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ANALYTICAL APPROXIMATIONS

Volume 28

Cecil Hastings, Jr.
Elaine Hastings

P-1301

4 March 1958

The RAND Corporation
1700 MAIN ST. • SANTA MONICA • CALIFORNIA

Analytical Approximation

Gaussian Error Integral: To better than .0005 over $(-\infty, +\infty)$,

$$\Phi(x) = \frac{2}{\sqrt{\pi}} \int_0^x e^{-t^2} dt$$

$$\doteq \frac{x}{\sqrt{x^2 + (a_0 + a_2 x^2 + a_4 x^4)^{-4}}}$$

wherein

$$a_0 = 1.0635$$

$$a_2 = .1535$$

$$a_4 = .0341$$

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Analytical Approximation

Gaussian Error Integral: To better than .00004 over $(-\infty, +\infty)$,

$$\Phi(x) = \frac{2}{\sqrt{\pi}} \int_0^x e^{-t^2} dt$$

$$\doteq \frac{x}{\sqrt{x^2 + (a_0 + a_2 x^2 + \ldots)^{-4}}}$$

wherein

$$a_0 = 1.06214$$

$$a_2 = .16193$$

$$a_4 = .02431$$

$$a_6 = .00266$$

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Analytical Approximation

Gaussian Error Integral: To better than .000006 over $(-\infty,+\infty)$,

$$\Phi(x) = \frac{2}{\sqrt{\pi}}\int_0^x e^{-t^2}dt$$

$$\doteq \frac{x}{\sqrt{x^2+(a_0+a_2x^2+a_4x^4+\ldots)^{-4}}}$$

wherein

a_0 = 1.062273

a_2 = .160871

a_4 = .026161

a_6 = .001648

a_8 = .000158 .

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Analytical Approximation

Gaussian Error Integral: To better than .00007 over $(-\infty, +\infty)$,

$$\Phi(x) = \frac{2}{\sqrt{\pi}} \int_0^x e^{-t^2} dt$$

$$\doteq \frac{x}{\sqrt{x^2 + (a_0 + a_2 x^2 + a_4 x^4)^{-8}}}$$

wherein

$$a_0 = 1.03074$$

$$a_2 = .07761$$

$$a_4 = .01019$$

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Analytical Approximation

Gaussian Error Integral: To better than .000006 over $(-\infty,+\infty)$,

$$\Phi(x) = \frac{2}{\sqrt{\pi}}\int_0^x e^{-t^2}dt$$

$$\doteq \frac{x}{\sqrt{x^2+(a_0+a_2x^2+a_4x^4+a_6x^6)^{-8}}}$$

wherein

$a_0 = 1.030653$

$a_2 = .078127$

$a_4 = .009592$

$a_6 = .000157$

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Analytical Approximation

Gaussian Error Integral: To better than .000005 over $(-\infty, +\infty)$,

$$\Phi(x) = \frac{2}{\sqrt{\pi}} \int_0^x e^{-t^2} dt$$

$$\doteq \frac{x}{\sqrt{x^2 + (a_0 + a_2 x^2 + a_4 x^4 \;)^{-10}}}$$

wherein

a_0 = 1.024457

a_2 = .062087

a_4 = .007205

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