PACIFIC MISSILE RANGE
POINT MUGU, CALIFORNIA

Publication No. PMR-MP-59-22

TABLES OF CONFIDENCE INTERVALS FOR
BINOMIAL DISTRIBUTION OF SAMPLE SIZE
2 TO 25 INCLUSIVE, AT VARIOUS LEVELS
OF CONFIDENCE

Prepared by: _____
E. Neuron

Approved by: _____
H. Gumbel
Head, Operations Research Group

17 July 1959

ACKNOWLEDGMENT

TABLE OF CONTENTS

INTRODUCTION

I. Use of the Tables

The tables presented in this publication owe their existence to the need of evaluators of military equipment for confidence intervals on binomial distributions of small sample sizes. These tables offer sample sizes from 2 to 25 inclusive and confidence coefficients from 50% to 99% inclusive.*

To use the tables, it is assumed that an experiment has been conducted using a random sample of size n, r of which have exhibited a specified property. A confidence coefficient must be agreed upon; this confidence coefficient establishes the certainty which one is willing, or able, to place on the estimation of the relative size of that portion of the sampled population which exhibits the specified property. Selecting the table of the proper confidence coefficient, enter the column headed by the proper size n and move down the column until the row marked by r on the left is reached. The two numbers in that row are the boundary values of the confidence limit on the probability of the specified property appearing in any one trial.

---

* Note that confidence coefficients for a confidence interval on a discrete distribution can not be exact. A confidence coefficient of 90% means, in this context, a confidence coefficient of at least 90%. For a full explanation of this fact see pages 510 to 514 of reference 1.

Example 1.

Disregarding all other information, it is known that seven of ten missile rounds fired at a target under "identical" conditions have resulted in hits. What is the "single shot hit probability" of the weapon system under these particular conditions when one can not tolerate a risk greater than 20% of making a false statement?

Then: n = 10

             r = 7

confidence coefficient = 100 - risk = 80%

Hence, the table for 80% confidence coefficient is selected. Proceed to column marked 10 and descend the column to the row marked 7. The two numbers 44.8 and 88.4 are found there. Hence, it is possible to make the following statement:

The true "single shot hit probability" of this particular weapon system under the conditions it was exercised lies between 44.8% and 88.4% at a confidence level of at least 80%.

Example 2.

Three preproduction samples of a radio receiver have been tested under high humidity conditions. Only one receiver operated within specifications for the required period of time. What estimate of the reliability of the operation of preproduction receivers under high humidity can be made if it is desired to have at least an even chance of making the right estimate?

In this case n=3, r=1, and the confidence coefficient is 50%. From the table the following statement can be made:

The reliability of the receivers produced in the preproduction run, when the receivers are operated in a high humidity environment, lies between 9.1% and 67.4% at a confidence level of at least 50%.

The number of confidence coefficients for which values have been computed are necessarily limited. If other confidence coefficients are desired the boundary values of the confidence limits can be computed by the method shown in the next section. A less accurate but more rapid method is that of graphical interpolation shown in figure 1. This is performed by plotting the confidence intervals in the tables versus the confidence coefficient for a given n and r.* Fairing curves through the plotted points will permit the selection of any confidence coefficient between 50% and 100% subject to the accuracy of the curve fit.

II. Computation Procedures

The tables were computed in accordance with the methods shown on pages xxxviii and xxxix of reference 2. The tables of the binomial probability distribution of reference 3 were used in the interpolation process. For a basis for the different formulae in cases where r = 0 or r = n,

---

* For a confidence coefficient of 100% the confidence interval always extends from 0% to 100%.
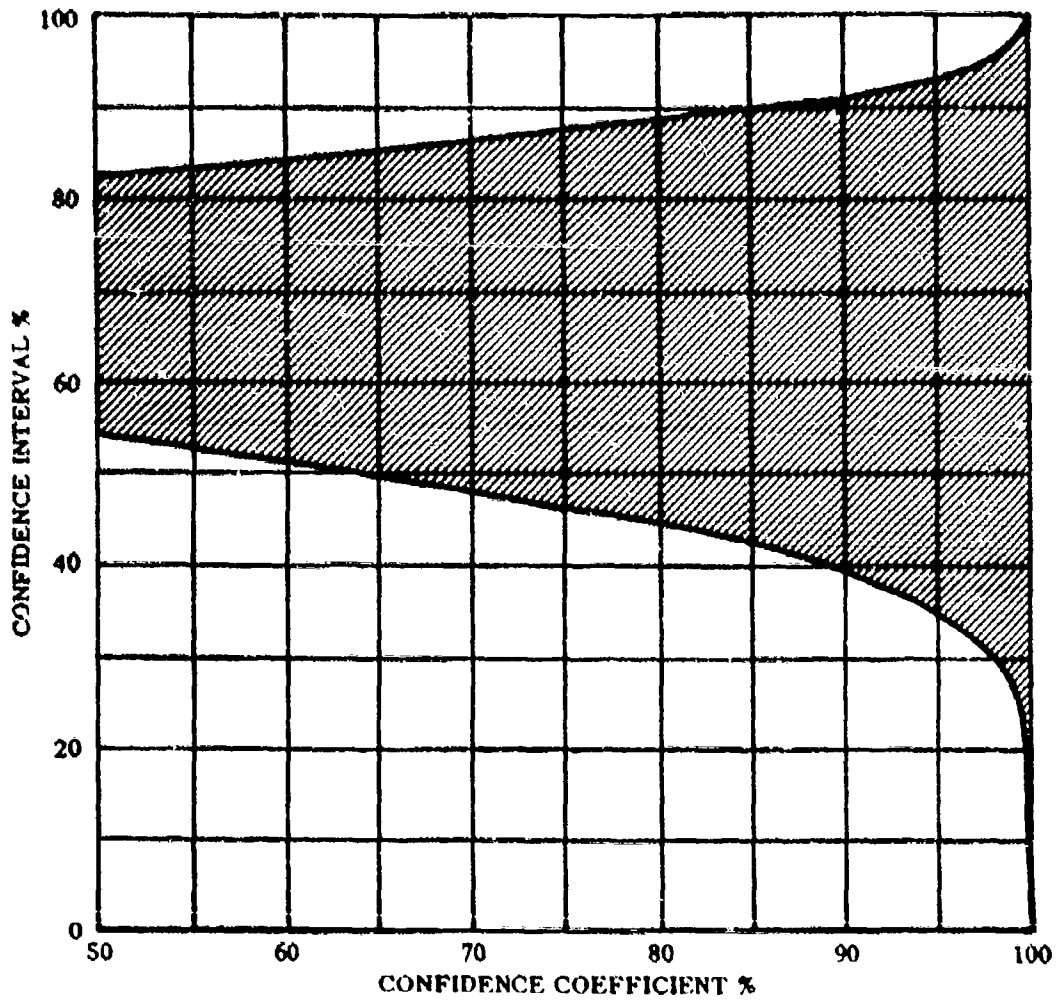
Figure 1. Example of Confidence Interval Interpolation for Confidence Coefficients Not Listed in Tables, n = 10, r = 7.

4

refer to the footnote on page 336 of reference 4. A short résumé of the method follows.

Assuming that the confidence coefficient C and the sample size n have been decided upon and are fixed for the remainder of the discussion there exist upper and lower confidence limits for each value of r, as r assumes values of 0, 1, 2, . . . , n.

For values of $r = 1, 2, \ldots, n-1$ the lower confidence limit $p_\ell(r)$ is obtained by finding that cumulative probability p in the tables which corresponds to a probability P_ℓ where

$$P_\ell = \frac{1 - C}{2} = \frac{100 - 100C}{2} \quad \%$$

The lower confidence limit $p_\ell(r)$ for $r = 0$, as explained in reference 4, is always taken to be

$$P_\ell(0) = 0$$

The lower confidence limit $p_\ell(r)$ for $r = n$ is obtained by finding that p in the tables which corresponds to

$$P_\ell = C = 100C \quad \%$$

Because of the symetrical properties of the distribution the simplest way of obtaining the upper confidence limits $p_u(r)$ is by equating

$$p_u(r) = 1 - p_\ell(n-r)$$

However, independent formulae for the upper limits can be constructed

in a fashion similar to that employed for the construction of the preceding formulae.

REFERENCES

1. Mathematical Methods of Statistics, Harald Cramer, Professor in the University of Stockholm, Princeton University Press, Princeton, N. J., 1946.

2. Tables of the Cumulative Binomial Probability Distribution, The Staff of the Computation Laboratory, Harvard University Press, Cambridge, Mass. 1955.

3. Tables of the Binomial Probability Distribution, U. S. Department of Commerce, National Bureau of Standards Applied Mathematics Series 6, January 27, 1950, U.S. Government Printing Office, Washington, D. C.

4. Selected Techniques of Statistical Analysis, Eisenhart, C., Hastay, M. W., and Wallis, W. A. (Editors), Statistical Research Group, Columbia University, New York and London: McGraw-Hill 1947.

80 % CONFIDENCE INTERVAL (PERCENT) FOR BINOMIAL DISTRIBUTION

r \ n	2		3		4		5		6		7		8	
0	00.0	89.9	00.0	20.6	00.0	25.9	00.0	22.9	00.0	20.9	00.0	9.4	00.0	8.8
1	13.4	86.6	9.1	67.4	6.9	54.4	5.6	45.4	4.7	39.0	4.0	34.1	3.5	30.3
2	70.7	100.	32.6	90.9	24.3	75.7	19.4	64.1	16.1	55.3	13.8	48.6	12.1	43.3
3			79.4	100.	45.6	93.1	35.9	80.6	29.7	70.3	25.3	62.1	22.1	55.6
4					84.1	100.	54.6	94.4	44.7	83.9	37.9	74.7	32.9	67.1
5							87.1	100.	61.0	95.3	51.4	86.2	44.4	77.9
6									89.1	100.	65.9	96.0	56.7	87.9
7											90.6	100.	69.7	96.5
8													91.7	100.

r \ n	9		10		11		12		13		14		15	
0	00.0	7.4	00.0	8.7	00.0	6.1	00.0	6.6	00.0	5.2	00.0	4.8	00.0	4.5
1	3.2	27.2	2.8	24.7	2.6	22.7	2.4	20.9	2.2	19.4	2.0	18.1	1.9	17.0
2	10.7	39.1	9.6	35.5	8.8	32.6	8.0	30.1	7.4	28.0	6.8	26.1	6.4	24.5
3	19.5	50.2	17.6	45.8	15.9	42.0	14.6	38.9	13.4	36.2	12.5	33.8	11.4	31.7
4	29.1	60.8	26.1	55.6	23.6	51.1	21.6	47.3	19.9	44.0	18.5	41.2	17.2	38.7
5	39.2	70.9	35.1	64.9	31.7	59.8	29.0	55.5	26.7	51.7	24.7	48.4	23.0	45.4
6	49.8	80.5	44.4	73.9	40.2	68.3	36.6	63.4	33.7	59.1	31.2	55.4	29.0	52.0
7	60.9	89.3	54.2	82.4	48.9	76.4	44.5	71.0	40.9	66.3	37.8	62.2	35.2	58.5
8	72.8	96.8	64.5	90.4	56.0	84.1	52.7	78.4	48.3	73.3	44.6	68.8	41.5	64.8
9	92.6	100.	75.3	97.2	67.4	91.2	61.1	85.4	56.0	80.1	51.6	75.3	48.0	71.0
10			93.3	100.	77.3	97.4	69.9	92.0	63.8	86.6	58.8	81.5	54.6	77.0
11					93.9	100.	79.1	97.6	72.0	92.6	66.2	87.5	61.3	82.8
12							94.4	100.	80.6	97.8	73.9	93.2	68.3	88.6
13									94.8	100.	81.9	98.0	75.5	93.6
14											95.2	100.	83.0	98.1
15													95.5	100.

80 % CONFIDENTIAL INTERVAL (PERCENT) FOR BINOMIAL DISTRIBUTION

r \ n	16		17		18		19		20	
0	00.0	4.2	00.0	4.0	00.0	3.8	00.0	3.6	00.0	3.4
1	1.8	16.0	1.7	15.1	1.6	14.3	1.6	13.6	1.5	12.9
2	6.0	23.1	5.7	21.8	5.3	20.6	5.1	19.6	4.8	18.7
3	10.9	29.9	10.2	28.2	9.7	26.7	9.2	25.4	8.7	24.2
4	16.1	36.4	15.1	34.4	14.3	32.7	13.5	31.0	12.8	29.6
5	21.5	42.8	20.2	40.5	19.1	38.4	18.1	36.6	17.1	34.8
6	27.1	49.1	25.5	46.5	24.0	44.1	22.7	41.9	21.6	40.0
7	32.9	55.2	30.9	52.3	29.1	50.4	27.5	47.3	26.1	45.1
8	38.8	61.2	36.4	58.0	34.3	55.1	32.4	52.5	30.7	50.1
9	44.8	67.1	42.0	63.6	39.5	60.5	37.4	57.6	35.4	55.0
10	50.9	72.9	47.7	69.1	44.9	65.7	42.4	62.6	40.1	59.9
11	57.2	78.5	54.5	74.5	49.6	70.9	47.5	67.6	45.0	64.6
12	63.6	83.9	59.5	79.8	55.9	76.0	52.7	72.5	49.9	69.3
13	70.1	89.1	65.6	84.9	61.6	80.9	58.1	77.3	54.9	73.9
14	76.9	94.0	71.8	89.8	67.3	85.7	63.4	81.9	60.0	78.4
15	84.0	98.2	78.2	94.3	73.3	90.3	69.0	86.5	65.2	82.9
16	95.7	100.	84.9	98.3	79.4	94.7	74.6	90.8	70.4	87.2
17			96.0	100.	85.7	96.4	80.4	94.9	75.8	91.3
18					96.2	100.	86.4	98.5	81.3	95.2
19							96.4	100.	87.1	98.5
20									96.6	100.

50 % CONFIDENCE INTERVAL (PERCENT) FOR BINOMIAL DISTRIBUTION

r \ n	21		22		23		24		25	
0	00.0	3.3	00.0	3.1	00.0	3.0	00.0	2.9	00.0	2.8
1	1.4	12.3	1.3	11.8	1.3	11.3	1.1	10.8	1.2	10.4
2	4.6	17.8	4.4	17.1	4.2	16.4	4.0	15.7	3.8	15.1
3	8.3	23.1	7.9	22.1	7.6	21.2	7.2	20.4	6.9	19.6
4	12.2	28.3	11.7	27.0	11.1	25.9	10.6	24.9	10.2	24.0
5	16.3	33.3	15.5	31.9	14.9	30.6	14.2	29.4	13.7	28.3
6	20.5	38.2	19.6	36.6	18.7	35.1	17.9	33.7	17.2	32.5
7	24.8	43.1	23.7	41.3	22.6	39.6	21.6	38.0	20.7	36.6
8	29.2	47.9	27.8	45.9	26.6	44.0	25.4	42.3	24.4	40.7
9	33.6	52.6	32.1	50.4	30.6	48.4	29.3	46.5	28.1	44.8
10	38.2	57.2	36.4	54.9	34.7	52.7	33.2	50.6	31.8	48.8
11	42.8	61.8	40.7	59.3	38.9	56.9	37.2	54.8	35.6	52.7
12	47.4	66.4	45.1	63.6	43.1	61.1	41.2	58.8	39.5	56.7
13	52.1	70.8	49.6	67.9	47.3	65.3	45.2	62.8	43.3	60.5
14	56.9	75.2	54.1	72.2	51.6	69.4	49.4	66.8	47.3	64.4
15	61.8	79.5	58.7	76.3	56.0	73.4	53.5	70.7	51.2	68.2
16	66.7	83.7	63.4	80.4	60.4	77.4	57.7	74.6	55.2	71.9
17	71.7	87.8	68.1	84.5	64.9	81.3	62.0	78.4	59.3	75.3
18	76.9	91.7	73.0	88.3	69.4	85.1	66.3	82.1	63.4	79.3
19	82.2	95.4	77.9	92.1	74.1	88.9	70.6	85.8	67.5	82.8
20	87.7	98.6	82.9	95.6	78.8	92.4	75.1	89.4	71.7	86.3
21	96.7	100.	88.2	98.7	83.6	95.8	79.6	92.8	76.0	89.8
22			96.9	100.	88.7	98.7	84.3	96.0	80.4	93.1
23					97.0	100.	89.2	96.9	84.9	96.2
24							97.1	100.	89.6	96.8
25									97.1	100.

r \ n	2		3		4		5		6		7		8	
0	00.0	38.8	00.0	28.5	00.0	20.5	00.0	15.7	00.0	14.2	00.0	12.3	00.0	10.8
1	10.6	89.4	7.2	71.3	5.4	58.2	4.4	49.0	3.7	42.3	3.1	37.1	2.8	33.0
2	45.2	100.	28.7	92.8	21.2	78.8	16.9	67.3	14.0	58.5	12.0	51.7	10.4	46.2
3			73.7	100.	41.8	94.6	32.7	83.1	26.9	73.1	22.8	65.0	19.9	58.4
4					79.8	100.	51.0	95.6	41.5	86.0	35.0	77.2	30.3	69.7
5							83.3	100.	57.7	96.3	48.3	86.0	41.6	80.1
6									85.8	100.	62.9	96.9	53.8	89.6
7											87.7	100.	67.0	97.2
8													89.2	100.

r \ n	9		10		11		12		13		14		15	
0	00.0	9.7	00.0	8.8	00.0	8.0	00.0	7.4	00.0	6.8	00.0	6.4	00.0	5.9
1	2.5	29.8	2.2	27.1	2.0	24.9	1.8	23.0	1.7	21.3	1.6	19.9	1.5	18.7
2	9.3	41.8	8.3	38.1	7.6	35.0	6.9	32.4	6.4	30.1	5.9	28.1	5.5	26.4
3	17.6	52.1	15.8	48.4	14.3	44.5	13.1	41.2	12.0	38.4	11.2	35.9	10.4	33.7
4	26.8	63.4	23.9	58.1	21.7	53.6	19.8	49.7	18.2	46.3	16.9	43.4	15.7	40.8
5	36.6	73.2	32.7	67.3	29.5	62.2	26.9	57.8	24.8	53.9	22.9	50.6	21.3	47.6
6	47.9	82.4	41.9	75.1	37.8	70.5	34.4	65.6	31.6	61.3	29.2	57.5	27.2	54.2
7	58.2	90.7	51.6	84.2	46.4	78.3	42.2	73.1	38.7	68.4	35.7	64.3	33.2	60.6
8	70.2	97.5	61.9	91.7	55.5	85.7	50.3	80.2	46.1	75.2	42.5	70.8	39.4	66.8
9	90.3	100.	72.9	97.8	65.0	92.4	56.8	86.9	53.7	81.8	49.4	77.1	45.8	72.8
10			91.2	100.	75.1	98.0	67.6	93.1	61.6	88.0	56.6	83.1	52.4	78.7
11					92.0	100.	77.0	98.1	69.9	93.6	64.1	88.8	59.2	84.3
12							92.6	100.	78.7	99.3	71.9	94.1	66.3	89.6
13									93.2	100.	80.1	98.4	73.6	94.5
14											93.6	100.	81.3	98.5
15													94.1	100.

11

n. r	16		17		18		19		20	
0	00.0	8.8	00.0	8.8	00.0	5.6	00.0	4.7	00.0	4.5
1	1.4	17.6	1.3	16.6	1.2	15.8	1.2	15.0	1.1	14.3
2	5.2	24.9	4.9	23.5	4.6	22.3	4.4	21.2	4.1	20.2
3	9.7	31.8	9.2	30.1	8.6	28.6	8.2	27.1	7.8	25.9
4	14.7	38.5	13.8	36.4	13.0	34.5	12.3	32.9	11.7	31.3
5	19.8	44.9	18.7	42.5	17.6	40.4	16.7	38.4	15.8	36.7
6	25.4	51.2	23.8	48.5	22.4	46.0	21.2	43.8	20.1	41.8
7	31.0	57.3	29.1	54.3	27.4	51.6	25.9	49.2	24.5	46.4
8	36.8	63.2	34.5	60.0	32.5	57.0	30.7	54.4	29.1	51.9
9	42.7	69.0	40.0	65.5	37.7	62.3	35.6	59.5	33.7	56.8
10	48.8	74.6	45.7	70.9	43.0	67.5	40.5	64.4	38.6	61.4
11	55.1	80.1	51.5	76.2	48.4	72.6	45.6	69.3	43.2	66.3
12	61.5	85.3	57.5	81.3	54.0	77.6	50.8	74.1	48.1	70.9
13	68.2	90.3	65.6	86.2	59.6	82.4	56.2	78.8	53.6	75.5
14	75.1	94.8	69.9	90.8	65.5	87.0	61.6	83.3	58.2	79.9
15	82.4	98.6	76.5	95.1	71.5	91.4	67.1	87.7	63.3	84.2
16	84.4	100.	83.4	98.7	77.7	95.4	72.9	91.8	68.7	88.3
17			94.7	100.	84.2	98.8	78.8	95.6	74.1	92.2
18					95.0	100.	85.0	98.8	79.8	95.9
19							95.3	100.	85.7	98.9
20									95.5	100.

60 % CONFIDENCE INTERVAL (PERCENT) FOR BINOMIAL DISTRIBUTION

n / r	21		22		23		24		25	
0	00.0	4.3	00.0	4.1	00.0	3.8	00.0	3.6	00.0	3.6
1	1.1	13.6	1.0	13.0	1.0	12.5	0.9	12.0	0.9	11.5
2	3.9	19.3	3.8	18.5	3.6	17.7	3.4	17.0	3.3	16.2
3	7.4	24.7	7.1	23.7	6.7	22.7	6.5	21.8	6.2	21.0
4	11.1	29.9	10.6	28.7	10.1	27.5	9.3	26.4	9.3	25.4
5	15.1	35.0	14.4	33.6	12.7	32.2	13.1	30.9	12.6	29.8
6	19.1	40.0	18.2	38.3	17.4	36.8	16.7	35.4	16.0	34.0
7	23.3	44.9	22.2	43.0	21.2	41.3	20.3	39.7	19.5	38.2
8	27.6	49.7	26.3	7.6	25.1	45.7	24.0	44.0	23.0	42.4
9	32.0	54.4	30.5	52.2	29.1	50.1	27.8	48.2	26.6	46.4
10	36.4	59.0	34.7	56.6	33.1	54.4	31.7	52.3	30.3	50.4
11	41.0	63.6	39.0	61.0	37.2	58.6	35.6	56.4	34.1	54.4
12	45.6	68.0	43.4	65.3	41.4	62.8	39.5	60.5	37.9	58.3
13	50.3	72.4	47.8	69.5	45.6	66.9	43.6	64.4	41.7	62.1
14	55.1	76.7	52.4	73.7	49.9	70.9	47.7	68.3	45.6	65.9
15	60.0	80.9	57.0	77.8	54.3	74.9	51.8	72.2	49.6	69.7
16	65.0	84.9	61.7	81.8	58.7	78.8	56.0	76.0	53.6	73.4
17	70.1	88.9	66.4	85.6	63.2	82.6	60.3	79.7	57.6	77.0
18	75.3	92.6	71.3	89.4	67.8	87.3	64.6	83.3	61.8	80.5
19	80.7	96.1	76.3	92.9	72.5	89.9	69.1	86.9	66.0	84.0
20	86.4	98.9	81.5	96.2	77.3	93.3	73.6	90.7	70.1	87.4
21	95.7	100.	87.0	99.0	82.3	96.4	78.2	93.5	74.6	90.7
22			95.9	100.	87.5	99.0	83.0	96.6	79.0	93.8
23					95.1	100.	88.0	99.1	83.8	96.7
24							96.2	100.	88.5	99.1
25									96.4	100.

70 % CONFIDENCE INTERVAL (PERCENT) FOR BINOMIAL DISTRIBUTION

r \ n	2		3		4		5		6		7		8	
0	00.0	45.8	00.0	36.1	00.0	26.0	00.0	21.4	00.0	18.2	00.0	15.8	00.0	14.0
1	7.8	92.2	5.3	75.6	4.0	62.7	3.2	53.2	2.7	46.1	2.3	40.7	2.0	36.4
2	54.8	100.	24.4	94.7	17.9	82.1	14.2	71.0	11.7	62.2	10.0	55.2	8.7	49.6
3			66.9	100.	37.3	96.0	29.0	85.8	23.7	76.3	20.1	68.2	17.4	61.6
4					74.0	100.	46.8	96.8	37.8	88.3	31.8	79.9	27.4	72.6
5							78.6	100.	53.9	97.3	44.8	90.0	38.4	82.6
6									81.8	100.	59.3	97.7	50.4	91.3
7											84.2	100.	63.6	98.0
8													86.0	100.

r \ n	9		10		11		12		13		14		15	
0	00.0	12.5	00.0	11.4	00.0	10.4	00.0	9.6	00.0	8.9	00.0	8.3	00.0	7.7
1	1.8	32.9	1.6	30.0	1.5	27.5	1.4	25.5	1.3	23.7	1.2	22.1	1.1	20.8
2	7.7	45.0	7.0	41.1	6.3	37.9	5.7	35.1	5.3	32.7	4.9	30.6	4.6	28.7
3	15.4	56.1	13.8	51.4	12.5	47.4	11.4	44.0	10.5	41.0	9.7	38.5	9.1	36.2
4	24.1	66.3	21.6	61.0	19.5	56.4	17.8	52.5	16.3	49.0	15.1	45.9	14.1	43.3
5	33.7	75.9	30.0	70.0	27.0	64.9	24.6	60.5	22.6	56.6	20.9	53.1	19.4	50.1
6	43.9	84.6	39.0	78.4	35.1	73.0	31.9	68.1	29.2	63.8	27.0	60.0	25.1	56.6
7	55.0	92.3	48.6	86.2	43.6	80.5	39.5	75.4	36.2	70.8	33.4	66.6	30.9	62.9
8	67.1	98.2	58.9	93.0	52.6	87.5	47.5	82.2	43.4	77.4	40.0	73.0	37.1	69.1
9	87.5	100.	70.0	98.4	62.1	93.7	56.0	88.6	51.0	83.7	46.9	79.1	43.4	74.9
10			88.6	100.	72.5	90.5	64.9	94.3	59.0	89.5	54.1	84.9	49.9	80.6
11					89.6	100.	74.5	98.6	67.3	94.7	61.5	90.3	56.7	85.9
12							90.4	100.	76.3	98.7	69.4	95.1	63.8	90.9
13									91.1	100.	77.9	98.8	71.3	95.4
14											91.7	100.	72.9	98.9
15													92.3	100.

70 % CONFIDENCE INTERVAL (PERCENT) FOR BINOMIAL DISTRIBUTION

n r	16		17		18		19		20	
0	00.0	7.3	00.0	6.6	00.0	6.6	00.0	6.2	00.0	6.9
1	1.1	19.6	1.0	18.5	0.9	17.6	0.9	16.7	0.8	15.9
2	4.3	27.1	4.1	25.6	3.7	24.3	3.6	23.1	3.4	22.1
3	8.5	34.1	6.0	32.3	7.5	30.7	7.1	29.2	6.8	27.9
4	13.2	40.9	12.4	38.7	11.6	36.8	11.0	35.0	10.5	33.4
5	18.2	47.3	17.0	44.9	16.1	42.6	15.2	40.6	14.4	38.8
6	23.4	53.5	22.0	50.8	20.7	48.3	19.5	46.1	18.5	44.0
7	28.9	59.6	27.1	56.6	25.5	53.9	24.0	51.4	22.8	49.1
8	34.5	65.5	32.3	62.7	30.4	59.2	28.7	56.5	27.2	54.1
9	40.4	71.1	37.3	67.7	35.5	64.5	33.5	61.6	31.7	58.9
10	46.5	76.6	43.4	72.9	40.8	69.6	38.4	66.5	36.3	63.7
11	52.7	81.8	49.2	78.0	46.1	74.5	43.5	71.3	41.1	68.3
12	59.1	86.8	55.1	83.0	51.7	79.3	48.6	76.0	45.9	72.8
13	65.9	91.5	61.3	87.6	57.4	83.9	53.9	80.5	50.9	77.2
14	72.9	95.7	67.7	92.0	63.2	88.4	59.4	84.8	56.0	81.5
15	80.4	98.9	74.4	95.9	69.3	92.5	65.0	89.0	61.2	85.6
16	92.7	100.	81.5	99.0	75.7	96.3	70.8	92.9	66.6	89.5
17			93.4	100.	82.4	99.1	76.9	96.4	72.1	93.2
18					93.6	100.	83.3	99.1	77.9	96.6
19							93.8	100.	84.1	99.2
20									94.2	100.

70 % CONFIDENCE INTERVAL (PERCENT) FOR BINOMIAL DISTRIBUTION

n / r	21		22		23		24		25	
0	00.0	8.8	00.0	8.3	00.0	8.2	00.0	4.9	00.0	4.7
1	0.7	15.2	0.6	14.6	0.7	13.9	0.7	13.4	0.7	12.9
2	3.3	21.1	3.1	20.2	3.0	19.4	2.9	18.6	2.7	17.9
3	6.4	26.6	6.1	25.5	5.9	24.5	5.6	23.5	5.4	22.6
4	9.9	31.9	9.6	30.6	9.1	29.4	8.7	28.2	8.3	27.2
5	13.7	37.1	13.0	35.6	12.4	34.1	11.9	32.8	11.4	31.6
6	17.6	42.1	16.8	40.4	16.0	38.8	15.3	37.5	14.7	35.9
7	21.6	47.0	20.6	45.1	19.7	43.3	18.8	41.7	18.0	40.2
8	25.8	51.8	24.6	49.7	23.4	47.8	22.4	46.0	21.5	44.3
9	30.1	56.5	28.6	54.2	27.3	52.1	26.1	50.2	25.0	48.4
10	34.5	61.0	32.6	58.6	31.3	56.4	29.9	54.3	28.6	52.4
11	39.0	65.5	37.0	63.0	35.3	60.6	33.7	58.4	32.3	56.3
12	43.5	69.9	41.4	67.2	39.4	64.7	37.7	62.3	36.0	60.2
13	48.2	74.2	45.8	71.4	43.6	68.7	41.6	66.3	39.8	64.0
14	53.0	78.4	50.3	75.4	47.9	72.7	45.7	70.1	43.7	67.7
15	57.9	82.4	54.9	79.4	52.2	76.6	49.8	73.9	47.6	71.4
16	62.9	86.3	59.6	83.2	56.7	80.3	54.0	77.6	51.6	75.0
17	68.1	90.1	64.4	87.0	61.2	84.0	58.3	81.2	55.7	78.5
18	73.4	93.6	69.4	90.5	65.9	87.6	62.7	84.7	59.8	82.0
19	78.9	96.7	74.5	93.9	70.6	90.9	67.2	88.1	64.1	85.3
20	84.8	99.2	79.8	96.9	75.5	94.1	71.8	91.3	68.4	88.6
21	94.6	100.	85.5	99.2	80.6	97.0	76.5	94.4	72.8	91.7
22			94.7	100.	86.1	99.3	81.4	97.1	77.4	94.6
23					94.9	100.	86.6	99.3	82.1	97.3
24							95.1	100.	87.1	99.3
25									95.3	100.

r \ n	2		3		4		5		6		7		8	
0	00.0	88.8	00.0	41.8	00.0	53.1	00.0	37.9	00.0	23.6	00.0	20.8	00.0	19.2
1	5.1	94.9	3.5	60.4	2.6	68.0	2.1	58.4	1.7	51.0	1.5	45.3	1.3	40.6
2	44.7	100.	19.6	96.5	14.3	85.7	11.2	75.3	9.3	66.7	7.9	59.6	6.9	53.8
3			58.5	100.	32.0	97.4	24.7	88.8	20.1	79.9	17.0	72.1	14.7	65.5
4					66.9	100.	41.6	97.9	33.3	90.7	27.9	83.0	24.0	76.0
5							72.5	100.	49.0	98.3	40.4	92.1	34.5	85.3
6									76.5	100.	54.7	98.5	46.2	93.1
7											79.5	100.	59.4	98.7
8													81.8	100.

r \ n	9		10		11		12		13		14		15	
0	00.0	14.8	00.0	14.8	00.0	13.6	00.0	12.6	00.0	11.7	00.0	10.8	00.0	10.2
1	1.2	36.8	1.1	33.7	1.0	31.0	0.9	28.8	0.8	26.8	0.8	25.1	0.7	23.6
2	6.1	49.0	5.4	45.0	4.9	41.5	4.5	38.6	4.2	36.0	3.9	33.7	3.6	31.7
3	12.9	59.9	11.6	55.2	10.5	51.1	9.6	47.5	8.8	44.4	8.1	41.7	7.6	39.2
4	21.0	69.9	18.8	64.6	16.9	60.0	15.4	55.9	14.2	52.4	13.1	49.2	12.2	46.4
5	30.1	79.0	26.7	73.3	24.1	68.2	21.9	63.8	20.0	59.8	18.5	56.3	17.2	53.2
6	40.1	87.1	35.4	81.2	31.8	75.9	28.8	71.2	26.4	66.9	24.3	63.1	22.5	59.7
7	51.0	93.9	44.8	88.4	40.0	83.1	36.2	78.1	33.1	73.6	30.4	69.6	28.2	65.9
8	63.2	98.8	55.0	94.6	48.9	89.5	44.1	84.6	40.2	80.0	36.9	75.7	34.1	71.8
9	85.5	100.	66.3	98.9	58.5	95.1	52.5	90.4	47.6	85.8	43.7	81.5	40.3	77.5
10			85.1	100.	69.0	99.0	61.4	95.5	55.6	91.2	50.8	86.9	46.8	82.8
11					86.4	100.	71.2	99.1	64.0	95.8	58.3	91.9	53.6	87.8
12							87.4	100.	73.2	99.2	66.3	96.1	60.8	92.4
13									88.3	100.	74.9	99.2	66.3	96.4
14											89.2	100.	76.4	99.3
15													89.8	100.

80 % CONFIDENCE INTERVAL (PERCENT) FOR BINOMIAL DISTRIBUTION

r	16		17		18		19		20	
0	00.0	9.4	00.0	9.8	00.0	9.8	00.0	8.1	00.0	7.9
1	0.7	22.2	0.6	21.0	0.6	20.0	0.6	19.0	0.6	18.1
2	3.3	30.0	3.2	28.4	3.0	26.9	2.8	25.6	2.6	24.5
3	7.1	37.1	6.6	35.2	6.3	33.5	5.9	31.9	5.6	30.4
4	11.4	43.9	10.7	41.7	10.1	39.6	9.5	37.8	9.0	36.1
5	16.1	50.4	15.1	47.6	14.2	45.5	13.4	43.4	12.7	41.6
6	21.0	56.6	19.7	53.7	18.6	51.2	17.6	48.9	16.6	46.7
7	26.3	62.5	24.6	59.5	23.1	56.7	21.8	54.1	20.7	51.6
8	31.8	68.2	29.7	65.0	27.9	62.0	26.3	59.3	24.9	56.7
9	37.5	73.7	35.0	70.3	32.9	67.1	31.0	64.2	29.3	61.5
10	43.4	79.0	40.5	75.4	38.0	72.1	35.8	69.0	33.8	66.2
11	49.6	83.9	46.3	80.3	43.3	76.9	40.7	73.7	38.5	70.7
12	56.1	88.6	52.2	84.9	48.8	81.5	45.9	78.2	43.3	75.1
13	62.9	92.9	58.3	89.3	54.5	85.8	51.1	82.5	48.2	79.3
14	70.0	96.7	64.8	93.4	60.4	89.9	56.6	86.6	53.3	83.4
15	77.8	99.3	71.6	96.8	66.5	93.7	62.2	90.5	58.5	87.3
16	90.6	100.	79.0	99.4	73.1	97.0	68.1	94.1	63.9	91.0
17			91.0	100.	80.0	99.4	74.4	97.2	69.6	94.4
18					91.4	100.	81.0	99.4	76.5	97.4
19							91.9	100.	81.9	99.5
20									92.1	100.

n / r	21		22		23		24		25	
0	00.0	7.4	00.0	7.1	00.0	6.8	00.0	6.6	00.0	6.3
1	0.5	17.3	0.5	16.6	0.5	15.9	0.5	15.3	0.5	14.7
2	2.5	23.4	2.4	22.4	2.3	21.5	2.2	20.7	2.1	19.9
3	5.3	29.1	5.1	27.9	4.9	26.8	4.7	25.8	4.6	24.8
4	8.6	34.5	8.2	33.1	7.8	31.8	7.5	30.6	7.2	29.8
5	12.1	39.7	11.5	38.1	11.0	36.6	10.5	35.3	10.1	34.0
6	15.7	44.8	15.0	43.0	14.3	41.3	13.7	39.8	13.1	38.3
7	19.6	49.7	18.7	47.7	17.8	45.9	17.0	44.2	16.3	42.6
8	23.6	54.4	22.5	52.3	21.4	50.3	20.5	48.5	19.6	46.7
9	27.8	59.1	26.4	56.8	25.2	54.6	24.1	52.7	23.0	50.8
10	32.0	63.6	30.4	61.1	29.0	58.9	27.7	56.8	26.5	54.8
11	36.4	68.0	34.6	65.4	33.0	63.0	31.5	60.8	30.1	58.7
12	40.9	72.2	38.9	69.6	37.0	67.0	36.3	64.7	33.8	62.5
13	45.6	76.4	43.2	73.6	41.1	71.0	39.2	68.5	37.5	66.2
14	50.3	80.4	47.7	77.5	45.4	74.8	43.2	72.3	41.3	69.9
15	55.2	84.3	52.3	81.3	49.7	78.6	47.3	75.9	45.2	73.5
16	60.3	87.9	57.0	85.0	54.1	82.2	51.5	79.5	49.2	77.0
17	65.5	91.4	61.9	88.5	58.7	85.7	55.8	83.0	53.3	80.4
18	70.9	94.7	66.9	91.8	63.4	89.0	60.2	86.3	57.4	83.7
19	76.6	97.5	72.1	94.9	68.2	92.2	64.7	89.5	61.7	86.9
20	82.7	99.5	77.6	97.6	73.2	95.1	69.4	92.6	66.0	89.9
21	92.6	100.	83.4	99.5	78.4	97.7	74.2	95.3	70.5	92.8
22			88.9	100.	84.1	99.6	79.3	97.8	75.2	95.5
23					93.2	100.	84.7	99.5	80.1	97.9
24							93.5	100.	85.3	99.5
25									86.7	100.

90 % CONFIDENCE INTERVAL (PERCENT) FOR BINOMIAL DISTRIBUTION

r	2		3		4		5		6		7		8	
0	00.0	68.4	00.0	53.8	00.0	45.8	00.0	56.9	00.0	31.9	00.0	26.0	00.0	25.0
1	2.5	97.5	1.7	86.5	1.3	75.2	1.0	65.7	0.9	58.2	0.7	52.1	0.6	47.1
2	31.6	100.	13.5	98.3	9.8	90.2	7.6	81.1	6.3	72.9	5.3	65.9	4.6	60.0
3			46.4	100.	24.8	98.7	18.9	92.4	15.3	84.7	12.9	77.5	11.1	71.1
4					56.2	100.	34.3	99.0	27.1	93.7	22.5	87.1	19.3	80.7
5							65.1	100.	41.8	99.1	34.1	94.7	28.9	88.9
6									68.2	100.	47.9	99.3	40.0	95.4
7											78.0	100.	52.9	99.4
8													75.0	100.

r	9		10		11		12		13		14		15	
0	00.0	22.6	00.0	20.6	00.0	18.9	00.0	17.5	00.0	16.2	00.0	15.2	00.0	14.2
1	0.6	42.9	0.5	39.4	0.5	36.4	0.4	33.9	0.4	31.6	0.4	29.7	0.4	27.9
2	4.1	55.0	3.7	50.7	3.3	47.0	3.0	43.8	2.8	41.0	2.6	38.6	2.4	36.4
3	9.8	65.5	8.7	60.7	7.9	56.5	7.2	52.8	6.6	49.5	6.1	46.6	5.7	44.0
4	16.9	74.9	15.0	69.7	13.5	65.0	12.3	60.9	11.2	57.3	10.4	54.0	9.6	51.1
5	25.1	83.1	22.2	77.8	20.0	72.9	18.1	68.5	16.5	64.5	15.3	61.0	14.2	57.8
6	34.5	90.2	30.3	85.0	27.1	80.0	24.5	75.5	22.4	71.3	20.6	67.5	19.1	64.0
7	45.0	95.9	39.3	91.3	35.0	86.5	31.5	81.9	28.7	77.6	26.3	73.7	24.4	70.0
8	57.1	99.4	49.3	96.3	43.5	92.1	39.1	87.7	35.5	83.5	32.5	79.4	30.0	75.6
9	77.4	100.	60.6	99.5	53.0	96.7	47.2	92.8	42.7	88.8	39.0	84.7	36.0	80.9
10			79.4	100	63.6	99.5	56.2	97.0	50.5	93.4	46.0	89.6	42.2	85.8
11					81.1	100.	66.1	99.6	59.0	97.2	53.4	93.9	48.9	90.4
12							82.5	100.	68.4	99.6	61.4	97.4	56.0	94.3
13									83.8	100.	70.3	99.6	63.6	97.6
14											84.8	100.	72.1	99.6
15													85.8	100.

90 % CONFIDENCE INTERVAL (PERCENT) FOR BINOMIAL DISTRIBUTION

r \ n	16		17		18		19		20	
0	00.0	13.4	00.0	12.7	00.0	12.0	00.0	11.4	00.0	10.9
1	0.3	26.4	0.3	25.0	0.3	23.8	0.3	22.7	0.3	21.6
2	2.2	34.4	2.1	32.6	2.0	31.0	1.9	29.6	1.8	28.3
3	5.3	41.7	5.0	39.6	4.7	37.7	4.4	35.9	4.2	34.4
4	9.0	48.5	8.4	46.1	8.0	43.9	7.5	41.9	7.1	40.1
5	13.2	54.8	12.4	52.2	11.6	49.8	11.0	47.6	10.5	45.5
6	17.8	60.9	16.6	58.0	15.6	55.4	14.7	53.0	13.9	50.8
7	22.7	66.7	21.2	63.6	19.9	60.8	18.7	58.2	17.7	55.8
8	27.9	72.1	26.0	68.9	24.4	65.9	23.0	63.2	21.7	60.7
9	33.3	77.3	31.1	74.0	29.1	70.9	27.4	68.0	25.9	65.3
10	39.1	82.2	36.4	78.8	34.1	75.6	32.0	72.6	30.2	69.8
11	45.2	86.8	42.0	83.4	39.2	80.1	36.8	77.0	34.7	74.1
12	51.5	91.0	47.8	87.6	44.6	84.4	41.8	81.3	39.3	78.3
13	58.3	94.7	53.9	91.6	50.2	88.4	47.0	85.3	44.2	82.3
14	65.6	97.8	60.4	95.0	56.1	92.0	52.4	89.0	49.2	86.1
15	73.6	99.7	67.4	97.9	62.3	95.3	58.1	92.5	54.5	89.5
16	86.6	100.	75.0	99.7	69.0	98.0	64.1	95.6	59.9	92.9
17			87.3	100.	76.2	99.7	70.4	98.1	65.6	95.8
18					88.0	100.	77.3	99.7	71.7	98.2
19							88.6	100.	78.4	99.7
20									89.1	100.

90 % CONFIDENCE INTERVAL (PERCENT) FOR BINOMIAL DISTRIBUTION

p	21		22		23		24		25	
0	00.0	10.4	00.0	19.8	00.0	19.6	00.0	19.2	00.0	18.8
1	0.3	20.7	0.3	19.8	0.2	19.0	0.2	18.3	0.2	17.6
2	1.7	27.1	1.6	25.9	1.5	24.9	1.4	24.0	1.4	23.1
3	5.0	32.9	3.8	31.6	3.6	30.5	3.5	29.2	3.3	28.2
4	6.8	38.5	6.4	36.9	6.2	35.5	5.9	34.2	5.6	33.0
5	9.9	45.7	9.4	42.0	9.0	40.4	8.6	38.9	8.3	37.6
6	13.2	48.9	12.6	46.9	12.0	45.1	11.5	43.5	11.0	42.0
7	16.8	53.6	16.0	51.6	15.2	49.7	14.5	47.9	13.9	46.2
8	20.6	58.3	19.5	56.1	18.6	54.1	17.8	52.2	17.0	50.4
9	24.5	62.8	23.3	60.5	22.2	58.3	21.1	56.3	20.2	54.4
10	28.6	67.2	27.1	64.8	25.8	62.5	24.6	60.3	23.5	58.3
11	32.8	71.4	31.1	68.9	29.6	66.5	28.2	64.3	27.0	62.1
12	37.2	75.5	35.2	72.9	33.5	70.4	31.9	68.1	30.5	65.9
13	41.7	79.4	39.5	76.7	37.5	74.2	35.7	71.8	34.1	69.5
14	46.4	83.2	43.9	80.4	41.7	77.8	39.7	75.4	37.9	73.0
15	51.2	86.8	48.4	84.0	45.9	81.4	43.7	78.9	41.7	76.5
16	56.3	90.1	53.1	87.4	50.3	84.8	47.8	82.2	45.6	79.8
17	61.5	93.2	58.0	90.6	54.9	88.0	52.1	85.5	49.6	83.0
18	67.1	95.0	63.1	93.6	59.6	91.0	55.5	88.5	53.8	86.1
19	72.9	98.3	68.4	96.2	64.5	93.8	61.1	91.4	58.0	89.0
20	79.3	99.7	74.1	98.4	69.7	96.4	65.8	94.1	62.4	91.8
21	89.6	100.	80.2	99.7	75.1	98.5	70.8	96.5	67.0	94.4
22			90.2	100.	81.0	99.8	76.0	98.6	71.8	96.7
23					90.4	100.	81.7	99.8	76.9	98.6
24							90.8	100.	82.4	99.8
25									91.2	100.

n\p	2		3		4		5		6		7		8	
0	00.0	77.6	00.0	55.2	00.0	52.7	00.0	45.1	00.0	39.3	00.0	34.8	00.0	31.2
1	1.3	98.7	0.8	90.6	0.6	81.6	0.5	71.6	0.4	64.1	0.4	57.9	0.3	52.6
2	22.4	100.	9.4	99.2	8.8	93.2	5.3	85.3	4.3	77.7	3.6	71.0	3.2	65.1
3			36.8	100.	19.4	99.4	14.7	94.7	11.8	88.2	9.9	81.6	8.5	75.5
4					47.3	100.	28.4	99.5	22.2	95.7	18.4	90.1	15.7	84.3
5							54.9	100.	35.9	99.6	29.0	96.4	24.5	91.5
6									60.7	100.	42.1	99.6	34.9	96.8
7											65.2	100.	47.4	99.7
8													68.8	100.

n\p	9		10		11		12		13		14		15	
0	00.0	28.3	00.0	25.9	00.0	23.9	00.0	22.1	00.0	20.6	00.0	19.3	00.0	18.1
1	0.3	46.3	0.3	44.5	0.2	41.3	0.2	38.5	0.2	36.0	0.2	33.9	0.2	32.0
2	2.8	60.0	2.5	55.6	2.3	51.8	2.1	48.5	1.9	45.5	1.7	42.8	1.6	40.5
3	7.5	70.1	6.6	65.2	5.9	61.0	5.5	57.2	5.0	53.8	4.6	50.8	4.3	48.1
4	13.7	78.8	12.1	73.8	10.9	69.2	9.9	65.1	9.1	61.4	8.4	58.1	7.8	55.1
5	21.2	86.3	18.7	81.3	16.7	76.6	15.2	72.3	13.9	68.4	12.7	64.9	11.8	61.6
6	29.9	92.5	26.2	87.9	23.4	83.3	21.1	78.9	19.2	74.9	17.7	71.1	16.3	67.7
7	40.0	97.2	34.8	93.4	30.8	89.1	27.7	84.8	25.1	80.8	23.0	77.0	21.3	73.4
8	51.7	99.7	44.4	97.5	39.0	94.0	34.9	90.1	31.6	86.1	28.9	82.3	26.6	78.7
9	71.7	100.	55.5	99.7	46.2	97.7	42.8	94.5	38.6	90.9	35.1	87.3	32.3	83.7
10			74.1	100.	58.7	99.8	51.5	97.9	46.2	95.0	41.9	91.6	38.4	88.2
11					76.1	100.	61.5	99.8	54.5	98.1	49.2	95.4	44.9	92.2
12							77.9	100.	64.0	99.8	57.2	98.3	51.9	95.7
13									79.4	100.	66.1	99.8	59.5	98.4
14											80.7	100.	68.0	99.8
15													81.9	100.

96 % CONFIDENCE INTERVAL (PERCENT) FOR BINOMIAL DISTRIBUTION

r	16		17		18		19		20	
0	00.0	17.5	00.0	16.2	00.0	15.3	00.0	14.6	00.0	13.9
1	0.2	30.2	0.2	28.7	0.2	27.3	0.1	26.0	0.1	24.9
2	1.5	38.4	1.4	36.5	1.3	34.7	1.2	33.1	1.2	31.7
3	4.0	45.7	3.8	43.4	3.6	41.4	3.3	39.6	3.2	37.9
4	7.2	52.4	6.8	50.1	6.4	47.7	6.0	45.6	5.7	43.7
5	11.0	58.7	10.3	56.0	9.7	53.5	9.9	51.2	8.6	49.1
6	15.2	64.5	14.2	61.7	13.3	59.0	12.5	56.6	11.9	54.3
7	19.8	70.1	18.4	67.1	17.3	64.3	16.3	61.7	15.4	59.2
8	24.6	75.4	23.0	72.2	21.5	69.3	20.2	66.5	19.1	64.0
9	29.9	80.2	27.8	77.0	26.0	74.0	24.4	71.1	23.1	68.5
10	35.4	84.8	32.9	81.6	30.7	78.5	28.9	75.6	27.2	72.8
11	41.3	89.0	38.3	85.8	35.7	82.7	33.5	79.8	31.5	76.9
12	47.6	92.8	44.0	89.7	41.0	86.7	38.3	83.7	36.0	80.9
13	54.3	96.0	49.9	93.2	46.5	90.3	43.4	87.5	40.8	84.6
14	61.6	98.5	56.6	96.2	52.3	93.6	48.8	90.1	45.7	88.1
15	69.8	99.8	63.5	98.6	58.6	96.5	54.4	94.0	50.9	91.4
16	82.5	100.	71.3	99.8	65.3	98.7	60.4	96.7	56.3	94.3
17			83.8	100.	72.7	99.8	66.9	98.8	62.1	96.8
18					84.7	100.	74.0	99.9	68.3	98.8
19							85.4	100.	75.1	99.9
20									86.1	100.

95 % CONFIDENCE INTERVAL (PERCENT) FOR BINOMIAL DISTRIBUTION

r \ n	21		22		23		24		25	
0	00.0	16.3	00.0	15.6	00.0	12.8	00.0	11.9	00.0	11.3
1	0.2	23.6	0.1	22.9	0.1	22.0	0.1	21.1	0.1	20.4
2	1.1	30.4	1.1	29.2	1.1	28.0	1.0	27.0	1.0	26.0
3	3.0	36.4	2.9	34.9	2.7	33.6	2.6	32.4	2.5	31.3
4	5.4	41.9	5.2	40.3	4.9	38.8	4.7	37.4	4.6	36.1
5	8.2	47.2	7.8	45.4	7.4	43.7	7.1	42.2	6.8	40.7
6	11.2	52.2	10.7	49.8	10.2	48.4	9.7	46.7	9.3	45.1
7	14.6	57.0	13.9	54.9	13.2	52.9	12.6	51.1	12.1	49.4
8	18.1	61.6	17.2	59.4	16.3	57.3	15.6	55.3	14.9	53.5
9	21.8	66.0	20.7	63.7	19.7	61.5	18.8	59.4	18.0	57.5
10	25.7	70.2	24.4	67.8	23.2	65.5	22.1	63.4	21.1	61.4
11	29.8	74.3	28.2	71.8	26.8	69.4	25.5	67.2	24.4	65.1
12	34.0	78.2	32.2	75.6	30.6	73.2	29.1	70.9	27.8	68.7
13	38.4	81.9	36.5	79.3	34.5	76.8	32.8	74.5	31.3	72.2
14	43.0	85.4	40.6	82.8	38.5	80.3	36.6	77.9	34.9	75.6
15	47.8	88.8	45.1	86.1	42.7	83.7	40.6	81.2	38.6	78.9
16	52.8	91.8	50.1	89.3	47.1	86.8	44.7	84.4	42.5	82.0
17	58.1	94.6	54.6	92.2	51.6	89.8	48.9	87.4	46.5	85.1
18	63.6	97.0	59.7	94.8	56.3	92.6	53.3	90.3	50.6	87.9
19	69.6	98.9	65.1	97.1	61.2	95.1	57.8	92.9	54.9	90.7
20	76.2	99.8	70.8	98.9	66.4	97.3	62.6	95.3	59.3	93.2
21	83.7	100.	77.1	99.9	72.0	98.9	67.6	97.4	63.9	95.5
22			84.2	100.	78.0	99.9	73.0	99.0	68.7	97.5
23					87.2	100.	78.9	99.9	74.0	99.0
24							88.2	100.	79.6	99.9
25									88.7	100.

r \ n	2		3		4		5		6		7		8	
0	00.0	90.0	00.0	78.8	00.0	68.4	00.0	60.1	00.0	53.8	00.0	48.2	00.0	43.8
1	0.3	99.7	0.2	95.9	0.1	88.9	0.1	81.5	0.1	74.6	0.1	69.8	0.1	63.2
2	10.0	100.	4.1	99.8	2.9	97.1	2.3	91.7	1.8	85.7	1.5	79.7	1.3	74.2
3			21.5	100.	11.1	99.9	8.3	97.7	6.6	93.4	5.5	88.2	4.7	85.0
4					31.6	100.	18.5	99.9	14.3	98.2	11.8	94.5	10.0	90.0
5							39.8	100.	25.4	99.9	20.3	98.5	17.0	95.3
6									46.4	100.	31.4	99.9	25.8	98.7
7											51.8	100.	36.8	99.9
8													56.2	100.

r \ n	9		10		11		12		13		14		15	
0	00.0	40.1	00.0	36.6	00.0	34.2	00.0	31.9	00.0	29.8	00.0	28.1	00.0	26.5
1	0.1	58.6	0.1	54.4	0.0	50.9	0.0	47.7	0.0	44.9	0.0	42.4	0.0	40.2
2	1.2	69.3	1.1	64.8	1.0	60.9	0.8	57.3	0.7	54.1	0.6	51.2	0.5	48.6
3	4.1	78.1	3.6	73.5	3.3	69.3	3.0	65.5	2.7	62.1	2.5	58.9	2.3	56.1
4	8.6	85.4	7.6	80.9	6.9	76.7	6.2	72.8	5.7	69.1	5.2	65.8	4.8	62.8
5	14.6	91.4	12.8	87.2	11.4	83.1	10.3	79.2	9.4	75.5	8.6	72.2	8.0	68.8
6	21.9	95.9	19.1	92.4	16.9	88.6	15.2	84.8	13.8	81.1	12.6	77.7	11.7	74.4
7	30.7	98.8	26.5	96.4	23.3	95.1	20.8	89.7	18.9	86.2	17.2	82.8	15.9	79.5
8	41.4	99.9	35.2	98.9	30.7	96.7	27.2	93.8	24.5	90.6	22.3	87.4	20.5	84.1
9	59.9	100.	45.6	99.9	39.1	99.0	34.5	97.0	30.9	94.3	28.0	91.4	25.6	88.3
10			63.1	100.	49.1	100.	42.7	99.2	37.9	97.3	34.2	94.8	31.2	92.0
11					65.8	100.	52.3	100.	45.9	99.3	41.1	97.5	37.2	95.2
12							68.1	100.	55.1	100.	48.8	99.4	43.9	97.7
13									70.2	100.	57.6	100.	51.4	99.5
14											71.9	100.	59.8	100.
15													73.5	100.

99 % CONFIDENCE INTERVAL (PERCENT) FOR BINOMIAL DISTRIBUTION

r\n	16		17		18		19		20	
0	00.0	26.0	00.0	28.8	00.0	22.6	00.0	21.6	00.0	20.6
1	00.0	38.2	00.0	36.4	00.0	34.7	00.0	33.1	00.0	31.6
2	0.5	46.3	0.4	44.2	0.4	42.2	0.3	40.4	0.3	38.8
3	2.2	53.6	2.1	51.0	2.0	48.9	1.8	46.8	1.7	44.9
4	4.5	59.9	4.2	57.3	4.0	54.9	3.7	52.7	3.5	50.7
5	7.4	65.8	7.0	63.1	6.5	60.6	6.1	58.2	5.8	56.0
6	10.9	71.4	10.1	68.5	9.5	65.8	9.0	63.3	8.4	60.9
7	14.7	76.4	13.7	73.5	12.8	70.7	12.1	68.0	11.3	65.7
8	18.9	81.1	17.6	78.1	16.5	75.3	15.5	72.6	14.6	70.1
9	23.6	85.3	21.9	82.4	20.4	79.6	19.2	76.8	18.0	74.3
10	28.6	89.1	26.5	86.3	24.7	83.5	23.2	80.8	21.8	78.2
11	34.2	92.6	31.5	89.9	29.3	87.2	27.4	84.5	25.7	82.0
12	40.1	95.5	36.9	93.0	34.2	90.5	32.0	87.9	29.9	85.4
13	46.5	97.8	42.7	95.8	39.4	93.5	36.7	91.0	34.3	88.7
14	53.7	99.5	49.0	97.8	45.1	96.0	41.8	93.9	39.1	91.6
15	61.8	100.	55.8	99.6	51.1	98.0	47.3	96.3	44.0	94.2
16	75.0	100.	63.6	100.	57.8	99.6	53.2	98.2	49.3	96.5
17			74.2	100.	65.3	100.	59.6	99.7	55.1	98.3
18					77.4	100.	66.9	100.	61.2	99.7
19							78.5	100.	66.2	100.
20									79.4	100.

27

96 % CONFIDENCE INTERVAL (PERCENT) FOR BINOMIAL DISTRIBUTION

n	21		22		23		24		25	
0	00.0	28.8	00.0	16.6	00.0	28.2	00.0	17.5	00.0	16.0
1	00.0	30.5	00.0	29.3	00.0	28.2	00.0	27.2	00.0	26.2
2	0.3	37.2	0.2	35.6	0.2	34.5	0.2	33.2	0.2	32.1
3	1.6	43.7	1.5	41.6	1.4	40.2	1.3	38.7	1.3	37.4
4	3.3	48.8	3.2	47.0	3.1	45.4	2.9	43.6	2.8	42.4
5	5.5	63.9	5.2	52.0	5.0	50.2	4.7	48.6	4.5	47.0
6	8.0	58.6	7.5	56.8	7.2	54.9	6.9	53.1	6.6	51.4
7	10.7	63.4	10.6	61.2	9.7	59.2	9.2	57.4	8.9	55.6
8	13.6	67.7	13.1	65.5	12.4	63.4	11.9	61.4	11.3	59.5
9	17.0	71.9	16.2	69.6	15.3	67.4	14.6	65.3	14.0	63.4
10	20.5	75.8	19.4	73.4	18.4	71.2	17.6	69.1	16.8	67.0
11	24.2	79.5	22.9	77.1	21.7	74.8	20.7	72.7	19.7	70.6
12	28.1	83.0	26.6	80.6	25.2	78.3	23.9	76.1	22.8	73.9
13	32.3	86.2	30.4	83.8	28.8	81.4	27.3	79.3	26.1	77.2
14	36.6	89.3	34.5	86.9	32.6	84.7	30.9	82.4	29.4	80.3
15	41.2	92.0	38.8	89.8	36.6	87.6	34.7	85.4	33.0	83.2
16	46.1	94.5	43.2	92.5	40.8	90.3	38.6	88.1	36.6	86.0
17	51.2	96.7	48.0	94.8	45.1	92.8	42.6	90.8	40.5	88.7
18	56.7	98.4	53.0	96.8	49.8	95.0	46.9	93.1	44.4	91.1
19	62.8	99.7	58.4	98.5	54.6	96.9	51.4	95.3	48.6	93.4
20	69.5	100.	64.2	99.8	59.8	98.6	56.2	97.1	53.0	95.5
21	90.5	100.	70.7	100.	65.5	99.8	61.3	98.7	57.6	97.2
22			81.1	100.	71.8	100.	66.8	99.8	62.6	98.7
23					81.8	100.	72.8	100.	67.9	99.8
24							82.5	100.	73.8	100.
25									83.2	100.