

**TNRPDF****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:

$$f(x, a, b, \mu, \sigma) = \frac{\phi\left(\frac{x-\mu}{\sigma}\right)}{\sigma\left[\Phi\left(\frac{b-\mu}{\sigma}\right) - \Phi\left(\frac{a-\mu}{\sigma}\right)\right]} \quad a \leq x \leq b \quad (\text{EQ Aux-315})$$

where  $\mu$  and  $\sigma$  are the mean and standard deviation of the parent normal distribution and a and b are the lower and upper truncation points.  $\phi$  and  $\Phi$  are the probability density and cumulative distribution functions for the normal distribution.

**SYNTAX**

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

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

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

<b> 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 pdf value is stored; and where the <SUBSET/EXCEPT/FOR qualification> is optional.

**EXAMPLES**

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

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

**DEFAULT**

None

**SYNONYMS**

None

**RELATED COMMANDS**

TNRCDF	=	Compute the truncated normal cumulative distribution 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 TNRPDF(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 TNRPDF(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 TNRPDF(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 TNRPDF(X,A,B,U,SD) FOR X = A 0.01 B
END OF MULTIPLY
    
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