TNECDF

PURPOSE

Compute the truncated exponential cumulative distribution function.

DESCRIPTION

A truncated exponential distribution is an exponential distribution that excludes values exceeding a certain threshold value (i.e., truncation from above). The truncated exponential distribution has the following probability density function:

$$f(x, x0, \mu, \sigma) = \frac{e^{\frac{-(x-\mu)}{\sigma}}}{\sigma\left(1 - e^{\frac{-(x0-\mu)}{\sigma}}\right)} \qquad \mu < x < x0 \qquad \textbf{(EQ Aux-309)}$$

where μ and σ are the location and scale parameters of the parent exponential distribution and x0 is the truncation threshold. The cumulative distribution function of the truncated exponential distribution is:

$$F(x, x0, \mu, \sigma) = \frac{1}{e^{\frac{x-\mu}{\sigma}}\left(e^{\frac{-(x0-\mu)}{\sigma}} - 1\right)} + \sigma\ \mathrm{TNEPDF}(0, x0, \mu, \sigma) \qquad \mu < x < x0 \qquad \textbf{(EQ Aux-310)}$$

where TNEPDF is truncated exponential probability density function.

SYNTAX

LET <y> = TNECDF(<x>,<x0>,<m>,<s>) <SUBSET/EXCEPT/FOR qualification>

where <x> is a number, parameter, or variable in the range (<m>,<x0>);

<x0> is a number, parameter, or variable that defines the truncation threshold;

<m> is a number, parameter, or variable that defines the location parameter of the parent exponential distribution;

<s> is a number, parameter, or variable that defines the scale parameter of the parent exponential distribution;

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

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

EXAMPLES

LET A = TNECDF(3,2,0.7,10)
LET X2 = TNECDF(X1,THETA,SCALE,X0)

NOTE

Truncating an exponential distribution from below results in an exponential distribution with the same scale parameter. The truncation point simply defines a new location parameter.

DEFAULT

None

SYNONYMS

None

RELATED COMMANDS

TNEPDF	=	Compute the truncated exponential probability density function.
TNEPPF	=	Compute the truncated exponential percent point function.
EXPCDF	=	Compute the exponential cumulative distribution function.
EXPPDF	=	Compute the exponential probability density function.
EXPPPF	=	Compute the exponential percent point function.

REFERENCE

"Continuous Univariate Distributions - 1," 2nd Ed., Johnson, Kotz, and Balakrishnan, Wiley and Sons, 1994 (page 554).

APPLICATIONS

Reliability

IMPLEMENTATION DATE

95/10

PROGRAM

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MULTIPLOT 2 2; MULTIPLOT CORNER COORDINATES 0 0 100 100
TITLE AUTOMATIC
.
LET U = 0
LET S = 10
LET X0 = 30
X1LABEL U = ^U, S = ^S, X0 = ^X0
PLOT TNECDF(x,x0,u,s) for x = u 0.1 x0
LET U = 0
LET S = 2
LET X0 = 3
X1LABEL U = ^U, S = ^S, X0 = ^X0
PLOT TNECDF(x,x0,u,s) for x = u 0.1 x0
LET U = 2
LET S = 5
LET X0 = 14
X1LABEL U = ^U, S = ^S, X0 = ^X0
PLOT TNECDF(x,x0,u,s) for x = u 0.1 x0
LET U = 0
LET S = 0.5
LET X0 = 1
X1LABEL U = ^U, S = ^S, X0 = ^X0
PLOT TNECDF(x,x0,u,s) for x = u 0.1 x0
END OF MULTIPLOT
```