ALPPPF

PURPOSE

Compute the alpha percent point function with shape parameters a and b.

DESCRIPTION

The alpha distribution has the following probability density function:

$$f(x, \alpha, \beta) = \frac{\beta\phi\left(\alpha - \frac{\beta}{x}\right)}{x^2\Phi(\alpha)} \qquad x > 0 \qquad \textbf{(EQ Aux-8)}$$

where ϕ is the standard normal density function and Φ is the standard normal cumulative distribution function. See the documentation for the NORPDF and NORCDF commands for a description of the standard normal density and distribution functions. The shape parameters alpha and beta should be positive.

The percent point function is the inverse of the cumulative distribution function. The cumulative distribution sums the probability from 0 to the given x value. The percent point function takes a cumulative probability value and computes the corresponding x value. The percent point function is:

$$G(p, \alpha, \beta) = \frac{\beta}{\alpha - \text{NORPPF}(p\Phi(\alpha))} \qquad \textbf{(EQ Aux-9)}$$

where NORPPF is the percent point function of the standard normal distribution.

SYNTAX

LET <y> = ALPPPF(<p>,<a>,<b>) <SUBSET/EXCEPT/FOR qualification>

where <p> is a number, parameter, or variable containing values between 0 and 1;

<y> is a variable or a parameter (depending on what <p> is) where the computed beta ppf value is stored;

<a> is a positive number, parameter, or variable that specifies the first shape parameter;

<b> is a number, parameter, or variable that specifies the second shape parameter;

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

EXAMPLES

LET A = ALPPPF(0.9,6,1)

LET X2 = ALPPPF(X1,2,1)

DEFAULT

None

SYNONYMS

None

RELATED COMMANDS

ALPCDF	=	Compute the alpha cumulative distribution function.
ALPPDF	=	Compute the alpha probability density function.
WEICDF	=	Compute the Weibull cumulative distribution function.
WEIPDF	=	Compute the Weibull probability density function.
WEIPPF	=	Compute the Weibull percent point function.
LGNCDF	=	Compute the log-normal cumulative distribution function.
LGNPDF	=	Compute the log-normal probability density function.
LGNPPF	=	Compute the log-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.

REFERENCE

"Reliability Applications of the Alpha Distribution," Salvia, IEEE Transactions On Reliability, Vol. R-34, August, 1985, (pp. 251-252).

"Continuous Univariate Distributions," 2nd. ed., Johnson, Kotz, and Balakrishnan, John Wiley and Sons, 1994.

APPLICATIONS

Reliability, accelerated life testing

IMPLEMENTATION DATE

95/5

PROGRAM

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XLIMITS 0 1
MAJOR XTIC MARK NUMBER 6
XTIC OFFSET 0.1 0.1
MULTIPLOT 2 2; MULTIPLOT CORNER COORDINATES 0 0 100 100
TITLE AUTOMATIC
LET A = 2
LET B = 1
X1LABEL ALPHA = ^A, BETA = ^B
PLOT ALPPPF(P,A,B) FOR P = 0.01 0.01 0.99
LET A = 0.5
LET B = 6
X1LABEL ALPHA = ^A, BETA = ^B
PLOT ALPPPF(P,A,B) FOR P = 0.01 0.01 0.99
LET A = 6
LET B = 0.5
X1LABEL ALPHA = ^A, BETA = ^B
PLOT ALPPPF(P,A,B) FOR P = 0.01 0.01 0.99
LET A = 0.5
LET B = 0.5
X1LABEL ALPHA = ^A, BETA = ^B
PLOT ALPPPF(P,A,B) FOR P = 0.01 0.01 0.99
END OF MULTIPLOT
```