

TNRCDF**PURPOSE**

Compute the truncated normal probability density function.

DESCRIPTION

A truncated normal distribution is a normal distribution that is restricted to lie within a finite range, i.e., $A \leq x \leq B$. A and B are the lower and upper truncation points respectively. A can be negative infinity or B can be positive infinity, but not both at the same time.

The truncated normal distribution can be expressed in terms of the normal distribution as follows:

$$f(x, a, b, \mu, \sigma) = \frac{\phi\left(\frac{x-\mu}{\sigma}\right)}{\sigma \left[\Phi\left(\frac{b-\mu}{\sigma}\right) - \Phi\left(\frac{a-\mu}{\sigma}\right) \right]} \quad a \leq x \leq b \quad (\text{EQ Aux-313})$$

where μ and σ are the mean and standard deviation of the parent normal distribution and a and b are the lower and upper truncation points. ϕ and Φ are the probability density and cumulative distribution functions for the standard normal distribution respectively.

The truncated normal cumulative distribution can be expressed in terms of the standard normal cumulative distribution function as follows:

$$F(x, a, b, \mu, \sigma) = \frac{\Phi\left(\frac{x-\mu}{\sigma}\right) - \Phi\left(\frac{a-\mu}{\sigma}\right)}{\Phi\left(\frac{b-\mu}{\sigma}\right) - \Phi\left(\frac{a-\mu}{\sigma}\right)} \quad a \leq x \leq b \quad (\text{EQ Aux-314})$$

SYNTAX

LET <y> = TNRCDF(<x>,<a>,,<m>,<s>) <SUBSET/EXCEPT/FOR qualification>

where <x> is a number, parameter, or variable in the range (<a>,);

<a> is a number, parameter, or variable that defines the lower truncation point;

 is a number, parameter, or variable that defines the upper truncation point;

<m> is a number, parameter, or variable that defines the mean of the parent normal distribution (defaults to 0 if omitted);

<s> is a number, parameter, or variable that defines the standard deviation of the parent normal distribution (defaults to 1 if omitted);

<y> is a variable or a parameter (depending on what <x> is) where the computed truncated normal cdf value is stored;

and where the <SUBSET/EXCEPT/FOR qualification> is optional.

EXAMPLES

LET A = TNRCDF(3,2,0.7,0,10)

LET X2 = TNRCDF(X1,U,SD,LOWER,UPPER)

DEFAULT

None

SYNONYMS

None

RELATED COMMANDS

TNRPDF	=	Compute the truncated normal probability density function.
TNRPPF	=	Compute the truncated normal percent point function.
NORCDF	=	Compute the normal cumulative distribution function.
NORPDF	=	Compute the normal probability density function.
NORPPF	=	Compute the normal percent point function.
FNRCDF	=	Compute the folded normal cumulative distribution function.
FNRPDF	=	Compute the folded normal probability density function.
FNRPPF	=	Compute the folded normal percent point function.

REFERENCE

"Continuous Univariate Distributions - 1," 2nd Ed., Johnson, Kotz, and Balakrishnan, Wiley and Sons, 1994 (pp. 156-162).

APPLICATIONS

Data Analysis

IMPLEMENTATION DATE

95/10

PROGRAM

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MULTIPLY 2 2; MULTIPLY CORNER COORDINATES 0 0 100 100
TITLE AUTOMATIC
LET U = 0; LET SD = 1
LET A = -4; LET B = 2
XILABEL A = ^A, B = ^B, U = 0, SD = 1
PLOT TNRCDF(X,A,B,U,SD) FOR X = A 0.01 B
.
LET A = 0; LET B = 99
XILABEL A = ^A, B = ^B, U = 0, SD = 1
PLOT TNRCDF(X,A,B,U,SD) FOR X = A 0.01 5
.
LET A = -100; LET B = 0
XILABEL A = ^A, B = ^B, U = 0, SD = 1
PLOT TNRCDF(X,A,B,U,SD) FOR X = -10 0.01 B
.
LET U = 5; LET SD = 10
LET A = -8; LET B = 20
XILABEL A = ^A, B = ^B, U = 0, SD = 1
PLOT TNRCDF(X,A,B,U,SD) FOR X = A 0.01 B
END OF MULTIPLY

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