# TNRPPF

## 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<=x<=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:

$$f(x, a, b, \mu, \sigma) = \frac{\phi\left(\frac{x-\mu}{\sigma}\right)}{\sigma\left[\Phi\left(\frac{b-\mu}{\sigma}\right) - \Phi\left(\frac{a-\mu}{\sigma}\right)\right]} \qquad a \le x \le b \qquad \textbf{(EQ Aux-316)}$$

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 standard normal distribution.

DATAPLOT calculates the truncated normal percent point function numerically using a bisection method.

## SYNTAX

LET <y> = TNRPPF(<p>,<a>,<b>,<m>,<s>) <SUBSET/EXCEPT/FOR qualification>
where <p> 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 <p> is) where the computed truncated normal cdf value is stored;
and where the <SUBSET/EXCEPT/FOR qualification> is optional.

## EXAMPLES

LET A = TNRPPF(0.95,2,0.7,0,10)
LET X2 = TNRPPF(P,U,SD,LOWER,UPPER)

## DEFAULT

None

## SYNONYMS

None

## RELATED COMMANDS

| | | |
|---|---|---|
| TNRCDF | = | Compute the truncated normal cumulative distribution function. |
| TNRPDF | = | Compute the truncated normal probability density 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

```
MULTIPLOT 2 2; MULTIPLOT CORNER COORDINATES 0 0 100 100
TITLE AUTOMATIC
LET U = 0
LET SD = 1
LET A = -4
LET B = 2
X1LABEL A = ^A, B= ^B, U = 0, SD = 1
PLOT TNRPPF(P,A,B,U,SD) FOR P = 0 0.01 1
.
LET A = 0
LET B = 99
X1LABEL A = ^A, B= ^B, U = 0, SD = 1
PLOT TNRPPF(P,A,B,U,SD) FOR P = 0 0.01 0.99
.
LET A = -100
LET B = 0
X1LABEL A = ^A, B= ^B, U = 0, SD = 1
PLOT TNRPPF(P,A,B,U,SD) FOR P = 0.01 0.01 1
.
LET U = 5
LET SD = 10
LET A = -8
LET B = 20
X1LABEL A = ^A, B= ^B, U = 0, SD = 1
PLOT TNRPPF(P,A,B,U,SD) FOR P = 0 0.01 1
END OF MULTIPLOT
```