GGDCDF

PURPOSE

Compute the standard form of the generalized gamma cumulative distribution function.

DESCRIPTION

The standard form of the generalized gamma distribution has the following probability density function:

$$f(x, k, c) = \frac{c x^{ck-1} e^{-x^c}}{\Gamma(k)} \qquad x > 0, k > 0, c \neq 0 \qquad \textbf{(EQ Aux-170)}$$

where k and c are shape parameters and Γ is the complete gamma function. The cumulative distribution is the area under under the curve from 0 to x (i.e., the integral of the above function. It has the formula:

$$F(x, k, c) = \frac{\Gamma_k(x^c)}{\Gamma(k)} \qquad x > 0, k > 0, c \neq 0 \qquad \textbf{(EQ Aux-171)}$$

where Γ is the complete gamma function and Γ_k is the incomplete gamma function.

SYNTAX

LET <y2> = GGDCDF(<y1>,<k>,<c>) <SUBSET/EXCEPT/FOR qualification>

where <y1> is a positive number, parameter, or a variable;

<y2> is a variable or a parameter (depending on what <y1> is) where the computed generalized gamma cdf value is saved;

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

<c> is a non-zero number, parameter, or variable that specifies the second shape parameter;

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

EXAMPLES

LET A = GGDCDF(3,1.5.0.6)

LET X2 = GGDCDF(X1,GAMMA,POWER)

NOTE

If c is 1, this distribution reduces to the standard gamma distribution. If k is 1, this distribution reduces to a Weibull distribution. If k =1/2 and c = 2, it reduces to a half-normal distribution. Several other common distributions are special cases of the generalized gamma distribution.

The second shape parameter can be negative (but not zero). Specifically, if c = -1, the generalized gamma is the inverted gamma distribution.

DEFAULT

None

SYNONYMS

None

RELATED COMMANDS

GGDPDF	=	Compute the generalized gamma probability density function.
GGDPPF	=	Compute the generalized gamma percent point function.
GAMCDF	=	Compute the gamma cumulative distribution function.
GAMPDF	=	Compute the gamma probability density function.
GAMPPF	=	Compute the gamma percent point function.
WEICDF	=	Compute the Weibull cumulative distribution function.
WEIPDF	=	Compute the Weibull probability density function.
WEIPPF	=	Compute the Weibull percent point function.
CHSCDF	=	Compute the chi-square cumulative distribution function.
CHSPDF	=	Compute the chi-square probability density function.
CHSPPF	=	Compute the chi-square percent point function.

REFERENCE

"Continuous Univariate Distributions," 2nd. ed., Johnson, Kotz, and Balakrishnan, John Wiley and Sons, 1994 (chapter 17).

"Statistical Distributions," 2nd. Edition, Evans, Hastings, and Peacock, Wiley and Sons, 1993 (chapter 18).

APPLICATIONS

Reliability

IMPLEMENTATION DATE

95/5

PROGRAM

```
LET G = DATA 1 1 1 0.5 0.5 0.5 2 2 2
LET C = DATA 0.5 1 2 0.5 1 2 0.5 1 2
LET START = DATA 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
LET INC = DATA 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01 0.01
LET STOP = DATA 5 5 5 5 5 5 5 5 5
.
MULTIPLOT 3 3; MULTIPLOT CORNER COORDINATES 0 0 100 100
TITLE AUTOMATIC
LOOP FOR K = 1 1 9
    LET G1 = G(K)
    LET C1 = C(K)
    LET FIRST = START(K)
    LET LAST = STOP(K)
    LET INCT = INC(K)
    X1LABEL GAMMA = ^G1
    X2LABEL C = ^C1
    PLOT GGDCDF(X,G1,C1) FOR X = FIRST INCT LAST
END OF LOOP
END OF MULTIPLOT
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