | .297590 | .303494 | .316046 | .327448 | .334486 | .344760 | .348972 | .358380 |
| 240.0 | .294052 | .297646 | .303550 | .316102 | .327504 | .335166 | .345420 | .349632 | .358936 |
| 240.5 | .294108 | .297702 | .303606 | .316158 | .327560 | .335846 | .346080 | .350292 | .359492 |
| 241.0 | .294163 | .297758 | .303662 | .316214 | .327616 | .336526 | .346740 | .350948 | .360048 |
| 241.5 | .294219 | .297814 | .303718 | .316270 | .327672 | .337206 | .347400 | .351604 | .360604 |
| 242.0 | .294274 | .297870 | .303774 | .316326 | .327728 | .337886 | .348060 | .352260 | .361160 |
| 242.5 | .294330 | .297926 | .303830 | .316382 | .327784 | .338566 | .348720 | .352916 | .361716 |
| 243.0 | .294385 | .297982 | .303886 | .316438 | .327840 | .339246 | .349380 | .353572 | .362272 |
| 243.5 | .294441 | .298038 | .303942 | .316494 | .327896 | .339926 | .350040 | .354228 | .362828 |
| 244.0 | .294496 | .298094 | .304000 | .316550 | .327952 | .340606 | .350700 | .354884 | .363384 |
| 244.5 | .294552 | .298150 | .304056 | .316606 | .328008 | .341286 | .351360 | .355540 | .363940 |
| 245.0 | .294607 | .298206 | .304112 | .316662 | .328064 | .341966 | .352020 | .356196 | .364496 |
| 245.5 | .294663 | .298262 | .304168 | .316718 | .328120 | .342646 | .352680 | .356852 | .365052 |
| 246.0 | .294718 | .298318 | .304224 | .316774 | .328176 | .343326 | .353340 | .357508 | .365608 |
| 246.5 | .294774 | .298374 | .304280 | .316830 | .328232 | .344006 | .354000 | .358164 | .366164 |
| 247.0 | .294829 | .298430 | .304336 | .316886 | .328288 | .344686 | .354660 | .358820 | .366720 |
| 247.5 | .294885 | .298486 | .304392 | .316942 | .328344 | .345366 | .355320 | .359476 | .367276 |
| 248.0 | .294940 | .298542 | .304448 | .316998 | .328400 | .346046 | .355980 | .360132 | .367832 |
| 248.5 | .294996 | .298598 | .304504 | .317054 | .328456 | .346726 | .356640 | .360788 | .368388 |
| 249.0 | .295051 | .298654 | .304560 | .317110 | .328512 | .347406 | .357300 | .361444 | .368944 |
| 249.5 | .295107 | .298710 | .304616 | .317166 | .328568 | .348086 | .357960 | .362100 | .369500 |
| 250.0 | .295162 | .298766 | .304672 | .317222 | .328624 | .348766 | .358620 | .362756 | .370056 |
| 250.5 | .295218 | .298822 | .304728 | .317278 | .328680 | .349446 | .359280 | .363412 | .370612 |
| 251.0 | .295273 | .298878 | .304784 | .317334 | .328736 | .350126 | .359940 | .364068 | .371168 |
| 251.5 | .295329 | .298934 | .304840 | .317390 | .328792 | .350806 | .360600 | .364724 | .371724 |
| 252.0 | .295384 | .298990 | .304896 | .317446 | .328848 | .351486 | .361260 | .365380 | .372280 |
| 252.5 | .295440 | .299046 | .304952 | .317502 | .328904 | .352166 | .361920 | .366036 | .372836 |
| 253.0 | .295495 | .299102 | .305008 | .317558 | .328960 | .352846 | .362580 | .366692 | .373392 |
| 253.5 | .295551 | .299158 | .305064 | .317614 | .329016 | .353526 | .363240 | .367348 | .373948 |
| 254.0 | .295606 | .299214 | .305120 | .317670 | .329072 | .354206 | .363900 | .368004 | .374504 |
| 254.5 | .295662 | .299270 | .305176 | .317726 | .329128 | .354886 | .364560 | .368660 | .375060 |
| 255.0 | .295717 | .299326 | .305232 | .317782 | .329184 | .355566 | .365220 | .369316 | .375616 |
| 255.5 | .295773 | .299382 | .305288 | .317838 | .329240 | .356246 | .365880 | .369972 | .376172 |
| 256.0 | .295828 | .299438 | .305344 | .317894 | .329296 | .356926 | .366540 | .370628 | .376728 |
| 256.5 | .295884 | .299494 | .305400 | .317950 | .329352 | .357606 | .367200 | .371284 | .377284 |
| 257.0 | .295939 | .299550 | .305456 | .318006 | .329408 | .358286 | .367860 | .371940 | .377840 |
| 257.5 | .295995 | .299606 | .305512 | .318062 | .329464 | .358966 | .368520 | .372596 | .378396 |
| 258.0 | .296050 | .299662 | .305568 | .318118 | .329520 | .359646 | .369180 | .373252 | .378952 |
| 258.5 | .296106 | .299718 | .305624 | .318174 | .329576 | .360326 | .369840 | .373908 | .379508 |
| 259.0 | .296161 | .299774 | .305680 | .318230 | .329632 | .361006 | .370500 | .374564 | .380064 |
| 259.5 | .296217 | .299830 | .305736 | .318286 | .329688 | .361686 | .371160 | .375220 | .380620 |
| 260.0 | .296272 | .299886 | .305792 | .318342 | .329744 | .362366 | .371820 | .375876 | .381176 |
| 260.5 | .296328 | .299942 | .305848 | .318398 | .329800 | .363046 | .372480 | .376532 | .381732 |
| 261.0 | .296383 | .299998 | .305904 | .318454 | .329856 | .363726 | .373140 | .377188 | .382288 |
| 261.5 | .296439 | .300054 | .305960 | .318510 | .329912 | .364406 | .373800 | .377844 | .382844 |
| 262.0 | .296494 | .300110 | .306016 | .318566 | .329968 | .365086 | .374460 | .378500 | .383400 |
| 262.5 | .296550 | .300166 | .306072 | .318622 | .330024 | .365766 | .375120 | .379156 | .383956 |
| 263.0 | .296605 | .300222 | .306128 | .318678 | .330080 | .366446 | .375780 | .379812 | .384512 |
| 263.5 | .296661 | .300278 | .306184 | .318734 | .330136 | .367126 | .376440 | .380468 | .385068 |
| 264.0 | .296716 | .300334 | .306240 | .318790 | .330192 | .367806 | .377100 | .381124 | .385624 |
| 264.5 | .296772 | .300390 | .306296 | .318846 | .330248 | .368486 | .377760 | .381780 | .386180 |
| 265.0 | .296827 | .300446 | .306352 | .318902 | .330304 | .369166 | .378420 | .382436 | .386736 |
| 265.5 | .296883 | .300502 | .306408 | .318958 | .330360 | .369846 | .379080 | .383092 | .387292 |
| 266.0 | .296938 | .300558 | .306464 | .319014 | .330416 | .370526 | .379740 | .383748 | .387848 |
| 266.5 | .296994 | .300614 | .306520 | .319070 | .330472 | .371206 | .380400 | .384404 | .388404 |
| 267.0 | .297049 | .300670 | .306576 | .319126 | .330528 | .371886 | .381060 | .385060 | .388960 |
| 267.5 | .297105 | .300726 | .306632 | .319182 | .330584 | .372566 | .381720 | .385716 | .389516 |
| 268.0 | .297160 | .300782 | .306688 | .319238 | .330640 | .373246 | .382380 | .386372 | .390072 |
| 268.5 | .297216 | .300838 | .306744 | .319294 | .330696 | .373926 | .383040 | .387028 | .390628 |
| 269.0 | .297271 | .300894 | .306800 | .319350 | .330752 | .374606 | .383700 | .387684 | .391184 |
| 269.5 | .297327 | .300950 | .306856 | .319406 | .330808 | .375286 | .384360 | .388340 | .391740 |
| 270.0 | .297382 | .301006 | .306912 | .319462 | .330864 | .375966 | .385020 | .389000 | .392296 |
| 270.5 | .297438 | .301062 | .306968 | .319518 | .330920 | .376646 | .385680 | .389656 | .392852 |
| 271.0 | .297493 | .301118 | .307024 | .319574 | .330976 | .377326 | .386340 | .390312 | .393408 |
| 271.5 | .297549 | .301174 | .307080 | .319630 | .331032 | .378006 | .387000 | .390968 | .393964 |
| 272.0 | .297604 | .301230 | .307136 | .319686 | .331088 | .378686 | .387660 | .391624 | .394520 |
| 272.5 | .297660 | .301286 | .307192 | .319742 | .331144 | .379366 | .388320 | .392280 | .395076 |
| 273.0 | .297715 | .301342 | .307248 | .319798 | .331200 | .380046 | .388980 | .392936 | .395632 |
| 273.5 | .297771 | .301398 | .307304 | .319854 | .331256 | .380726 | .389640 | .393592 | .396188 |
| 274.0 | .297826 | .301454 | .307360 | .319910 | .331312 | .381406 | .390300 | .394248 | .396744 |
| 274.5 | .297882 | .301510 | .307416 | .319966 | .331368 | .382086 | .390960 | .394904 | .397300 |
| 275.0 | .297937 | .301566 | .307472 | .320022 | .331424 | .382766 | .391620 | .395560 | .397856 |
| 275.5 | .297993 | .301622 | .307528 | .320078 | .331480 | .383446 | .392280 | .396216 | .398412 |
| 276.0 | .298048 | .301678 | .307584 | .320134 | .331536 | .384126 | .392940 | .396872 | .398968 |
| 276.5 | .298104 | .301734 | .307640 | .320190 | .331592 | .384806 | .393600 | .397528 | .399524 |
| 277.0 | .298159 | .301790 | .307696 | .320246 | .331648 | .385486 | .394260 | .398184 | .400080 |
| 277.5 | .298215 | .301846 | .307752 | .320302 | .331704 | .386166 | .394920 | .398840 | .400636 |
| 278.0 | .298270 | .301902 | .307808 | .320358 | .331760 | .386846 | .395580 | .399496 | .401192 |
| 278.5 | .298326 | .301958 | .307864 | .320414 | .331816 | .387526 | .396240 | .400152 | .401748 |
| 279.0 | .298381 | .302014 | .307920 | .320470 | .331872 | .388206 | .396900 | .400808 | .402304 |
| 279.5 | .298437 | .302070 | .307976 | .320526 | .331928 | .388886 | .397560 | .401464 | .402860 |
| 280.0 | .298492 | .302126 | .308032 | .320582 | .331984 | .389566 | .398220 | .402120 | .403416 |
| 280.5 | .298548 | .302182 | .308088 | .320638 | .332040 | .390246 | .398880 | .402776 | .403972 |
| 281.0 | .298603 | .302238 | .308144 | .320694 | .332096 | .390926 | .399540 | .403432 | .404528 |
| 281.5 | .298659 | .302294 | .308200 | .320750 | .332152 | .391606 | .400200 | .404088 | .405084 |
| 282.0 | .298714 | .302350 | .308256 | .320806 | .332208 | .392286 | .400860 | .404744 | .405640 |
| 282.5 | .298770 | .302406 | .308312 | .320862 | .332264 | .392966 | .401520 | .405400 | .406196 |
| 283.0 | .298825 | .302462 | .308368 | .320918 | .332320 | .393646 | .402180 | .406056 | .406752 |
| 283.5 | .298881 | .302518 | .308424 | .320974 | .332376 | .394326 | .402840 | .406712 | .407308 |
| 284.0 | .298936 | .302574 | .308480 | .321030 | .332432 | .395006 | .403500 | .407368 | .407864 |
| 284.5 | .298992 | .302630 | .308536 | .321086 | .332488 | .395686 | .404160 | .408024 | .408420 |
| 285.0 | .299047 | .302686 | .308592 | .321142 | .332544 | .396366 | .404820 | .408680 | .408976 |
| 285.5 | .299103 | .302742 | .308648 | .321198 | .332600 | .397046 | .405480 | .409336 | .409532 |
| 286.0 | .299158 | .302798 | .308704 | .321254 | .332656 | .397726 | .406140 | .409992 | .410088 |
| 286.5 | .299214 | .302854 | .308760 | .321310 | .332712 | .398406 | .406800 | .410648 | .410644 |
| 287.0 | .299269 | .302910 | .308816 | .321366 | .332768 | .399086 | .407460 | .411304 | .411200 |
| 287.5 | .299325 | .302966 | .308872 | .321422 | .332824 | .399766 | .408120 | .411960 | .411756 |
| 288.0 | .299380 | .303022 | .308928 | .321478 | .332880 | .400446 | .408780 | .412616 | .412312 |
| 288.5 | .299436 | .303078 | .308984 | .321534 | .332936 | .401126 | .409440 | .413272 | .412868 |
| 289.0 | .299491 | .303134 | .309040 | .321590 | .332992 | .401806 | .410100 | .413928 | .413424 |
| 289.5 | .299547 | .303190 | .309096 | .321646 | .333048 | .402486 | .410760 | .414584 | .413980 |
| 290.0 | .299602 | .303246 | .309152 | .321702 | .333104 | .403166 | .411420 | .415240 | .414536 |
| 290.5 | .299658 | .303302 | .309208 | .321758 | .333160 | .403846 |         |         |         |

Percentage Points of the  $\chi^2$ -Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu$ | .000001    | .000005    | .000010    | .000050    | .000100    | .000500    | .001000    | .002500    | .005000   | .010000   | .025000   | .050000   | .100000   | .200000   | .500000   | 1.000000  | 2.000000  | 5.000000  | 10.000000 | 20.000000 | 50.000000 | 100.000000 | 200.000000 | 500.000000 | 1000.000000 | 2000.000000 | 5000.000000 | 10000.000000 |
|-------|------------|------------|------------|------------|------------|------------|------------|------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|------------|------------|-------------|-------------|-------------|--------------|
| 262.5 | .36141 03  | .376297 03 | .371892 03 | .361209 03 | .356379 03 | .34501 03  | .339078 03 | .331411 03 | .32269 03 | .31269 03 | .30269 03 | .29269 03 | .28269 03 | .27269 03 | .26269 03 | .25269 03 | .24269 03 | .23269 03 | .22269 03 | .21269 03 | .20269 03 | .19269 03  | .18269 03  | .17269 03  | .16269 03   | .15269 03   | .14269 03   | .13269 03    |
| 263.5 | .36674 03  | .376893 03 | .372485 03 | .361793 03 | .356960 03 | .345073 03 | .339140 03 | .331473 03 | .32275 03 | .31275 03 | .30275 03 | .29275 03 | .28275 03 | .27275 03 | .26275 03 | .25275 03 | .24275 03 | .23275 03 | .22275 03 | .21275 03 | .20275 03 | .19275 03  | .18275 03  | .17275 03  | .16275 03   | .15275 03   | .14275 03   | .13275 03    |
| 264.5 | .367951 03 | .377489 03 | .373078 03 | .362378 03 | .357545 03 | .345644 03 | .339711 03 | .332044 03 | .32332 03 | .31332 03 | .30332 03 | .29332 03 | .28332 03 | .27332 03 | .26332 03 | .25332 03 | .24332 03 | .23332 03 | .22332 03 | .21332 03 | .20332 03 | .19332 03  | .18332 03  | .17332 03  | .16332 03   | .15332 03   | .14332 03   | .13332 03    |
| 265.5 | .368554 03 | .378681 03 | .374263 03 | .363563 03 | .358730 03 | .346829 03 | .340896 03 | .333229 03 | .32450 03 | .31450 03 | .30450 03 | .29450 03 | .28450 03 | .27450 03 | .26450 03 | .25450 03 | .24450 03 | .23450 03 | .22450 03 | .21450 03 | .20450 03 | .19450 03  | .18450 03  | .17450 03  | .16450 03   | .15450 03   | .14450 03   | .13450 03    |
| 266.5 | .369157 03 | .379276 03 | .374858 03 | .364158 03 | .359325 03 | .347424 03 | .341491 03 | .333824 03 | .32510 03 | .31510 03 | .30510 03 | .29510 03 | .28510 03 | .27510 03 | .26510 03 | .25510 03 | .24510 03 | .23510 03 | .22510 03 | .21510 03 | .20510 03 | .19510 03  | .18510 03  | .17510 03  | .16510 03   | .15510 03   | .14510 03   | .13510 03    |
| 267.5 | .369760 03 | .379872 03 | .375454 03 | .364754 03 | .359921 03 | .348020 03 | .342087 03 | .334420 03 | .32570 03 | .31570 03 | .30570 03 | .29570 03 | .28570 03 | .27570 03 | .26570 03 | .25570 03 | .24570 03 | .23570 03 | .22570 03 | .21570 03 | .20570 03 | .19570 03  | .18570 03  | .17570 03  | .16570 03   | .15570 03   | .14570 03   | .13570 03    |
| 268.5 | .370363 03 | .380468 03 | .376050 03 | .365350 03 | .360517 03 | .348616 03 | .342683 03 | .335016 03 | .32629 03 | .31629 03 | .30629 03 | .29629 03 | .28629 03 | .27629 03 | .26629 03 | .25629 03 | .24629 03 | .23629 03 | .22629 03 | .21629 03 | .20629 03 | .19629 03  | .18629 03  | .17629 03  | .16629 03   | .15629 03   | .14629 03   | .13629 03    |
| 269.5 | .370966 03 | .381063 03 | .376645 03 | .365945 03 | .361112 03 | .349211 03 | .343278 03 | .335611 03 | .32689 03 | .31689 03 | .30689 03 | .29689 03 | .28689 03 | .27689 03 | .26689 03 | .25689 03 | .24689 03 | .23689 03 | .22689 03 | .21689 03 | .20689 03 | .19689 03  | .18689 03  | .17689 03  | .16689 03   | .15689 03   | .14689 03   | .13689 03    |
| 270.5 | .371569 03 | .381666 03 | .377248 03 | .366548 03 | .361715 03 | .349814 03 | .343881 03 | .336214 03 | .32749 03 | .31749 03 | .30749 03 | .29749 03 | .28749 03 | .27749 03 | .26749 03 | .25749 03 | .24749 03 | .23749 03 | .22749 03 | .21749 03 | .20749 03 | .19749 03  | .18749 03  | .17749 03  | .16749 03   | .15749 03   | .14749 03   | .13749 03    |
| 271.5 | .372172 03 | .382269 03 | .377851 03 | .367151 03 | .362318 03 | .350417 03 | .344484 03 | .336817 03 | .32809 03 | .31809 03 | .30809 03 | .29809 03 | .28809 03 | .27809 03 | .26809 03 | .25809 03 | .24809 03 | .23809 03 | .22809 03 | .21809 03 | .20809 03 | .19809 03  | .18809 03  | .17809 03  | .16809 03   | .15809 03   | .14809 03   | .13809 03    |
| 272.5 | .372775 03 | .382872 03 | .378454 03 | .367754 03 | .362921 03 | .351020 03 | .345087 03 | .337420 03 | .32870 03 | .31870 03 | .30870 03 | .29870 03 | .28870 03 | .27870 03 | .26870 03 | .25870 03 | .24870 03 | .23870 03 | .22870 03 | .21870 03 | .20870 03 | .19870 03  | .18870 03  | .17870 03  | .16870 03   | .15870 03   | .14870 03   | .13870 03    |
| 273.5 | .373378 03 | .383475 03 | .379057 03 | .368357 03 | .363524 03 | .351623 03 | .345690 03 | .338023 03 | .32930 03 | .31930 03 | .30930 03 | .29930 03 | .28930 03 | .27930 03 | .26930 03 | .25930 03 | .24930 03 | .23930 03 | .22930 03 | .21930 03 | .20930 03 | .19930 03  | .18930 03  | .17930 03  | .16930 03   | .15930 03   | .14930 03   | .13930 03    |
| 274.5 | .373981 03 | .384078 03 | .379660 03 | .368960 03 | .364127 03 | .352226 03 | .346293 03 | .338626 03 | .32990 03 | .31990 03 | .30990 03 | .29990 03 | .28990 03 | .27990 03 | .26990 03 | .25990 03 | .24990 03 | .23990 03 | .22990 03 | .21990 03 | .20990 03 | .19990 03  | .18990 03  | .17990 03  | .16990 03   | .15990 03   | .14990 03   | .13990 03    |
| 275.5 | .374584 03 | .384681 03 | .380263 03 | .369563 03 | .364730 03 | .352829 03 | .346896 03 | .339229 03 | .33050 03 | .32050 03 | .31050 03 | .30050 03 | .29050 03 | .28050 03 | .27050 03 | .26050 03 | .25050 03 | .24050 03 | .23050 03 | .22050 03 | .21050 03 | .20050 03  | .19050 03  | .18050 03  | .17050 03   | .16050 03   | .15050 03   | .14050 03    |
| 276.5 | .375187 03 | .385284 03 | .380866 03 | .370166 03 | .365333 03 | .353432 03 | .347499 03 | .339832 03 | .33110 03 | .32110 03 | .31110 03 | .30110 03 | .29110 03 | .28110 03 | .27110 03 | .26110 03 | .25110 03 | .24110 03 | .23110 03 | .22110 03 | .21110 03 | .20110 03  | .19110 03  | .18110 03  | .17110 03   | .16110 03   | .15110 03   | .14110 03    |
| 277.5 | .375790 03 | .385887 03 | .381469 03 | .370769 03 | .365936 03 | .354035 03 | .348102 03 | .340435 03 | .33170 03 | .32170 03 | .31170 03 | .30170 03 | .29170 03 | .28170 03 | .27170 03 | .26170 03 | .25170 03 | .24170 03 | .23170 03 | .22170 03 | .21170 03 | .20170 03  | .19170 03  | .18170 03  | .17170 03   | .16170 03   | .15170 03   | .14170 03    |
| 278.5 | .376393 03 | .386490 03 | .382072 03 | .371372 03 | .366539 03 | .354638 03 | .348705 03 | .341038 03 | .33230 03 | .32230 03 | .31230 03 | .30230 03 | .29230 03 | .28230 03 | .27230 03 | .26230 03 | .25230 03 | .24230 03 | .23230 03 | .22230 03 | .21230 03 | .20230 03  | .19230 03  | .18230 03  | .17230 03   | .16230 03   | .15230 03   | .14230 03    |
| 279.5 | .376996 03 | .387093 03 | .382675 03 | .371975 03 | .367142 03 | .355241 03 | .349308 03 | .341641 03 | .33290 03 | .32290 03 | .31290 03 | .30290 03 | .29290 03 | .28290 03 | .27290 03 | .26290 03 | .25290 03 | .24290 03 | .23290 03 | .22290 03 | .21290 03 | .20290 03  | .19290 03  | .18290 03  | .17290 03   | .16290 03   | .15290 03   | .14290 03    |
| 280.5 | .377599 03 | .387696 03 | .383278 03 | .372578 03 | .367745 03 | .355844 03 | .349911 03 | .342244 03 | .33350 03 | .32350 03 | .31350 03 | .30350 03 | .29350 03 | .28350 03 | .27350 03 | .26350 03 | .25350 03 | .24350 03 | .23350 03 | .22350 03 | .21350 03 | .20350 03  | .19350 03  | .18350 03  | .17350 03   | .16350 03   | .15350 03   | .14350 03    |
| 281.5 | .378202 03 | .388299 03 | .383881 03 | .373181 03 | .368348 03 | .356447 03 | .350514 03 | .342847 03 | .33410 03 | .32410 03 | .31410 03 | .30410 03 | .29410 03 | .28410 03 | .27410 03 | .26410 03 | .25410 03 | .24410 03 | .23410 03 | .22410 03 | .21410 03 | .20410 03  | .19410 03  | .18410 03  | .17410 03   | .16410 03   | .15410 03   | .14410 03    |
| 282.5 | .378805 03 | .388902 03 | .384484 03 | .373784 03 | .368951 03 | .357050 03 | .351117 03 | .343450 03 | .33470 03 | .32470 03 | .31470 03 | .30470 03 | .29470 03 | .28470 03 | .27470 03 | .26470 03 | .25470 03 | .24470 03 | .23470 03 | .22470 03 | .21470 03 | .20470 03  | .19470 03  | .18470 03  | .17470 03   | .16470 03   | .15470 03   | .14470 03    |
| 283.5 | .379408 03 | .389505 03 | .385087 03 | .374387 03 | .369554 03 | .357653 03 | .351720 03 | .344053 03 | .33530 03 | .32530 03 | .31530 03 | .30530 03 | .29530 03 | .28530 03 | .27530 03 | .26530 03 | .25530 03 | .24530 03 | .23530 03 | .22530 03 | .21530 03 | .20530 03  | .19530 03  | .18530 03  | .17530 03   | .16530 03   | .15530 03   | .14530 03    |
| 284.5 | .379991 03 | .390088 03 | .385670 03 | .374970 03 | .370137 03 | .358236 03 | .352303 03 | .344636 03 | .33590 03 | .32590 03 | .31590 03 | .30590 03 | .29590 03 | .28590 03 | .27590 03 | .26590 03 | .25590 03 | .24590 03 | .23590 03 | .22590 03 | .21590 03 | .20590 03  | .19590 03  | .18590 03  | .17590 03   | .16590 03   | .15590 03   | .14590 03    |
| 285.5 | .380594 03 | .390691 03 | .386273 03 | .375573 03 | .370740 03 | .358839 03 | .352906 03 | .345239 03 | .33650 03 | .32650 03 | .31650 03 | .30650 03 | .29650 03 | .28650 03 | .27650 03 | .26650 03 | .25650 03 | .24650 03 | .23650 03 | .22650 03 | .21650 03 | .20650 03  | .19650 03  | .18650 03  | .17650 03   | .16650 03   | .15650 03   | .14650 03    |
| 286.5 | .381197 03 | .391294 03 | .386876 03 | .376176 03 | .371343 03 | .359442 03 | .353509 03 | .345842 03 | .33710 03 | .32710 03 | .31710 03 | .30710 03 | .29710 03 | .28710 03 | .27710 03 | .26710 03 | .25710 03 | .24710 03 | .23710 03 | .22710 03 | .21710 03 | .20710 03  | .19710 03  | .18710 03  | .17710 03   | .16710 03   | .15710 03   | .14710 03    |
| 287.5 | .381800 03 | .391897 03 | .387479 03 | .376779 03 | .371946 03 | .360045 03 | .354112 03 | .346445 03 | .33770 03 | .32770 03 | .31770 03 | .30770 03 | .29770 03 | .28770 03 | .27770 03 | .26770 03 | .25770 03 | .24770 03 | .23770 03 | .22770 03 | .21770 03 | .20770 03  | .19770 03  | .18770 03  | .17770 03   | .16770 03   | .15770 03   | .14770 03    |
| 288.5 | .382403 03 | .392500 03 | .388082 03 | .377382 03 | .372549 03 | .360648 03 | .354715 03 | .347048 03 | .33830 03 | .32830 03 | .31830 03 | .30830 03 | .29830 03 | .28830 03 | .27830 03 | .26830 03 | .25830 03 | .24830 03 | .23830 03 | .22830 03 | .21830 03 | .20830 03  | .19830 03  | .18830 03  | .17830 03   | .16830 03   | .15830 03   | .14830 03    |
| 289.5 | .383006 03 | .393103 03 | .388685 03 | .377985 03 | .373152 03 | .361251 03 | .355318 03 | .347651 03 | .33890 03 | .32890 03 | .31890 03 | .30890 03 | .29890 03 | .28890 03 | .27890 03 | .26890 03 | .25890 03 | .24890 03 | .23890 03 | .22890 03 | .21890 03 | .20890 03  | .19890 03  | .18890 03  | .17890 03   | .16890 03   | .15890 03   | .14890 03    |
| 290.5 | .383609 03 | .393706 03 | .389288 03 | .378588 03 | .373755 03 | .361854 03 | .355921 03 | .348254 03 | .33950 03 | .32950 03 | .31950 03 | .30950 03 | .29950 03 | .28950 03 | .27950 03 | .26950 03 | .25950 03 | .24950 03 | .23950 03 | .22950 03 | .21950 03 | .20950 03  | .19950 03  | .18950 03  | .17950 03   | .16950 03   | .15950 03   | .14950 03    |
| 291.5 | .384212 03 | .394309 03 | .389891 03 | .379191 03 | .374358 03 | .362457 03 | .356524 03 | .348857 03 | .34010 03 | .33010 03 | .32010 03 | .31010 03 | .30010 03 | .29010 03 | .28010 03 | .27010 03 | .26010 03 | .25010 03 | .24010 03 | .23010 03 | .22010 03 | .21010 03  | .20010 03  | .19010 03  | .18010 03   | .17010 03   | .16010 03   | .15010 03    |
| 292.5 | .384815 03 | .394912 03 | .390494 03 | .379794 03 | .374961 03 | .363060 03 | .357127 03 | .349460 03 | .34070 03 | .33070 03 | .32070 03 | .31070 03 | .30070 03 | .29070 03 | .28070 03 | .27070 03 | .26070 03 | .25070 03 | .24070 03 | .23070 03 | .22070 03 | .          |            |            |             |             |             |              |

Percentage Points of the  $\chi^2$ -Distribution:  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu$ | 0.0000 | 0.0005 | 0.0010 | 0.0050 | 0.0100 | 0.0250 | 0.0500 | 0.1000 | 0.2000 | 0.5000 | 1.0000 | 2.0000 | 5.0000 | 10.0000 | 20.0000 | 50.0000 | 100.0000 | 200.0000 | 500.0000 | 1000.0000 |
|-------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|---------|---------|----------|----------|----------|-----------|
| 287.5 | 34909  | 34910  | 34911  | 34912  | 34913  | 34914  | 34915  | 34916  | 34917  | 34918  | 34919  | 34920  | 34921  | 34922   | 34923   | 34924   | 34925    | 34926    | 34927    | 34928     |
| 288.0 | 34929  | 34930  | 34931  | 34932  | 34933  | 34934  | 34935  | 34936  | 34937  | 34938  | 34939  | 34940  | 34941  | 34942   | 34943   | 34944   | 34945    | 34946    | 34947    | 34948     |
| 288.5 | 34949  | 34950  | 34951  | 34952  | 34953  | 34954  | 34955  | 34956  | 34957  | 34958  | 34959  | 34960  | 34961  | 34962   | 34963   | 34964   | 34965    | 34966    | 34967    | 34968     |
| 289.0 | 34969  | 34970  | 34971  | 34972  | 34973  | 34974  | 34975  | 34976  | 34977  | 34978  | 34979  | 34980  | 34981  | 34982   | 34983   | 34984   | 34985    | 34986    | 34987    | 34988     |
| 289.5 | 34989  | 34990  | 34991  | 34992  | 34993  | 34994  | 34995  | 34996  | 34997  | 34998  | 34999  | 35000  | 35001  | 35002   | 35003   | 35004   | 35005    | 35006    | 35007    | 35008     |
| 290.0 | 35009  | 35010  | 35011  | 35012  | 35013  | 35014  | 35015  | 35016  | 35017  | 35018  | 35019  | 35020  | 35021  | 35022   | 35023   | 35024   | 35025    | 35026    | 35027    | 35028     |
| 290.5 | 35029  | 35030  | 35031  | 35032  | 35033  | 35034  | 35035  | 35036  | 35037  | 35038  | 35039  | 35040  | 35041  | 35042   | 35043   | 35044   | 35045    | 35046    | 35047    | 35048     |
| 291.0 | 35049  | 35050  | 35051  | 35052  | 35053  | 35054  | 35055  | 35056  | 35057  | 35058  | 35059  | 35060  | 35061  | 35062   | 35063   | 35064   | 35065    | 35066    | 35067    | 35068     |
| 291.5 | 35069  | 35070  | 35071  | 35072  | 35073  | 35074  | 35075  | 35076  | 35077  | 35078  | 35079  | 35080  | 35081  | 35082   | 35083   | 35084   | 35085    | 35086    | 35087    | 35088     |
| 292.0 | 35089  | 35090  | 35091  | 35092  | 35093  | 35094  | 35095  | 35096  | 35097  | 35098  | 35099  | 35100  | 35101  | 35102   | 35103   | 35104   | 35105    | 35106    | 35107    | 35108     |
| 292.5 | 35109  | 35110  | 35111  | 35112  | 35113  | 35114  | 35115  | 35116  | 35117  | 35118  | 35119  | 35120  | 35121  | 35122   | 35123   | 35124   | 35125    | 35126    | 35127    | 35128     |
| 293.0 | 35129  | 35130  | 35131  | 35132  | 35133  | 35134  | 35135  | 35136  | 35137  | 35138  | 35139  | 35140  | 35141  | 35142   | 35143   | 35144   | 35145    | 35146    | 35147    | 35148     |
| 293.5 | 35149  | 35150  | 35151  | 35152  | 35153  | 35154  | 35155  | 35156  | 35157  | 35158  | 35159  | 35160  | 35161  | 35162   | 35163   | 35164   | 35165    | 35166    | 35167    | 35168     |
| 294.0 | 35169  | 35170  | 35171  | 35172  | 35173  | 35174  | 35175  | 35176  | 35177  | 35178  | 35179  | 35180  | 35181  | 35182   | 35183   | 35184   | 35185    | 35186    | 35187    | 35188     |
| 294.5 | 35189  | 35190  | 35191  | 35192  | 35193  | 35194  | 35195  | 35196  | 35197  | 35198  | 35199  | 35200  | 35201  | 35202   | 35203   | 35204   | 35205    | 35206    | 35207    | 35208     |
| 295.0 | 35209  | 35210  | 35211  | 35212  | 35213  | 35214  | 35215  | 35216  | 35217  | 35218  | 35219  | 35220  | 35221  | 35222   | 35223   | 35224   | 35225    | 35226    | 35227    | 35228     |
| 295.5 | 35229  | 35230  | 35231  | 35232  | 35233  | 35234  | 35235  | 35236  | 35237  | 35238  | 35239  | 35240  | 35241  | 35242   | 35243   | 35244   | 35245    | 35246    | 35247    | 35248     |
| 296.0 | 35249  | 35250  | 35251  | 35252  | 35253  | 35254  | 35255  | 35256  | 35257  | 35258  | 35259  | 35260  | 35261  | 35262   | 35263   | 35264   | 35265    | 35266    | 35267    | 35268     |
| 296.5 | 35269  | 35270  | 35271  | 35272  | 35273  | 35274  | 35275  | 35276  | 35277  | 35278  | 35279  | 35280  | 35281  | 35282   | 35283   | 35284   | 35285    | 35286    | 35287    | 35288     |
| 297.0 | 35289  | 35290  | 35291  | 35292  | 35293  | 35294  | 35295  | 35296  | 35297  | 35298  | 35299  | 35300  | 35301  | 35302   | 35303   | 35304   | 35305    | 35306    | 35307    | 35308     |
| 297.5 | 35309  | 35310  | 35311  | 35312  | 35313  | 35314  | 35315  | 35316  | 35317  | 35318  | 35319  | 35320  | 35321  | 35322   | 35323   | 35324   | 35325    | 35326    | 35327    | 35328     |
| 298.0 | 35329  | 35330  | 35331  | 35332  | 35333  | 35334  | 35335  | 35336  | 35337  | 35338  | 35339  | 35340  | 35341  | 35342   | 35343   | 35344   | 35345    | 35346    | 35347    | 35348     |
| 298.5 | 35349  | 35350  | 35351  | 35352  | 35353  | 35354  | 35355  | 35356  | 35357  | 35358  | 35359  | 35360  | 35361  | 35362   | 35363   | 35364   | 35365    | 35366    | 35367    | 35368     |
| 299.0 | 35369  | 35370  | 35371  | 35372  | 35373  | 35374  | 35375  | 35376  | 35377  | 35378  | 35379  | 35380  | 35381  | 35382   | 35383   | 35384   | 35385    | 35386    | 35387    | 35388     |
| 299.5 | 35389  | 35390  | 35391  | 35392  | 35393  | 35394  | 35395  | 35396  | 35397  | 35398  | 35399  | 35400  | 35401  | 35402   | 35403   | 35404   | 35405    | 35406    | 35407    | 35408     |
| 300.0 | 35409  | 35410  | 35411  | 35412  | 35413  | 35414  | 35415  | 35416  | 35417  | 35418  | 35419  | 35420  | 35421  | 35422   | 35423   | 35424   | 35425    | 35426    | 35427    | 35428     |
| 300.5 | 35429  | 35430  | 35431  | 35432  | 35433  | 35434  | 35435  | 35436  | 35437  | 35438  | 35439  | 35440  | 35441  | 35442   | 35443   | 35444   | 35445    | 35446    | 35447    | 35448     |
| 301.0 | 35449  | 35450  | 35451  | 35452  | 35453  | 35454  | 35455  | 35456  | 35457  | 35458  | 35459  | 35460  | 35461  | 35462   | 35463   | 35464   | 35465    | 35466    | 35467    | 35468     |
| 301.5 | 35469  | 35470  | 35471  | 35472  | 35473  | 35474  | 35475  | 35476  | 35477  | 35478  | 35479  | 35480  | 35481  | 35482   | 35483   | 35484   | 35485    | 35486    | 35487    | 35488     |
| 302.0 | 35489  | 35490  | 35491  | 35492  | 35493  | 35494  | 35495  | 35496  | 35497  | 35498  | 35499  | 35500  | 35501  | 35502   | 35503   | 35504   | 35505    | 35506    | 35507    | 35508     |
| 302.5 | 35509  | 35510  | 35511  | 35512  | 35513  | 35514  | 35515  | 35516  | 35517  | 35518  | 35519  | 35520  | 35521  | 35522   | 35523   | 35524   | 35525    | 35526    | 35527    | 35528     |
| 303.0 | 35529  | 35530  | 35531  | 35532  | 35533  | 35534  | 35535  | 35536  | 35537  | 35538  | 35539  | 35540  | 35541  | 35542   | 35543   | 35544   | 35545    | 35546    | 35547    | 35548     |
| 303.5 | 35549  | 35550  | 35551  | 35552  | 35553  | 35554  | 35555  | 35556  | 35557  | 35558  | 35559  | 35560  | 35561  | 35562   | 35563   | 35564   | 35565    | 35566    | 35567    | 35568     |
| 304.0 | 35569  | 35570  | 35571  | 35572  | 35573  | 35574  | 35575  | 35576  | 35577  | 35578  | 35579  | 35580  | 35581  | 35582   | 35583   | 35584   | 35585    | 35586    | 35587    | 35588     |
| 304.5 | 35589  | 35590  | 35591  | 35592  | 35593  | 35594  | 35595  | 35596  | 35597  | 35598  | 35599  | 35600  | 35601  | 35602   | 35603   | 35604   | 35605    | 35606    | 35607    | 35608     |
| 305.0 | 35609  | 35610  | 35611  | 35612  | 35613  | 35614  | 35615  | 35616  | 35617  | 35618  | 35619  | 35620  | 35621  | 35622   | 35623   | 35624   | 35625    | 35626    | 35627    | 35628     |
| 305.5 | 35629  | 35630  | 35631  | 35632  | 35633  | 35634  | 35635  | 35636  | 35637  | 35638  | 35639  | 35640  | 35641  | 35642   | 35643   | 35644   | 35645    | 35646    | 35647    | 35648     |
| 306.0 | 35649  | 35650  | 35651  | 35652  | 35653  | 35654  | 35655  | 35656  | 35657  | 35658  | 35659  | 35660  | 35661  | 35662   | 35663   | 35664   | 35665    | 35666    | 35667    | 35668     |
| 306.5 | 35669  | 35670  | 35671  | 35672  | 35673  | 35674  | 35675  | 35676  | 35677  | 35678  | 35679  | 35680  | 35681  | 35682   | 35683   | 35684   | 35685    | 35686    | 35687    | 35688     |
| 307.0 | 35689  | 35690  | 35691  | 35692  | 35693  | 35694  | 35695  | 35696  | 35697  | 35698  | 35699  | 35700  | 35701  | 35702   | 35703   | 35704   | 35705    | 35706    | 35707    | 35708     |
| 307.5 | 35709  | 35710  | 35711  | 35712  | 35713  | 35714  | 35715  | 35716  | 35717  | 35718  | 35719  | 35720  | 35721  | 35722   | 35723   | 35724   | 35725    | 35726    | 35727    | 35728     |
| 308.0 | 35729  | 35730  | 35731  | 35732  | 35733  | 35734  | 35735  | 35736  | 35737  | 35738  | 35739  | 35740  | 35741  | 35742   | 35743   | 35744   | 35745    | 35746    | 35747    | 35748     |
| 308.5 | 35749  | 35750  | 35751  | 35752  | 35753  | 35754  | 35755  | 35756  | 35757  | 35758  | 35759  | 35760  | 35761  | 35762   | 35763   | 35764   | 35765    | 35766    | 35767    | 35768     |
| 309.0 | 35769  | 35770  | 35771  | 35772  | 35773  | 35774  | 35775  | 35776  | 35777  | 35778  | 35779  | 35780  | 35781  | 35782   | 35783   | 35784   | 35785    | 35786    | 35787    | 35788     |
| 309.5 | 35789  | 35790  | 35791  | 35792  | 35793  | 35794  | 35795  | 35796  | 35797  | 35798  | 35799  | 35800  | 35801  | 35802   | 35803   | 35804   | 35805    | 35806    | 35807    | 35808     |
| 310.0 | 35809  | 35810  | 35811  | 35812  | 35813  | 35814  | 35815  | 35816  | 35817  | 35818  | 35819  | 35820  | 35821  | 35822   | 35823   | 35824   | 35825    | 35826    | 35827    | 35828     |
| 310.5 | 35829  | 35830  | 35831  | 35832  | 35833  | 35834  | 35835  | 35836  | 35837  | 35838  | 35839  | 35840  | 35841  | 35842   | 35843   | 35844   | 35845    | 35846    | 35847    | 35848     |
| 311.0 | 35849  | 35850  | 35851  | 35852  | 35853  | 35854  | 35855  | 35856  | 35857  | 35858  | 35859  | 35860  | 35861  | 35862   | 35863   | 35864   | 35865    | 35866    | 35867    | 35868     |
| 311.5 | 35869  | 35870  | 35871  | 35872  | 35873  | 35874  | 35875  | 35876  | 35877  | 35878  | 35879  | 35880  | 35881  | 35882   | 35883   | 35884   | 35885    | 35886    | 35887    | 35888     |
| 312.0 | 35889  | 35890  | 35891  | 35892  | 35893  | 35894  | 35895  | 35896  | 35897  | 35898  | 35899  | 35900  | 35901  | 35902   | 35903   | 35904   | 35905    | 35906    | 35907    | 35908     |
| 312.5 | 35909  | 35910  | 35911  | 35912  | 35913  | 35914  | 35915  | 35916  | 35917  | 35918  | 35919  | 35920  | 35921  | 35922   | 35923   | 35924   | 35925    | 35926    | 35927    | 35928     |
| 313.0 | 35929  | 35930  | 35931  | 35932  | 35933  | 35934  | 35935  | 35936  | 35937  | 35938  | 35939  | 35940  | 35941  | 35942   | 35943   | 35944   | 35945    | 35946    | 35947    | 35948     |
| 313.5 | 35949  | 35950  | 35951  | 35952  | 35953  | 35954  | 35955  | 35956  | 35957  | 35958  | 35959  | 35960  | 35961  | 35962   | 35963   | 35964   | 35965    | 35966    | 35967    | 35968     |
| 314.0 | 35969  | 35970  | 35971  | 35972  | 35973  | 35974  | 35975  | 35976  | 35977  | 35978  | 35979  | 35980  | 35981  | 35982   | 35983   | 35984   | 35985    | 35986    | 35987    | 35988     |
| 314.5 | 35989  | 35990  | 35991  | 35992  | 35993  | 35994  | 35995  | 35996  | 35997  | 35998  | 35999  | 36000  | 36001  | 36002   | 36003   | 36004   | 36005    | 36006    | 36007    | 36008     |
| 315.0 | 36009  | 36010  | 36011  | 36012  | 36013  | 36014  | 36015  | 36016  | 36017  | 36018  | 36019  | 36020  | 36021  |         |         |         |          |          |          |           |

### Percentage Points of the $\chi^2$ Distribution Values of $\chi^2$ in Terms of $Q$ and $\nu$

|        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        | 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| 000000 | 000001 | 000002 | 000003 | 000004 | 000005 | 000006 | 000007 | 000008 | 000009 | 000010 | 000011 | 000012 | 000013 | 000014 | 000015 | 000016 | 000017 | 000018 | 000019 | 000020 | 000021 | 000022 | 000023 | 000024 | 000025 | 000026 | 000027 | 000028 | 000029 | 000030 | 000031 | 000032 | 000033 | 000034 | 000035 | 000036 | 000037 | 000038 | 000039 | 000040 | 000041 | 000042 | 000043 | 000044 | 000045 | 000046 | 000047 | 000048 | 000049 | 000050 | 000051 | 000052 | 000053 | 000054 | 000055 | 000056 | 000057 | 000058 | 000059 | 000060 | 000061 | 000062 | 000063 | 000064 | 000065 | 000066 | 000067 | 000068 | 000069 | 000070 | 000071 | 000072 | 000073 | 000074 | 000075 | 000076 | 000077 | 000078 | 000079 | 000080 | 000081 | 000082 | 000083 | 000084 | 000085 | 000086 | 000087 | 000088 | 000089 | 000090 | 000091 | 000092 | 000093 | 000094 | 000095 | 000096 | 000097 | 000098 | 000099 | 000100 | 000101 | 000102 | 000103 | 000104 | 000105 | 000106 | 000107 | 000108 | 000109 | 000110 | 000111 | 000112 | 000113 | 000114 | 000115 | 000116 | 000117 | 000118 | 000119 | 000120 | 000121 | 000122 | 000123 | 000124 | 000125 | 000126 | 000127 | 000128 | 000129 | 000130 | 000131 | 000132 | 000133 | 000134 | 000135 | 000136 | 000137 | 000138 | 000139 | 000140 | 000141 | 000142 | 000143 | 000144 | 000145 | 000146 | 000147 | 000148 | 000149 | 000150 | 000151 | 000152 | 000153 | 000154 | 000155 | 000156 | 000157 | 000158 | 000159 | 000160 | 000161 | 000162 | 000163 | 000164 | 000165 | 000166 | 000167 | 000168 | 000169 | 000170 | 000171 | 000172 | 000173 | 000174 | 000175 | 000176 | 000177 | 000178 | 000179 | 000180 | 000181 | 000182 | 000183 | 000184 | 000185 | 000186 | 000187 | 000188 | 000189 | 000190 | 000191 | 000192 | 000193 | 000194 | 000195 | 000196 | 000197 | 000198 | 000199 | 000200 | 000201 | 000202 | 000203 | 000204 | 000205 | 000206 | 000207 | 000208 | 000209 | 000210 | 000211 | 000212 | 000213 | 000214 | 000215 | 000216 | 000217 | 000218 | 000219 | 000220 | 000221 | 000222 | 000223 | 000224 | 000225 | 000226 | 000227 | 000228 | 000229 | 000230 | 000231 | 000232 | 000233 | 000234 | 000235 | 000236 | 000237 | 000238 | 000239 | 000240 | 000241 | 000242 | 000243 | 000244 | 000245 | 000246 | 000247 | 000248 | 000249 | 000250 | 000251 | 000252 | 000253 | 000254 | 000255 | 000256 | 000257 | 000258 | 000259 | 000260 | 000261 | 000262 | 000263 | 000264 | 000265 | 000266 | 000267 | 000268 | 000269 | 000270 | 000271 | 000272 | 000273 | 000274 | 000275 | 000276 | 000277 | 000278 | 000279 | 000280 | 000281 | 000282 | 000283 | 000284 | 000285 | 000286 | 000287 | 000288 | 000289 | 000290 | 000291 | 000292 | 000293 | 000294 | 000295 | 000296 | 000297 | 000298 | 000299 | 000300 | 000301 | 000302 | 000303 | 000304 | 000305 | 000306 | 000307 | 000308 | 000309 | 000310 | 000311 | 000312 | 000313 | 000314 | 000315 | 000316 | 000317 | 000318 | 000319 | 000320 | 000321 | 000322 | 000323 | 000324 | 000325 | 000326 | 000327 | 000328 | 000329 | 000330 | 000331 | 000332 | 000333 | 000334 | 000335 | 000336 | 000337 | 000338 | 000339 | 000340 | 000341 | 000342 | 000343 | 000344 | 000345 | 000346 | 000347 | 000348 | 000349 | 000350 | 000351 | 000352 | 000353 | 000354 | 000355 | 000356 | 000357 | 000358 | 000359 | 000360 | 000361 | 000362 | 000363 | 000364 | 000365 | 000366 | 000367 | 000368 | 000369 | 000370 | 000371 | 000372 | 000373 | 000374 | 000375 | 000376 | 000377 | 000378 | 000379 | 000380 | 000381 | 000382 | 000383 | 000384 | 000385 | 000386 | 000387 | 000388 | 000389 | 000390 | 000391 | 000392 | 000393 | 000394 | 000395 | 000396 | 000397 | 000398 | 000399 | 000400 | 000401 | 000402 | 000403 | 000404 | 000405 | 000406 | 000407 | 000408 | 000409 | 000410 | 000411 | 000412 | 000413 | 000414 | 000415 | 000416 | 000417 | 000418 | 000419 | 000420 | 000421 | 000422 | 000423 | 000424 | 000425 | 000426 | 000427 | 000428 | 000429 | 000430 | 000431 | 000432 | 000433 | 000434 | 000435 | 000436 | 000437 | 000438 | 000439 | 000440 | 000441 | 000442 | 000443 | 000444 | 000445 | 000446 | 000447 | 000448 | 000449 | 000450 | 000451 | 000452 | 000453 | 000454 | 000455 | 000456 | 000457 | 000458 | 000459 | 000460 | 000461 | 000462 | 000463 | 000464 | 000465 | 000466 | 000467 | 000468 | 000469 | 000470 | 000471 | 000472 | 000473 | 000474 | 000475 | 000476 | 000477 | 000478 | 000479 | 000480 | 000481 | 000482 | 000483 | 000484 | 000485 | 000486 | 000487 | 000488 | 000489 | 000490 | 000491 | 000492 | 000493 | 000494 | 000495 | 000496 | 000497 | 000498 | 000499 | 000500 | 000501 | 000502 | 000503 | 000504 | 000505 | 000506 | 000507 | 000508 | 000509 | 000510 | 000511 | 000512 | 000513 | 000514 | 000515 | 000516 | 000517 | 000518 | 000519 | 000520 | 000521 | 000522 | 000523 | 000524 | 000525 | 000526 | 000527 | 000528 | 000529 | 000530 | 000531 | 000532 | 000533 | 000534 | 000535 | 000536 | 000537 | 000538 | 000539 | 000540 | 000541 | 000542 | 000543 | 000544 | 000545 | 000546 | 000547 | 000548 | 000549 | 000550 | 000551 | 000552 | 000553 | 000554 | 000555 | 000556 | 000557 | 000558 | 000559 | 000560 | 000561 | 000562 | 000563 | 000564 | 000565 | 000566 | 000567 | 000568 | 000569 | 000570 | 000571 | 000572 | 000573 | 000574 | 000575 | 000576 | 000577 | 000578 | 000579 | 000580 | 000581 | 000582 | 000583 | 000584 | 000585 | 000586 | 000587 | 000588 | 000589 | 000590 | 000591 | 000592 | 000593 | 000594 | 000595 | 000596 | 000597 | 000598 | 000599 | 000600 | 000601 | 000602 | 000603 | 000604 | 000605 | 000606 | 000607 | 000608 | 000609 | 000610 | 000611 | 000612 | 000613 | 000614 | 000615 | 000616 | 000617 | 000618 | 000619 | 000620 | 000621 | 000622 | 000623 | 000624 | 000625 | 000626 | 000627 | 000628 | 000629 | 000630 | 000631 | 000632 | 000633 | 000634 | 000635 | 000636 | 000637 | 000638 | 000639 | 000640 | 000641 | 000642 | 000643 | 000644 | 000645 | 000646 | 000647 | 000648 | 000649 | 000650 | 000651 | 000652 | 000653 | 000654 | 000655 | 000656 | 000657 | 000658 | 000659 | 000660 | 000661 | 000662 | 000663 | 000664 | 000665 | 000666 | 000667 | 000668 | 000669 | 000670 | 000671 | 000672 | 000673 | 000674 | 000675 | 000676 | 000677 | 000678 | 000679 | 000680 | 000681 | 000682 | 000683 | 000684 | 000685 | 000686 | 000687 | 000688 | 000689 | 000690 | 000691 | 000692 | 000693 | 000694 | 000695 | 000696 | 000697 | 000698 | 000699 | 000700 | 000701 | 000702 | 000703 | 000704 | 000705 | 000706 | 000707 | 000708 | 000709 | 000710 | 000711 | 000712 | 000713 | 000714 | 000715 | 000716 | 000717 | 000718 | 000719 | 000720 | 000721 | 000722 | 000723 | 000724 | 000725 | 000726 | 000727 | 000728 | 000729 | 000730 | 000731 | 000732 | 000733 | 000734 | 000735 | 000736 | 000737 | 000738 | 000739 | 000740 | 000741 | 000742 | 000743 | 000744 | 000745 | 000746 | 000747 | 000748 | 000749 | 000750 | 000751 | 000752 | 000753 | 000754 | 000755 | 000756 | 000757 | 000758 | 000759 | 000760 | 000761 | 000762 | 000763 | 000764 | 000765 | 000766 | 000767 | 000768 | 000769 | 000770 | 000771 | 000772 | 000773 | 000774 | 000775 | 000776 | 000777 | 000778 | 000779 | 000780 | 000781 | 000782 | 000783 | 000784 | 000785 | 000786 | 000787 | 000788 | 000789 | 000790 | 000791 | 000792 | 000793 | 000794 | 000795 | 000796 | 000797 | 000798 | 000799 | 000800 | 000801 | 000802 | 000803 | 000804 | 000805 | 000806 | 000807 | 000808 | 000809 | 000810 | 000811 | 000812 | 000813 | 000814 | 000815 | 000816 | 000817 | 000818 | 000819 | 000820 | 000821 | 000822 | 000823 | 000824 | 000825 | 000826 | 000827 | 000828 | 000829 | 000830 | 000831 | 000832 | 000833 | 000834 | 000835 | 000836 | 000837 | 000838 | 000839 | 000840 | 000841 | 000842 | 000843 | 000844 | 000845 | 000846 | 000847 | 000848 | 000849 | 000850 | 000851 | 000852 | 000853 | 000854 | 000855 | 000856 | 000857 | 000858 | 000859 | 000860 | 000861 | 000862 | 000863 | 000864 | 000865 | 000866 | 000867 | 000868 | 000869 | 000870 | 000871 | 000872 | 000873 | 000874 | 000875 | 000876 | 000877 | 000878 | 000879 | 000880 | 000881 | 000882 | 000883 | 000884 | 000885 | 000886 | 000887 | 000888 | 000889 | 000890 | 000891 | 000892 | 000893 | 000894 | 000895 | 000896 | 000897 | 000898 | 000899 | 000900 | 000901 | 000902 | 000903 | 000904 | 000905 | 000906 | 000907 | 000908 | 000909 | 000910 | 000911 | 000912 | 000913 | 000914 | 000915 | 000916 | 000917 | 000918 | 000919 | 000920 | 000921 | 000922 | 000923 | 000924 | 000925 | 000926 | 000927 | 000928 | 000929 | 000930 | 000931 | 000932 | 000933 | 000934 | 000935 | 000936 | 000937 | 000938 | 000939 | 000940 | 000941 | 000942 | 000943 | 000944 | 000945 | 000946 | 000947 | 000948 | 000949 | 000950 | 000951 | 000952 | 000953 | 000954 | 000955 | 000956 | 000957 | 000958 | 000959 | 000960 | 000961 | 000962 | 000963 | 000964 | 000965 | 000966 | 000967 | 000968 | 000969 | 000970 | 000971 | 000972 | 000973 | 000974 | 000975 | 000976 | 000977 | 000978 | 000979 | 000980 | 000981 | 000982 | 000983 | 000984 | 000985 | 000986 | 000987 | 000988 | 000989 | 000990 | 000991 | 000992 | 000993 | 000994 | 000995 | 000996 | 000997 | 000998 | 000999 | 001000 |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|----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Percentage Points of the  $\chi^2$  Distribution  
Values of  $\chi^2$  in Terms of  $Q$  and  $\nu$

| $\nu$ | .005  | .01   | .025  | .05   | .1    | .2    | .5    | 1     | 2     | 5    | 10   | 20   | 50   | 100  | 200  | 500  | 1000 | 2000 | 5000 | 10000 |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|------|------|------|------|------|------|------|------|------|-------|
| 1     | 3.84  | 2.71  | 1.64  | 1.39  | 1.07  | .72   | .45   | .32   | .24   | .18  | .14  | .10  | .07  | .05  | .04  | .03  | .02  | .01  | .005 | .001  |
| 2     | 5.99  | 4.61  | 3.00  | 2.38  | 1.89  | 1.39  | .98   | .74   | .58   | .44  | .34  | .26  | .19  | .14  | .10  | .07  | .05  | .04  | .03  | .02   |
| 3     | 7.88  | 6.25  | 4.11  | 3.36  | 2.60  | 1.94  | 1.43  | 1.10  | .85   | .64  | .48  | .37  | .29  | .22  | .16  | .12  | .09  | .07  | .05  | .04   |
| 4     | 9.49  | 7.78  | 5.38  | 4.43  | 3.57  | 2.71  | 2.00  | 1.59  | 1.20  | .90  | .68  | .52  | .40  | .32  | .24  | .18  | .14  | .10  | .07  | .05   |
| 5     | 11.07 | 9.24  | 6.63  | 5.40  | 4.35  | 3.34  | 2.45  | 1.93  | 1.45  | 1.05 | .78  | .60  | .46  | .37  | .28  | .21  | .16  | .12  | .09  | .07   |
| 6     | 12.59 | 10.59 | 7.68  | 6.36  | 5.21  | 4.10  | 3.00  | 2.39  | 1.83  | 1.35 | .96  | .74  | .57  | .45  | .35  | .27  | .20  | .15  | .11  | .08   |
| 7     | 14.07 | 11.83 | 8.56  | 7.14  | 5.89  | 4.61  | 3.44  | 2.73  | 2.07  | 1.52 | 1.08 | .83  | .64  | .50  | .39  | .30  | .23  | .17  | .13  | .10   |
| 8     | 15.51 | 13.09 | 9.35  | 7.88  | 6.58  | 5.28  | 3.90  | 3.03  | 2.29  | 1.67 | 1.16 | .88  | .68  | .53  | .41  | .32  | .25  | .19  | .14  | .11   |
| 9     | 16.92 | 14.36 | 10.12 | 8.56  | 7.26  | 5.90  | 4.38  | 3.36  | 2.59  | 1.86 | 1.26 | .95  | .74  | .58  | .44  | .35  | .27  | .21  | .16  | .12   |
| 10    | 18.31 | 15.58 | 10.83 | 9.20  | 7.88  | 6.43  | 4.74  | 3.69  | 2.88  | 2.04 | 1.38 | 1.04 | .81  | .64  | .50  | .38  | .30  | .23  | .18  | .14   |
| 11    | 19.68 | 16.76 | 11.55 | 9.88  | 8.45  | 6.97  | 5.09  | 4.01  | 3.16  | 2.23 | 1.50 | 1.13 | .88  | .70  | .55  | .42  | .34  | .27  | .21  | .16   |
| 12    | 21.03 | 17.93 | 12.24 | 10.53 | 9.03  | 7.52  | 5.43  | 4.33  | 3.44  | 2.42 | 1.62 | 1.21 | .94  | .76  | .60  | .46  | .37  | .30  | .23  | .18   |
| 13    | 22.36 | 19.08 | 12.91 | 11.16 | 9.62  | 8.08  | 5.76  | 4.64  | 3.71  | 2.61 | 1.74 | 1.30 | .99  | .80  | .64  | .50  | .40  | .33  | .26  | .20   |
| 14    | 23.68 | 20.15 | 13.57 | 11.78 | 10.23 | 8.64  | 6.08  | 4.95  | 3.98  | 2.80 | 1.86 | 1.39 | 1.06 | .86  | .69  | .54  | .43  | .36  | .29  | .22   |
| 15    | 25.00 | 21.20 | 14.22 | 12.40 | 10.81 | 9.20  | 6.40  | 5.25  | 4.25  | 2.99 | 1.97 | 1.48 | 1.12 | .91  | .74  | .58  | .46  | .39  | .32  | .25   |
| 16    | 26.29 | 22.31 | 14.86 | 13.02 | 11.39 | 9.77  | 6.71  | 5.51  | 4.51  | 3.18 | 2.09 | 1.57 | 1.19 | .97  | .80  | .63  | .51  | .43  | .36  | .29   |
| 17    | 27.59 | 23.40 | 15.49 | 13.63 | 11.97 | 10.34 | 7.02  | 5.76  | 4.76  | 3.37 | 2.20 | 1.66 | 1.27 | 1.04 | .86  | .69  | .56  | .48  | .40  | .33   |
| 18    | 28.87 | 24.48 | 16.11 | 14.24 | 12.55 | 10.90 | 7.32  | 6.00  | 5.00  | 3.56 | 2.31 | 1.75 | 1.35 | 1.11 | .93  | .75  | .62  | .54  | .46  | .39   |
| 19    | 30.19 | 25.54 | 16.72 | 14.84 | 13.12 | 11.45 | 7.58  | 6.24  | 5.23  | 3.75 | 2.42 | 1.84 | 1.43 | 1.18 | .99  | .81  | .67  | .59  | .51  | .44   |
| 20    | 31.53 | 26.59 | 17.32 | 15.44 | 13.69 | 12.00 | 7.83  | 6.47  | 5.40  | 3.94 | 2.53 | 1.93 | 1.51 | 1.25 | 1.05 | .87  | .73  | .65  | .57  | .50   |
| 21    | 32.85 | 27.64 | 17.91 | 16.03 | 14.25 | 12.55 | 8.08  | 6.69  | 5.57  | 4.13 | 2.64 | 2.02 | 1.59 | 1.32 | 1.11 | .93  | .79  | .71  | .63  | .56   |
| 22    | 34.17 | 28.68 | 18.49 | 16.62 | 14.84 | 13.10 | 8.32  | 6.91  | 5.74  | 4.32 | 2.75 | 2.11 | 1.67 | 1.39 | 1.18 | 1.00 | .85  | .77  | .69  | .62   |
| 23    | 35.48 | 29.71 | 19.06 | 17.21 | 15.43 | 13.64 | 8.56  | 7.13  | 5.90  | 4.51 | 2.86 | 2.20 | 1.75 | 1.46 | 1.25 | 1.07 | .91  | .83  | .75  | .68   |
| 24    | 36.78 | 30.76 | 19.63 | 17.79 | 16.01 | 14.18 | 8.79  | 7.35  | 6.07  | 4.70 | 2.97 | 2.29 | 1.83 | 1.53 | 1.32 | 1.14 | .97  | .89  | .81  | .74   |
| 25    | 38.08 | 31.79 | 20.19 | 18.37 | 16.59 | 14.72 | 9.02  | 7.57  | 6.24  | 4.89 | 3.08 | 2.38 | 1.91 | 1.60 | 1.39 | 1.21 | 1.03 | .95  | .87  | .80   |
| 26    | 39.36 | 32.81 | 20.74 | 18.94 | 17.17 | 15.25 | 9.25  | 7.78  | 6.41  | 5.08 | 3.19 | 2.47 | 2.00 | 1.67 | 1.46 | 1.28 | 1.10 | .102 | .93  | .86   |
| 27    | 40.66 | 33.82 | 21.29 | 19.51 | 17.74 | 15.78 | 9.47  | 7.99  | 6.58  | 5.27 | 3.30 | 2.56 | 2.08 | 1.74 | 1.53 | 1.35 | 1.17 | 1.09 | .104 | .97   |
| 28    | 41.90 | 34.82 | 21.83 | 20.08 | 18.31 | 16.31 | 9.69  | 8.20  | 6.75  | 5.46 | 3.41 | 2.65 | 2.17 | 1.81 | 1.60 | 1.42 | 1.24 | 1.16 | 1.08 | .106  |
| 29    | 43.16 | 35.81 | 22.36 | 20.64 | 18.88 | 16.84 | 9.91  | 8.41  | 6.91  | 5.65 | 3.52 | 2.74 | 2.26 | 1.89 | 1.67 | 1.50 | 1.31 | 1.23 | 1.15 | .108  |
| 30    | 44.41 | 36.79 | 22.89 | 21.21 | 19.44 | 17.37 | 10.13 | 8.62  | 7.08  | 5.84 | 3.63 | 2.83 | 2.35 | 1.96 | 1.74 | 1.57 | 1.38 | 1.30 | 1.22 | .110  |
| 31    | 45.66 | 37.76 | 23.41 | 21.77 | 20.00 | 17.90 | 10.34 | 8.83  | 7.25  | 6.03 | 3.74 | 2.92 | 2.44 | 2.04 | 1.81 | 1.64 | 1.49 | 1.41 | 1.33 | .112  |
| 32    | 46.91 | 38.73 | 23.93 | 22.33 | 20.56 | 18.43 | 10.55 | 9.04  | 7.42  | 6.22 | 3.85 | 3.01 | 2.53 | 2.12 | 1.88 | 1.71 | 1.56 | 1.48 | 1.40 | .114  |
| 33    | 48.15 | 39.69 | 24.44 | 22.89 | 21.12 | 18.96 | 10.76 | 9.25  | 7.59  | 6.41 | 3.96 | 3.10 | 2.62 | 2.20 | 1.95 | 1.78 | 1.63 | 1.55 | 1.47 | .116  |
| 34    | 49.40 | 40.64 | 24.95 | 23.45 | 21.68 | 19.49 | 10.96 | 9.46  | 7.76  | 6.60 | 4.07 | 3.19 | 2.71 | 2.29 | 2.02 | 1.85 | 1.70 | 1.62 | 1.54 | .118  |
| 35    | 50.64 | 41.59 | 25.46 | 24.01 | 22.24 | 20.02 | 11.17 | 9.67  | 7.93  | 6.79 | 4.18 | 3.28 | 2.80 | 2.37 | 2.10 | 1.92 | 1.77 | 1.69 | 1.61 | .120  |
| 36    | 51.88 | 42.53 | 25.96 | 24.57 | 22.79 | 20.55 | 11.37 | 9.88  | 8.10  | 6.98 | 4.29 | 3.37 | 2.89 | 2.46 | 2.17 | 1.99 | 1.84 | 1.76 | 1.68 | .122  |
| 37    | 53.12 | 43.47 | 26.46 | 25.13 | 23.35 | 21.08 | 11.57 | 10.09 | 8.27  | 7.17 | 4.40 | 3.46 | 2.98 | 2.55 | 2.24 | 2.06 | 1.91 | 1.83 | 1.75 | .124  |
| 38    | 54.36 | 44.40 | 26.96 | 25.69 | 23.90 | 21.61 | 11.77 | 10.29 | 8.46  | 7.36 | 4.51 | 3.55 | 3.07 | 2.64 | 2.31 | 2.13 | 2.00 | 1.90 | 1.82 | .126  |
| 39    | 55.60 | 45.33 | 27.45 | 26.25 | 24.46 | 22.14 | 11.97 | 10.49 | 8.65  | 7.55 | 4.62 | 3.64 | 3.16 | 2.73 | 2.39 | 2.20 | 2.07 | 1.97 | 1.89 | .128  |
| 40    | 56.84 | 46.26 | 27.94 | 26.81 | 25.01 | 22.67 | 12.17 | 10.69 | 8.84  | 7.74 | 4.73 | 3.73 | 3.25 | 2.82 | 2.47 | 2.27 | 2.14 | 2.04 | 1.96 | .130  |
| 41    | 58.08 | 47.18 | 28.43 | 27.37 | 25.57 | 23.20 | 12.36 | 10.89 | 9.03  | 7.93 | 4.84 | 3.82 | 3.34 | 2.91 | 2.55 | 2.34 | 2.21 | 2.11 | 2.03 | .132  |
| 42    | 59.32 | 48.11 | 28.91 | 27.93 | 26.12 | 23.73 | 12.56 | 11.08 | 9.22  | 8.12 | 4.95 | 3.91 | 3.43 | 3.00 | 2.63 | 2.41 | 2.28 | 2.18 | 2.10 | .134  |
| 43    | 60.56 | 49.03 | 29.39 | 28.49 | 26.68 | 24.26 | 12.75 | 11.28 | 9.41  | 8.31 | 5.06 | 4.00 | 3.52 | 3.09 | 2.71 | 2.49 | 2.35 | 2.25 | 2.17 | .136  |
| 44    | 61.79 | 49.95 | 29.87 | 29.05 | 27.23 | 24.79 | 12.95 | 11.47 | 9.60  | 8.50 | 5.17 | 4.09 | 3.61 | 3.18 | 2.79 | 2.56 | 2.42 | 2.32 | 2.24 | .138  |
| 45    | 63.03 | 50.87 | 30.34 | 29.61 | 27.78 | 25.32 | 13.14 | 11.67 | 9.79  | 8.69 | 5.28 | 4.18 | 3.70 | 3.27 | 2.87 | 2.64 | 2.50 | 2.40 | 2.31 | .140  |
| 46    | 64.27 | 51.79 | 30.81 | 30.17 | 28.33 | 25.85 | 13.33 | 11.86 | 9.98  | 8.88 | 5.39 | 4.27 | 3.79 | 3.36 | 2.95 | 2.71 | 2.57 | 2.47 | 2.38 | .142  |
| 47    | 65.50 | 52.70 | 31.28 | 30.73 | 28.88 | 26.38 | 13.52 | 12.05 | 10.17 | 9.07 | 5.50 | 4.36 | 3.88 | 3.45 | 3.03 | 2.79 | 2.64 | 2.54 | 2.45 | .144  |
| 48    | 66.74 | 53.61 | 31.75 | 31.29 | 29.43 | 26.91 | 13.71 | 12.24 | 10.36 | 9.26 | 5.61 | 4.45 | 3.97 | 3.54 | 3.11 | 2.86 | 2.71 | 2.61 | 2.52 | .146  |
| 49    | 67.97 | 54.52 | 32.21 | 31.85 | 29.98 | 27.44 | 13.90 | 12.43 | 10.55 | 9.45 | 5.72 | 4.54 | 4.06 | 3.63 | 3.19 | 2.93 | 2.78 | 2.68 | 2.59 | .148  |
| 50    | 69.15 | 55.43 | 32.68 | 32.41 | 30.53 | 27.97 | 14.09 | 12.62 | 10.74 | 9.64 | 5.83 | 4.63 | 4.15 | 3.72 | 3.27 | 3.00 | 2.85 | 2.75 | 2.66 | .150  |

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$\frac{d}{dt} \int_{\Omega} u^2 dx = -2 \int_{\Omega} |\nabla u|^2 dx + 2 \int_{\partial \Omega} u^2 ds$

[illegible]

[illegible]

1000000

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7 per 1000 in 1970, 10 per 1000 in 1971, 12 per 1000 in 1972, 14 per 1000 in 1973, 16 per 1000 in 1974, 18 per 1000 in 1975, 20 per 1000 in 1976, 22 per 1000 in 1977, 24 per 1000 in 1978, 26 per 1000 in 1979, 28 per 1000 in 1980, 30 per 1000 in 1981, 32 per 1000 in 1982, 34 per 1000 in 1983, 36 per 1000 in 1984, 38 per 1000 in 1985, 40 per 1000 in 1986, 42 per 1000 in 1987, 44 per 1000 in 1988, 46 per 1000 in 1989, 48 per 1000 in 1990, 50 per 1000 in 1991, 52 per 1000 in 1992, 54 per 1000 in 1993, 56 per 1000 in 1994, 58 per 1000 in 1995, 60 per 1000 in 1996, 62 per 1000 in 1997, 64 per 1000 in 1998, 66 per 1000 in 1999, 68 per 1000 in 2000, 70 per 1000 in 2001, 72 per 1000 in 2002, 74 per 1000 in 2003, 76 per 1000 in 2004, 78 per 1000 in 2005, 80 per 1000 in 2006, 82 per 1000 in 2007, 84 per 1000 in 2008, 86 per 1000 in 2009, 88 per 1000 in 2010, 90 per 1000 in 2011, 92 per 1000 in 2012, 94 per 1000 in 2013, 96 per 1000 in 2014, 98 per 1000 in 2015, 100 per 1000 in 2016, 102 per 1000 in 2017, 104 per 1000 in 2018, 106 per 1000 in 2019, 108 per 1000 in 2020, 110 per 1000 in 2021, 112 per 1000 in 2022, 114 per 1000 in 2023, 116 per 1000 in 2024, 118 per 1000 in 2025, 120 per 1000 in 2026, 122 per 1000 in 2027, 124 per 1000 in 2028, 126 per 1000 in 2029, 128 per 1000 in 2030, 130 per 1000 in 2031, 132 per 1000 in 2032, 134 per 1000 in 2033, 136 per 1000 in 2034, 138 per 1000 in 2035, 140 per 1000 in 2036, 142 per 1000 in 2037, 144 per 1000 in 2038, 146 per 1000 in 2039, 148 per 1000 in 2040, 150 per 1000 in 2041, 152 per 1000 in 2042, 154 per 1000 in 2043, 156 per 1000 in 2044, 158 per 1000 in 2045, 160 per 1000 in 2046, 162 per 1000 in 2047, 164 per 1000 in 2048, 166 per 1000 in 2049, 168 per 1000 in 2050, 170 per 1000 in 2051, 172 per 1000 in 2052, 174 per 1000 in 2053, 176 per 1000 in 2054, 178 per 1000 in 2055, 180 per 1000 in 2056, 182 per 1000 in 2057, 184 per 1000 in 2058, 186 per 1000 in 2059, 188 per 1000 in 2060, 190 per 1000 in 2061, 192 per 1000 in 2062, 194 per 1000 in 2063, 196 per 1000 in 2064, 198 per 1000 in 2065, 200 per 1000 in 2066, 202 per 1000 in 2067, 204 per 1000 in 2068, 206 per 1000 in 2069, 208 per 1000 in 2070, 210 per 1000 in 2071, 212 per 1000 in 2072, 214 per 1000 in 2073, 216 per 1000 in 2074, 218 per 1000 in 2075, 220 per 1000 in 2076, 222 per 1000 in 2077, 224 per 1000 in 2078, 226 per 1000 in 2079, 228 per 1000 in 2080, 230 per 1000 in 2081, 232 per 1000 in 2082, 234 per 1000 in 2083, 236 per 1000 in 2084, 238 per 1000 in 2085, 240 per 1000 in 2086, 242 per 1000 in 2087, 244 per 1000 in 2088, 246 per 1000 in 2089, 248 per 1000 in 2090, 250 per 1000 in 2091, 252 per 1000 in 2092, 254 per 1000 in 2093, 256 per 1000 in 2094, 258 per 1000 in 2095, 260 per 1000 in 2096, 262 per 1000 in 2097, 264 per 1000 in 2098, 266 per 1000 in 2099, 268 per 1000 in 2100, 270 per 1000 in 2101, 272 per 1000 in 2102, 274 per 1000 in 2103, 276 per 1000 in 2104, 278 per 1000 in 2105, 280 per 1000 in 2106, 282 per 1000 in 2107, 284 per 1000 in 2108, 286 per 1000 in 2109, 288 per 1000 in 2110, 290 per 1000 in 2111, 292 per 1000 in 2112, 294 per 1000 in 2113, 296 per 1000 in 2114, 298 per 1000 in 2115, 300 per 1000 in 2116, 302 per 1000 in 2117, 304 per 1000 in 2118, 306 per 1000 in 2119, 308 per 1000 in 2120, 310 per 1000 in 2121, 312 per 1000 in 2122, 314 per 1000 in 2123, 316 per 1000 in 2124, 318 per 1000 in 2125, 320 per 1000 in 2126, 322 per 1000 in 2127, 324 per 1000 in 2128, 326 per 1000 in 2129, 328 per 1000 in 2130, 330 per 1000 in 2131, 332 per 1000 in 2132, 334 per 1000 in 2133, 336 per 1000 in 2134, 338 per 1000 in 2135, 340 per 1000 in 2136, 342 per 1000 in 2137, 344 per 1000 in 2138, 346 per 1000 in 2139, 348 per 1000 in 2140, 350 per 1000 in 2141, 352 per 1000 in 2142, 354 per 1000 in 2143, 356 per 1000 in 2144, 358 per 1000 in 2145, 360 per 1000 in 2146, 362 per 1000 in 2147, 364 per 1000 in 2148, 366 per 1000 in 2149, 368 per 1000 in 2150, 370 per 1000 in 2151, 372 per 1000 in 2152, 374 per 1000 in 2153, 376 per 1000 in 2154, 378 per 1000 in 2155, 380 per 1000 in 2156, 382 per 1000 in 2157, 384 per 1000 in 2158, 386 per 1000 in 2159, 388 per 1000 in 2160, 390 per 1000 in 2161, 392 per 1000 in 2162, 394 per 1000 in 2163, 396 per 1000 in 2164, 398 per 1000 in 2165, 400 per 1000 in 2166, 402 per 1000 in 2167, 404 per 1000 in 2168, 406 per 1000 in 2169, 408 per 1000 in 2170, 410 per 1000 in 2171, 412 per 1000 in 2172, 414 per 1000 in 2173, 416 per 1000 in 2174, 418 per 1000 in 2175, 420 per 1000 in 2176, 422 per 1000 in 2177, 424 per 1000 in 2178, 426 per 1000 in 2179, 428 per 1000 in 2180, 430 per 1000 in 2181, 432 per 1000 in 2182, 434 per 1000 in 2183, 436 per 1000 in 2184, 438 per 1000 in 2185, 440 per 1000 in 2186, 442 per 1000 in 2187, 444 per 1000 in 2188, 446 per 1000 in 2189, 448 per 1000 in 2190, 450 per 1000 in 2191, 452 per 1000 in 2192, 454 per 1000 in 2193, 456 per 1000 in 2194, 458 per 1000 in 2195, 460 per 1000 in 2196, 462 per 1000 in 2197, 464 per 1000 in 2198, 466 per 1000 in 2199, 468 per 1000 in 2200, 470 per 1000 in 2201, 472 per 1000 in 2202, 474 per 1000 in 2203, 476 per 1000 in 2204, 478 per 1000 in 2205, 480 per 1000 in 2206, 482 per 1000 in 2207, 484 per 1000 in 2208, 486 per 1000 in 2209, 488 per 1000 in 2210, 490 per 1000 in 2211, 492 per 1000 in 2212, 494 per 1000 in

[illegible]

**APPENDIX B**  
**TABLE B**  
**PERCENTAGE POINTS OF THE CHI-SQUARE DISTRIBUTION (Condensed)**

## PERCENTAGE POINTS OF $Q(\nu|\chi^2)$ – CONDENSED TABLE B

In this appendix, we give a condensed version of the table in Appendix A. The values of  $Q$  and  $\nu$  are taken from the table given in [1, pp. 984-985]. There are numerous errors in that table. One of the largest occurs for  $\nu = 7$ ,  $Q = .995$ . They give  $\chi^2 = .989265$  instead of a correct value of  $\chi^2 = .989256$ .

The values of  $\chi^2$  are given to seven correct significant digits in Table B.

5

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[illegible]

**APPENDIX C**  
**PROGRAM LISTING – GAMINV**

## GAMINV – PROGRAM LISTING FOR COMPUTING $x$ FROM THE INCOMPLETE GAMMA FUNCTION RATIOS AND $a$

### Purpose

This subroutine, for a given  $P$ ,  $Q$  and  $a$ , is used to find the  $x$  value for which

$$P = \int_0^x e^{-t} t^{a-1} dt / \int_0^\infty e^{-t} t^{a-1} dt, \quad a > 0, \quad x \geq 0$$

$$Q = 1 - P$$

### Calling Sequence

Call GAMINV ( $a, x, x_0, P, Q, IERR$ )

where  $a, x, P, Q$  are as above  $x_0$  is an optional input starting value.  $x_0$  must be set to zero if user does not want to specify a starting value.  $IERR$  is a parameter set by GAMINV. Normally  $IERR$  is an integer from 1 to 19 which denotes the number of iterations the Newton-Raphson method has taken to compute the  $x$  value.  $IERR$  is stored in  $Y$  (See page 10).

$IERR = 0$  when either  $a = 1$  or  $a < 1$  with  $Q\Gamma(a) \geq .45$  and  $\{(ax)/(1+a)\} < 10^{-14}$ , or  $P = 1, Q = 0$  or  $P = 0, Q = 1$ . In every case an acceptable value of  $x$  is given

$IERR = -2$  when  $a \leq 0$ . No  $x$  value is given.

$IERR = -4$  when  $|P + Q - 1| > 5 \cdot 10^{-13}$ . No  $x$  value is given.

$IERR = -5$  when  $x_0 \leq 0$ . No  $x$  value is given.

$IERR = -6$  when the Newton-Raphson method has taken 20 iterations to compute the  $x$  value. The  $x$  value is given but may not be very accurate.

$IERR = -7$  when user has specified a poor input starting value. A subsequent  $x_0$  of the Newton-Raphson method is negative. No  $x$  value is given.

**Termination procedure** The routine uses the Newton-Raphson method and terminates when  $n = 20$  (which should never occur) or when

$$|x_{n+1} - x_n| \leq 5 \times 10^{-5} x_{n+1} \quad n \leq 19$$

and one of two other inequalities (38) or (39) are satisfied. If (38) or (39) is not satisfied one more iteration is done.

Accuracy: One can expect about 8 correct significant digits in the output value of  $x$ . This can be improved by another call to the routine with that  $x$  specified as  $x_0$ .

Restrictions:  $a > 0$ ,  $x_0 \geq 0$

If  $P = 0$  and  $Q = 1$  then  $x = 0$  is returned.

If  $P = 1$  and  $Q = 0$  then  $x = 10^{320}$  is returned  $|P + Q - 1| \leq 5 \cdot 10^{-13}$ .

Remark: GAMINV uses 3 subroutines, PAX6, EVA and GAMCØ3.

# Program Listing - GAMINV

```

SUBROUTINE GAMINV ( A,XNP1,S3,PI,QI,IT )
  DIMENSION C2(4)
  DATA ( C2(I),I=1,4 ) /.15,.05,.01,.001 /
  DATA RT2/1.4142 13562 37310/,ALAM/5.E-5/,TALAM/1.E-4/,EPS/1.E-5/,
1    EPS3/1.E-14/,EPS1/5.E-13/,J/0/
  XNP1=C.
  IT=0
  IF ( PI.EQ.0..AND.QI.EQ.1. ) RETURN
  IF ( PI.NE.1..OR.QI.NE.0. ) GO TO 2011
  XNP1=1.E+320
  RETURN
2011 CONTINUE
  IF ( A.GT.J. ) GO TO 2:15
  IT=-2
  RETURN
2J15 CONTINUE
  IF ( ABS(PI+QI-1.) .LE. EPS1 ) GO TO 2:17
  IT=-4
  RETURN
2J17 CONTINUE
  IF ( S3.GE.0. ) GO TO 2J41
  IT=-5
  RETURN
2041 CONTINUE
  IF ( A.NE.1. ) GO TO 2:51
  XNP1=-ALOG(QI)
  RETURN
2051 CONTINUE
  IF ( S3.EQ.0. ) GO TO 3312
  XN=S3
  IF ( PI.LE.0.5 ) GO TO 3017
  GO TO 3317
3011 CONTINUE
  T3=1./A
  AP=(PI+A*T3)**(T3)
  XN=AP/(1.-AP/(A+1.))
  T3=(XN*A)/(A+1.)
  XNP1=XN
  IF ( T3.LT.EPS3 ) RETURN
  IF ( XN.LE.0.57 ) GO TO 3015
  B1LN=ALOG(91)
  A3=A-1.
  T1=-B1LN+A3*ALOG(-B1LN)
  X4=-B1LN-(-A3)*ALOG(T1)-ALOG( (T1+2.-A)/(T1+1.) )
  XN=AMAX1(XN,X4)
3015 CONTINUE
  IF ( PI.GT.0.5 ) GO TO 3317
3017 CONTINUE
  IT=J
3021 CONTINUE
  CALL PAX6 ( A,XN,P,Q,J,R )
  IF ( P.GT.1. ) GO TO 9071
  IF ( P.EQ.0..OR.Q.EQ.0. ) GO TO 9071
  XNP1=XN*(1.-(P-PI)/R)
  IT=IT+1

```

# Program Listing - GAMINV

```

      IF ( IT.GE.20 ) GO TO 3039
      T1=ABS(XNP1-XN)
      IF ( T1 .GT.(ALAM*XNP1)) GO TO 3031
      T1=T1*T1
      IF ( 4.LE.(XNP1-1.) ) GO TO 3028
      AP1=A+1.
      T3=T1*(AP1-XNP1)*ABS(A-XNP1-1.)
      T5=(TALAM*XNP1*XNP1*AP1)/A
      IF ( T3.LE.T5 ) RETURN
      GO TO 3029
3028 CONTINUE
      T3=T1*(XNP1+1.-A)*(XNP1+2.-A)
      T5=TALAM*XNP1*(XNP1+1.)
      IF ( T3.LE.T5 ) RETURN
3029 CONTINUE
      CALL PAX6 ( A,XNP1,P,Q,J,R )
      IF ( P.GT.1. ) GO TO 3071
      IF ( 2.EQ.J. ) CALL EVA(A,XNP1,R )
      XN=XNP1
      XNP1=XNP1*(1.-(P-PI)/R)
      IT=IT+1
      IF ( IT.GE.20 ) GO TO 3039
      RETURN
3071 CONTINUE
      XN=XNP1
      GO TO 3021
3312 CONTINUE
      IF ( 1.GT.1. ) GO TO 3331
      CALL GAMC03 ( A,H,EPS,T5 )
      B1=Q1*T5
      IF ( B1.GE.0.4 ) GO TO 3011
      B1LN=ALOG(B1)
      A3=A-1.
      T1=-B1LN+A3*ALOG(-B1LN)
      XN=-B1LN-(-A3)*ALOG(T1)-ALOG( (T1+2.-A)/(T1+1.) )
      IF ( XN.GE.0.67 ) GO TO 3316
      T3=1./A
      AP=(PI*A*T5)**(T3)
      XM=AP/(1.-AP/(A+1.))
      XN=AMAX1(XN,XM)
3316 CONTINUE
      IF ( PI.LE.0.5 ) GO TO 3017
3317 CONTINUE
      IT=0
3321 CONTINUE
      CALL PAX6 ( A,XN,P,Q,J,R )
      IF ( P.GT.1. ) GO TO 3071
      IF ( P.EQ.0..OR.Q.EQ.0. ) GO TO 3071
      XNP1=XN*(1.+(Q-Q1)/R)
      IT=IT+1
      IF ( IT.GE.20 ) GO TO 3009
      T1=ABS(XNP1-XN)
      IF ( T1 .GT.(ALAM*XNP1)) GO TO 3331
      T1=T1*T1
      IF ( 4.LE.(XNP1-1.) ) GO TO 3325

```

Program Listing - GAMINV

```

AP1=A+1.
T3=T1*(AP1-XNP1)*ABS(A-XNP1-1.)
T3=(TALAM*XNP1*XNP1*AP1)/A
IF ( T3.LE.T5 ) RETURN
GO TO J327
3325 CONTINUE
T3=T1*(XNP1+1.-A)*(XNP1+2.-A)
T5=TALAM*XNP1*(XNP1+1.)
IF ( T3.LE.T5 ) RETURN
3327 CONTINUE
CALL PAX6 ( A,XNP1,P,Q,J,R )
IF ( P.GT.1. ) GO TO 3071
IF ( R.EQ.0. ) CALL EVA ( A,XNP1,R )
XN=XNP1
XNP1=XNP1*(1.+(Q-Q1)/R)
IT=IT+1
IF ( IT.GE.20 ) GO TO 30J9
RETURN
3331 CONTINUE
XN=XNP1
GO TO 3321
5331 CONTINUE
P=PI
Q=2I
IF ( Q1.GT.0.5 ) T=SQR((-2.*ALOG(PI) )
IF ( Q1.LE.0.5 ) T=SQR((-2.*ALOG(Q1) )
XP=T+((( -0.21352 34937 15827*T-4.253, 21559 671.4)*T
1 -11.661 67202 83963)*T-3.3112 53221 02741)/
1 (((0.36117 06101 894202-1*T+1.2736 44897 82223)*T
1 +5.4069 15977 63039)*T+6.0105 37656 25462)*T+1.)
IF ( PI.LE.0.5 ) XP=-XP
XPSQ=XP*XP
G1=XP*RT2
G2=.66566 66666 66667*(XPSQ-1. )
XPC3=XPSQ*XP
G3=(XP(3-7.*XP)/(9.*RT2)
XP4TH=XPC3*XP
G4=-(5.*XP4TH+14.*XPSQ-32.)/435.
G5=(9.*XP4TH*XP+256.*XPC3-433.*XP)/(4860.*RT2)
T1=2.*A
RT2A=SQR(T1)
XN=.5*( T1 +G1*RT2A+G2+G3/RT2A+G4/ T1 +G5/(T1*RT2A))
IF ( PI.GT.0.5 ) GO TO 5471
IF ( A.GT.19. ) GO TO 3017
IF ( XN.GT.(.11 *(A+1.))) GO TO 3017
IF ( A.GT.4. ) GO TO 5469
APP5=A+.5
L3=INT(APP5)
IF ( PI.GT.C2(L3) ) GO TO 3017
5469 CONTINUE
CALL GAMC03 ( A,M,EPS,T1 )
T3=1./A
X5=(PI*A*T1)**(T3)
T3=SQR(1.-(4.*X5)/(A+1. ) )
XN=(2.*X5)/(1.+T3 )

```

# Program Listing - GAMINV

```

GO TO 3917
5471 CONTINUE
IF ( A.GE.11.0 ) GO TO 3317
IF ( XN.LE.(4.8*A) ) GO TO 3317
CALL GAMC03 ( A,H,EPS,T1 )
B1=21*T1
B1LN=ALOG(B1)
XN=-B1LN-(1.-1)*ALOG(XN)-ALOG((XN+2.-A)/(XN+1.))
GO TO 3317
9009 CONTINUE
IT=-6
RETURN
9071 CONTINUE
IT=-7
XNP1=XN
RETURN
END

```

# Program Listing - GAMINV

```

      SJ3ROJTIME PAX6 ( A,X,AYS,JANS,IOP3,P )
      DIMENSION VA(20),VB(20),ZA(30),ZB(30),SA(20),SB(20)
9.  FORMAT ( 1H0,3H A= ,E22.14,3H X= ,E22.14 )
11  FORMAT ( 15H INPUT ERROR )
      DATA
1  P1/2.4266 79552 35532 E+2 /,
2  P1/2.1979 26161 82942 E+1 /,
3  P2/6.9963 83448 61914 E+3 /,
4  P3/-3.5609 84370 18154 E-2 /,
5  P4/2.1505 88758 65861 E+2 /,
6  Q1/9.1164 90540 45144 E+1 /,
7  Q2/1.5082 79763 04076 E+1 /,
8  Q3/1. /,
9  C1/3.1045 92610 24162 E+2 /
      DATA
1  C1/4.5151 89537 11873 E+2 /,
2  C2/3.3932 09107 34344 E+2 /,
3  C3/1.5298 92050 46940 E+2 /,
4  C4/4.3162 22722 20567 E+1 /,
5  C5/7.2117 58250 84369 E+0 /,
6  C6/5.5419 55174 78974 E-1 /,
7  C7/-1.3086 4857 3 82717E-7 /,
8  A1/40/-2.9961 07077 13542 E-3/,
9  A2/41/-4.9473 09106 23251 E-2 /
      DATA
1  A1/42/-2.2695 05935 39087 E-1 /,
2  A1/43/-2.7866 13046 09648 E-1 /,
3  A1/44/-2.2319 24597 34185 E-2 /,
4  B1/0/1.0620 923.5 28469 E-2 /,
5  B1/1/1.9130 83261 67830 E-1 /,
6  B1/2/1.0516 75107 06793 /,
7  B1/3/1.9973 32018 17135 /,
8  B1/4/1. /,
9  D1/3.0045 92619 50993 E+2 /
      DATA
1  D1/7.9095 09253 27898 E+2 /,
2  D2/3.3135 40948 50610 E+2 /,
3  D3/6.3899 22644 65631 E+2 /,
4  D4/2.7758 54447 43988 E+2 /,
5  D5/7.7000 15293 52295 E+1 /,
6  D5/1.2782 72731 96294 E+1 /,
7  D7/1. /
C      ZST2=SP(OP3+13./OP13936 80. )
C      ZST3=SP(OP361733./OP2J155 3920. )
C      ZST4=SP(OP11388 8261./OP50791 58784 0. )
C      ZST5=SP(OP75692 02533./OP78364 1649 60. )
      DATA
1  C5/5/.46539 65736 46935E-3 /,
2  C5/4/.22422 66600 50012E-2 /,
3  C5/3/.17947 22737 75593E-2 /,
4  C5/2/.24384 14494 74166E-2 /,
5  G44/13/1.7724 53850 90592 /,
6  R12/1/2.5065 28274 63100 /,
7, R13/1/1.7724 53850 90592 /
      DATA ACC1/5.E-13/,ACC3/3.E-7/,ALPHA3/4.892/,

```

# Program Listing - GAMINV

```

1      ALPHA1/7.3+86/,ACO/1.      /,
1      XJ1/31.000/,X03/17.00/,CEP/2.3025 85092 99405/
2      ,UX1/1.0366/,UX3/2.92+5/
3      ,RT2/.1+142 13562 37310E+1/,ABAP/100./
4      ,ALPHA5/3.29053/,X.5/9.7/,JX5/3.887/,ACC5/5.E-4/
      ASAV=A
      IND=1
      ANS=0.
      IF ( IOP3.NE.1 ) GO TO 1105
      ALPHA=ALPHA1
      XJ=XJ1
      ACC=ACC1
      UX=JX1
      GO TO 1111
1105  CONTINUE
      IF ( IOP3.NE.1 ) GO TO 1107
      ALPHA=ALPHA3
      ACC=ACC3
      XJ=XJ3
      UX=UX3
      GO TO 1111
1107  CONTINUE
      ALPHA=ALPHA5
      ACC=ACC5
      XJ=XJ5
      UX=JX5
1111  CONTINUE
      IF ( A.LE.0.0 .OR. X.LT.0.0 ) GO TO 1131
      IF ( X.GT.0.0 ) GO TO 1151
1121  CONTINUE
      GO TO 1171
1131  ANS=2.
      RETURN
1151  CONTINUE
      IF ( A.LT.15. ) GO TO 1331
      RTA=SQRT(A)
      IF ( ACO.LT.ACC1 ) GO TO 1155
      IF ( A.GE.X ) GO TO 1161
      FP=1.-1./(9.*A)*ALPHA/(3.*RTA)
      FP=-FP*FP*FP*A*X
      IF ( FP.GE.0.0 ) GO TO 1191
1155  CONTINUE
      IF ( A.LT.A9A2 ) GO TO 1331
      IF ( (.75*A).GT.X.OR.(1.25*A).LT.X ) GO TO 1331
      GO TO 5011
1161  CONTINUE
      CONTINUE
      FM=1.-1./(9.*A)-ALPHA/(3.*RTA)
      FM=-FM*FM*FM*A*X
      IF ( FM.LE.0. ) GO TO 1121
      GO TO 1155
1171  CONTINUE
      ANS=3.
      QANS=1.
      RETURN

```

Program Listing -- GAMINV

```

1191 CONTINUE
1311 CONTINUE
      ANS=1.
      QANS=3.
      RETURN
1331 CONTINUE
      IF ( A.LE.X ) GO TO 1441
1341 CONTINUE
      IF ( A.GE.30. ) GO TO 1343
      ALGX=ALOG(X)
      T1=-X+A*ALGX
      CALL GAMC03 ( A,H,ACC,GANS )
      R=EXP(T1)/GANS
      GO TO 1349
1343 CONTINUE
      AISQ=1./(A*A)
      T1=A-X+A*ALOG(X/A)+(((AISQ-1.3333 37333 33333)*AISQ+4.666 66666
1 6666667)*AISQ-140.)/(1680.*A)
      R=RTA*EXP(T1)*.39894 22804 01433
1349 CONTINUE
      IF ( A.GT.X ) GO TO 1351
1350 CONTINUE
      IF ( A.LT.1. ) GO TO 1459
      IF ( A.GE.X ) GO TO 3311
      GO TO 3315
1351 CONTINUE
      IF ( R.LE.((.2*A*(1.-X/(A+1.))*ACO)) GO TO 1171
      GO TO 1350
1441 CONTINUE
      IF ( X.GE.X0 ) GO TO 1341
      TWOA=2.*A
      J=INT(TWOA)
      T1=ABS(FLOAT(J)-TWOA)
      IF ( T1.GT.0.) GO TO 1341
      I=J/2
      AF=A-FLOAT(I)
      IF ( AF.GT.0. ) GO TO 6011
      GO TO 6071
1459 CONTINUE
      IF ( X.LT.1.5 ) GO TO 1461
      T1=(2.+X-A)/(1.+X)
      IF ( R.LE.(ACO*X*T1+.2)) GO TO 1311
      IF ( R.GT.(.101*X*T1) ) GO TO 3311
      GO TO 7011
1461 CONTINUE
      INC=1
      GO TO 3011

C
C      THIS IS PART F
C
2011 CONTINUE
      ACC7=.5*ACC
      T7=A*ALGX
      CEE=2.
      T=T7/CEE

```

Program Listing - GAMINV

```

2031  SUM=T
      CEE=CEE+1.
      T=(T*T7)/CEE
      SUM=SJM+T
      IF ( ABS(T).GT.ACC7 ) GO TO 2031
      T2=T7*(1.+SUM)
      TK=-X
      CEE=1.
      AJK=TK/(A+CEE)
      SJM=AJK
2071  CONTINUE
      CEE=CEE+1.
      TK=-(X*TK)/CEE
      AJK=TK/(A+CEE)
      SUM=SUM+AJK
      IF ( ABS(AJK).GE.-ACC*SUM) GO TO 2071
      T3=-A*SUM
      T1=H
      T4=T1+T2
      T5=T1*T2
      QANS=T3-T4+T3*(T4+T5)-T5
      ANS=1.-QANS
      RETURN
3005  CONTINUE
      IF ( X.LE.CEP ) GO TO 3011
      IF ( X.LT.X0 ) GO TO 7011
      IF ( A.LT.2. ) GO TO 3006
      IF ( (R*(X+1.)).LE.(ACO*X*(2.+X-A)*.2) ) GO TO 1311
      GO TO 9011
3006  CONTINUE
      IF ( R.LE.(.2*ACO*(X+1.-A)) ) GO TO 1311
      GO TO 9011

C
C
C      THIS IS PART A
C
3011  CONTINUE
      HAVACC=ACC*.5
      ROVA=R/A
      SNP1=1.
      SUM=SNP1
      CEE=A
3031  CONTINUE
      CEE=CEE+1.
      T1=X/CEE
      SNP1=SNP1*T1
      SUM=SUM+SNP1
      IF ( T1.GT..66666 66666 66667 ) GO TO 3031
3041  CONTINUE
      IF ( SNP1.LE.HAVACC ) GO TO 3051
      CEE=CEE+1.
      SNP1=(SNP1*X)/CEE
      SUM=SUM+SNP1
      GO TO 3041

```

Program Listing - GAMINV

```

3051  CONTINUE
      ANS=ROVA*SUM
      QANS=1.-ANS
      IF ( !NO.EQ.1.AND.ANS.GT.0.9 ) GO TO 2011
      RETURN

C
C      THIS IS PART E1
C
5011  CONTINUE
      AISQ=1./(A*A)
      T1=A-X+A*ALOG(X/A)*(((AISQ-1.3333 33333 33333)*AISQ+4.666 66666
1  666667)*AISQ-140.)/(1680.*A)
      R=RTA*EXP(T1)*.39694 22804 01433
      ASAV=A
      A=A-1.
      ALPHY=3.*SQRT(A+2./3.)
      ALPINV=1./ALPHY
      A2THRD=A+.66666 66666 66667
      DELTA=(X-A)-.66666 66666 66667
      SZ=DELTA/A2THRD
      Z=EXP(.33333 33333 33333*ALOG(X/A2THRD))
      SQ=(ALPHY*SZ)/((Z+1.)*Z+1.)
      XSAV=X
      X=(SQ*SQ)/2.
      RTX=ABS(SQ)/RT2
      T5=EXP(-X)
      IF ( X.GT.0.25 ) GO TO 5361
      T1=((P3*X+P2)*X+P1)*X+P0
      T3=((Q3*X+Q2)*X+Q1)*X+Q0
      DEL=RTX*(T1/T3)
      CERF=1.-DEL
      GO TO 5381
5361  CONTINUE
      IF ( X.GT.16.) GO TO 5371
      T1=C1+RTX*(C1+RTX*(C2+RTX*(C3+RTX*(C4+RTX*(C5+RTX*(C6+C7*RTX))))))
1  )
      T3=D0+RTX*(D1+RTX*(D2+RTX*(D3+RTX*(D4+RTX*(D5+RTX*(D6+RTX*D7))))))
1  )
      CERF=T1/T3
      DEL=1.-CERF
      GO TO 5381
5371  CONTINUE
      T=1./X
      T1=ALPH0+T*(ALPH1+T*(ALPH2+T*(ALPH3+T*ALPH4)))
      T3=BET1+T*(BET2+T*(BET3+T*(BET4)))
      CERF=(1./RTX)*(1./RT PI+T1/(T3*X))
      DEL=1.-CERF
5381  CONTINUE
      Z43=1.
      IF ( X.LE.0.25 ) Z80=(.5*CERF*RT2PI)/T5
      IF ( X.GT.0.25 ) Z80=.5*CERF*RT2PI
      IF ( SQ.GE.0. ) GO TO 5389
      Z43=-1.
5389  CONTINUE
      X=XSAV

```

Program Listing - GAMINV

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```

Z3(1)=Z30
ZA(1)=ZA0
S3S2=S3*S2
T7=-1./ (ABS(S3))
TOL=ACC*Z30
DO 5391 L=2,5
K=2*(L-1)
T7=T7*S3S2
Z3(L)=-T7
1  + (FLOAT(K)-1.) * Z3(L-1)
ZA(L)=-T7 * S0 + FLOAT(K) * ZA(L-1)
5391 CONTINUE
V3(1)=Z3(1)
V3(2)=-.63333 33333 33333E-1 * Z3(3)
V4(1)=.66666 66666 66666E-1 * ZA(3)
S3(1)=V3(1)
ALPHS3=ALFINV*ALPINV
ALPHC3=ALPHSQ*ALPINV
S3(2)=V3(2)*ALPHS3
SA(1)=V4(1)*ALPHC3
T15=S3(1)+S3(2)
T17=SA(1)
V3(3)=- (Z3(4)-.0625 * Z3(5)) * .55555 55555 55556E-1
V4(2)=.47619 04761 90476E-1 * ZA(4) - .55555 55555 55556E-2 * ZA(5)
T23=ALPHSQ
I5=3
MF=J
5395 CONTINUE
I7=I5-1
T23=T23*ALPHSQ
S3(I5)=V3(I5)*T23
S4(I7)=V4(I7)*T23*ALPINV
T15=T15+S3(I5)
T17=T17+SA(I7)
IF (ABS(S3(I5)).LT.TOL.AND.ABS(SA(I7)).LT.TOL) GO TO 5431
I3=2*I5
I5=I5+1
T7=T7*S3S2
T25=6.*FLOAT(I5)-7.
Z3(I3)=-T7+T25*Z3(I3-1)
Z4(I3)=-T7*S0+(T25+1.)*Z4(I3-1)
T7=T7*S3S2
Z3(I3+1)=-T7+(T25+2.)*Z3(I3)
Z4(I3+1)=-T7*S0+(T25+3.)*Z4(I3)
MF=MF+1
GO TO ( 5397,5399,5401,5403,5405,5407,5409,5411,5413,5415,5431),MF
1
5397 CONTINUE
V3(4)=- (Z3(5)-.16444 44444 44444E-2 * Z3(6) + .23148 14814 81481E-2 * Z3(7)
1  ) * .41666 66666 66667E-1
VA(3)=(ZA(5)-.20714 28571 42857 * ZA(6) + .00625 * ZA(7)) * .37037 03703
1  73370E-1
GO TO 5395
5399 CONTINUE
V3(5)=- (Z3(6)-.24370 10582 01058 * Z3(7) + .11342 59259 25926E-1 * Z3(8)

```

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PERMIT FULLY LEGAL

Program Listing - GAMINV

```

1      1-.60281 63580 24691E-4*ZB(9))*.33333 33333 33333E-1
VA(4)=.33303 03030 30303E-1*ZA(6)-.85097 00176 36684E-2*ZA(7)
1      +.52336 86.67 01940E-3*ZA(6)-.64300 41152 26337E-5*ZA(9)
GO TO 5395
5401 CONTINUE
V3(6)=-.29(7)-.31303 85487 52834*ZB(8)+.23806 21693 12109E-1*Z3(9)
1      1-.47.67 90123 45679E-3*ZB(1))+.12050 32716 04938E-5*Z3(11))+
2      .27777 77777 77778E-1
VA(5)=.25641 12564 10256E-1*ZA(7)-.37892 14900 32601E-2*ZA(3)+
1      .70924 16225 74356E-3*ZA(9)-.21568 19017 93063E-4*ZA(10)
2      +Z4(11)*.13395 91906 72154E-6
GO TO 5395
5403 CONTINUE
VA(5)=+.22222 22222 22222E-1*ZA(8)-.88026 17135 95047E-2*ZA(9)+
1      .10129 13208 68040E-2*ZA(10)-.42538 29446 73068E-4*ZA(11)+
2      .62437 74387 13028E-6*ZA(12)-.22326 53177 86923E-6*ZA(13)
VB(7)=-.23809 52380 95238E-1*ZB(8)+.88185 92672 75934E-2*ZB(9)-
1      .90642 29253 23273E-3*ZB(10)+.31511 18214 77562E-4*ZB(11)-
2      .32596 73639 68907E-6*Z3(12)+.40513 60737 22756E-9*Z9(13)
GO TO 5395
5405 CONTINUE
VA(7)=+.19607 84313 72549E-1*ZA(9)-.86836 00350 26702E-2*ZA(10)+
1      .11301 47027 03357E-2*ZA(11)-.66655 77815 71536E-4*ZA(12)+
2      .15617 53570 88423E-5*ZA(13)-.13739 92297 55917E-7*ZA(14)+
3      .31309 07191 48504E-10*ZA(15)
VB(8)=-.20833 33333 33333E-1*Z3(9)+.87544 99954 20366E-2*ZB(10)-
2      .11092 44092 74237E-2*ZB(11)+.54338 41632 21759E-4*Z3(12)-
3      .10360 16990 45843E-5*ZB(13)+.63258 50670 62948E-3*ZB(14)-
3      .55373 34270 50400E-11*ZB(15)
GO TO 5395
5407 CONTINUE
VA(8)=+.17543 85904 91228E-1*ZA(10)-.84985 14229 13981E-2*ZA(11)+
1      .13448 60337 51072E-2*ZA(12)-.92061 86407 70127E-4*ZA(13)+
2      .29398 23607 35374E-5*ZA(14)-.42707 63569 50073E-7*ZA(15)+
3      .24541 46544 68959E-9*ZA(16)-.36915 56180 33933E-12*ZA(17)
VB(9)=-.18518 51851 65185E-1*Z3(10)+.65966 42554 97589E-2*Z3(11)-
1      .12740 20546 38934E-2*Z3(12)+.79204 62192 68942E-4*ZB(13)-
2      .21983 32483 95004E-5*Z3(14)+.25640 60419 02548E-7*ZB(15)-
3      .10320 26650 58016 E-9*Z3(16)+.57600 56531 74020E-13*Z3(17)
GO TO 5395
5409 CONTINUE
VA(9)=+.15373 01007 30159E-1*ZA(11)-.82821 56153 67318E-2*ZA(12)
1      +.14652 06930 61439E-2*ZA(13)-.11757 92089 58914E-3*ZA(14)+
2      .47165 76990 79954E-5*ZA(15)-.95201 29482 98324E-7*Z1(16)+
3      .92092 73029 09851E-3*ZA(17)-.36402 25970 59366E-11*ZA(18)+
4      .38453 71021 18680E-14*ZA(19)
V3(10)=-.16666 00060 66667E-1*ZB(11)+.83928 01741 73222E-2*Z9(12)
1      -.14082 22293 54033E-2*Z3(13)+.10485 97493 66735E-3*ZB(14)-
2      .37786 94453 83984E-5*ZB(15)+.65709 46457 57853E-7*ZB(16)-
3      .06433 50733 06120E-9*Z3(17)+.13412 65412 18996E-11*Z3(18)-
4      .53407 93084 98167E-15*Z3(19)
GO TO 5395
5411 CONTINUE
VA(10)=+.14492 75302 31884E-1*ZA(12)-.80534 46095 24176E-2*ZA(13)
2      +.15625 36761 62327E-2*ZA(14)-.14249 82760 43991E-3*ZA(15)+

```

# Program Listing -- GAMINV

```

3      .57347 44263 92697E-5*ZA(16)-.17514 13319 57715E-6*ZA(17)+
4      .24007 91370 41612E-5*ZA(18)-.16288 16309 64713E-10*ZA(19)+
5      .46225 32193 27600E-13*ZA(20)-.35605 28723 32111E-16*ZA(21)
V3(11)=-.15151 51515 15152E-1*ZB(12)+.81685 47795 41828E-2*ZB(13)
1      -.15164 52843 22835E-2*ZB(14)+.13014 45605 38248E-3*ZB(15)-
2      .57147 99417 62549E-5*ZB(16)+.13158 76549 27232E-6*ZB(17)-
3      .15383 56544 74373E-8*ZB(18)+.82135 07414 80055E-11*ZB(19)-
4      .15509 66311 87868E-13*ZB(20)+.44506 60904 15139E-17*ZB(21)
GO TO 5395
5413  CONTINUE
VA(11)=+.13333 33333 33333E-1*ZA(13)-.78228 73159 47945E-2*ZA(14)
1      +.15412 35305 54189E-2*ZA(15)-.16641 22539 53536E-3*ZA(16)+
2      .91363 09627 54997E-5*ZA(17)-.28427 17670 98726E-6*ZA(18)+
3      .50343 42786 29405E-8*ZA(19)-.49118 23691 34031E-10*ZA(20)+
4      .24317 07160 76481E-12*ZA(21)-.51251 26773 74051E-15*ZA(22)+
5      .29671 7269 43426E-13*ZA(23)
V3(12)=-.13888 88888 88889E-1*ZB(13)+.79379 48362 75189E-2*ZB(14)
1      -.16039 76493 89170E-2*ZB(15)+.15459 78095 11729E-3*ZB(16)-
2      .79380 81011 28000E-5*ZB(17)+.22651 75615 82738E-6*ZB(18)-
3      .35325 6641 8641E-8*ZB(19)+.29351 25130 22109E-10*ZB(20)-
4      .11351 52915 07799E-12*ZB(21)+.15785 01067 33903E-15*ZB(22)-
6      .33717 12606 17530E-13*ZB(23)
GO TO 5395
5415  CONTINUE
VA(12)=+.12345 67901 23457E-1*ZA(14) -.75962 63771 72480E-2*ZA(11)
1      5)+.17048 20355 90103E-2*ZA(16)-.18910 65799 70833E-3*ZA(17)+
2      .11572 03320 56449E-5*ZA(18)-.42273 44701 27948E-6*ZA(19)+
2      .91376 18615 14362E-8*ZA(20)-.11653 40193 25387E-9*ZA(21)+
3      .94315 10565 35040E-12*ZA(22)-.31318 52910 85580E-14*ZA(23)+
4      .50384 30725 14400E-17*ZA(24)-.22478 06537 45020E-20*ZA(25)
V3(13)=-.12820 51282 05120E-1*ZB(14)+.77088 28747 69910E-2*ZB(15)
1      -.16747 26889 27663E-2*ZB(16)+.17731 99594 95527E-3*ZB(17)-
2      .15383 04179 05402E-4*ZB(18)+.34937 60792 28262E-6*ZB(19)-
3      .58844 70270 71384E-8*ZB(20)+.77494 50300 60715E-10*ZB(21)-
4      .47532 73760 28715E-12*ZB(22)+.13508 28991 58372E-14*ZB(23)-
5      .14341 01846 89323E-17*ZB(24)+.23414 67226 51062E-21*ZB(25)
GO TO 5395
5431  CONTINUE
T=1./A
CST=(((((CST5*T-CST4)*T+CST3)*T+CST2)*T-.11959 87654 32199E-1)*T
1      +.27777 77777 77778 E-1)*T+1.
PAP1X=(CST*(T15+T17)*T5)/RT2PI
A=ASAV
IF ( S..LT.). ) GO TO 5441
QANS=PAP1X
ANS=1.-QANS
GO TO 5451
5441  CONTINUE
ANS=PAP1X
QANS=1.-ANS
5451  CONTINUE
RETURN

```

C  
C  
C

THIS IS PART 01

Program Listing - GAMINV

```

6011 CONTINUE
      N=0
      RTX=SQRT(X)
      T5=EXP(-X)
      RN=T5/(RTX*GAMPT5)

C
C      THIS IS PART B1 SUPPLEMENT
C
      IF ( X.GT.16.) GO TO 6J31
      T1=CU+RTX*(C1+RTX*(C2+RTX*(C3+RTX*(C4+RTX*(C5+RTX*(C6+C7*RTX))))))
1      T3=00+RTX*(01+RTX*(02+RTX*(03+RTX*(04+RTX*(05+RTX*(06+RTX*07))))))
1      DEL=(T5*T1)/T3
      GO TO 6J91
6031 CONTINUE
      T=1./X
      T1=ALPH0+T*(ALPH1+T*(ALPH2+T*(ALPH3+T*ALPH4)))
      T3=3ET0+T*(3ET1+T*(3ET2+T*(3ET3+T*3ET4)))
      DEL=( T5 /RTX)*(1./RTPI +T1/(T3*X))
      GO TO 6091
6071 CONTINUE
      N=1
      RN=EXP(-X)
      DEL=RN
6091 CONTINUE
      PNCX=DEL
      CEE=AF+FLCAT(N)-1.
6101 CONTINUE
      IF ( N.EQ.I ) GO TO 6111
      N=N+1
      CEE=CEE+1.
      RN=(X*RN)/CEE
      PNCX=PNCX+RN
      GO TO 6101
6111 CONTINUE
      R=X*RN
      QANS=PNCX
      ANS=1.-QANS
      RETURN

C
C      THIS IS PART C
C
7011 CONTINUE
      A2NM1=1.
      A2N=1.
      B2NM1=X
      B2N=X+1.-A
      AN=1.
7031 CONTINUE
      A2NM1=X*A2N+AN*A2NM1
      B2NM1=X*B2N+AN*B2NM1
      AN0=A2NM1/B2NM1
      AN=AN+1.
      SA2N=AN-A

```

# Program Listing - GAMINV

```

A2N=A2NM1+SA2N*A2N
B2N=B2NM1+SA2N*B2N
ANJ=A2N/B2N
IF ( ABS(ANJ-AMJ).GE.(ACC*ANG) ) GO TO 7031
QANS=R*ANJ
ANS=1.-QANS
RETURN

```

```

C
C      THIS IS PART D
C

```

```

9011 CONTINUE
    SNP1=1.
    SUM=SNP1
    CEE=A
9031 CONTINUE
    CEE=CEE-1.
    SNP1=(SNP1*CEE)/X
    SUM=SJM+SNP1
    IF ( ABS(SNP1).GE.ACC ) GO TO 9031
    QANS=(R*SUM)/X
    ANS=1.-QANS
    RETURN
END

```

# Program Listing - GAMINV

```

SUBROUTINE GAMC03 ( A,M,      AC ,T1 )
DIMENSION C(30)
DATA ( C(I),I=3,18 ) /
1  +.57721 56649 01533 E+0 ,
2  -.65587 80715 2J254 E+0 ,
3  -.42002 63503 40952 E-1 ,
4  +.16653 86113 02291 E+0 ,
5  -.42197 73455 55443 E-1 ,
6  -.95219 71527 87697 E-2 ,
7  +.72189 43246 66311 E-2 ,
8  -.11651 67591 05907 E-2 ,
9  -.21524 16741 14951E-3 ,
1 +.12805 02023 03116 E-3 ,
2 -.20134 85470 47802 E-4 ,
3 -.12504 93492 14267 E-5 ,
4 +.11330 27231 90170 E-5 ,
5 -.20563 38416 97761 E-6 ,
6 +.50160 95104 48142 E-8 ,
7 +.50020 07644 46922 E-8 /
ACC=.5*AC
I=INT(A)
A=A-FLOAT(I)
IF ( AF.EQ.0 . ) GO TO 3031
CEE=AF-1.
IF ( AF.LT.0.5 ) CEE=AF
PHI=CEE
<=3
ANK=C(K)*CEE
SUM=ANK
3011 CONTINUE
CEE=CEE*PHI
K=K+1
ANK=C(K)*CEE
SUM=SUM+ANK
IF ( ABS(ANK).LT.(ACC*ABS(SUM)) ) GO TO 3031
IF ( K.EQ.18 ) GO TO 3031
GO TO 3011
3031 CONTINUE
H=SUM
IF ( AF.GE.0.5 ) H=(1.-A+SUM)/A
T1=1.+SUM
IF ( AF.LT.0.5 ) T1=AF*T1
T1=1./T1
IF ( I.EQ.0 ) RETURN
AJ=AF-1.
J=J
3051 CONTINUE
J=J+1
AJ=AJ+1.
T1=AJ*T1
IF ( J.LT.I ) GO TO 3051
3071 CONTINUE
GO TO 3151
3091 CONTINUE
J=J

```

Program Listing - GAMINV

```
      T1=1.  
      IF ( I.EQ.1 ) RETURN  
      I=I-1  
3131  CONTINUE  
      J=J+1  
      T1=FLOAT(J)*T1  
      IF ( J.LT.I ) GO TO 3131  
3151  CONTINUE  
      RETURN  
      END
```

# Program Listing - GAMINV

```

SJJROUTINE EVA ( A,X,R )
DATA ACC/5.E-13/
IF ( A.GE.30. ) GO TO 13.3
T1=-X+A*ALOG(X)
CALL GAMCOJ ( A,H,ACC,GANS )
R=EXP(T1)/GANS
RETURN
13.3 CONTINUE
RTA=SQRT(A)
AIS2=1./(A*A)
T1=A-X+A*ALOG(X/A)+(((AISQ-1.3333 33333 33333)*AISQ+4.666 66666
1 666667)*AISQ-140.)/(1680.*A)
R=RTA*EXP(T1)*.39894 22804 01433
RETURN
END

```

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| 19. KEY WORDS (Continue on reverse side if necessary and identify by block number)<br><br>Percentile points of $\chi^2$<br>Newton-Raphson, inverse gamma function                                                                                                                                                                                                                                                                                                                                                                                       |                       |                                                                |
| 20. ABSTRACT (Continue on reverse side if necessary and identify by block number)<br><br>A Fortran IV program is developed for computing the percentage points of the<br>Chisquare distribution. The Newton-Raphson procedure is used with good initial<br>approximations. The maximum number of iterations is four and in most cases only one or<br>two are needed. An extensive table is given of the percentage points $\chi^2$ in terms of $v$ , a<br>positive number, and $Q(v \chi^2)$ , the probability integral of the Chi-square distribution. |                       |                                                                |