DGAPPF

PURPOSE

Compute the standard form of the double gamma percent point function with tail length parameter γ.

DESCRIPTION

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

$$f(x) = \left(\frac{1}{2}\right)\frac{|x|^{(\gamma-1)}e^{-|x|}}{\Gamma(\gamma)} \qquad \textbf{(EQ 8-89)}$$

where γ is a positive number that is the shape parameter and Γ is the standard Gamma function (see the documentation for the GAMMA command for details of this function).

The percent point function can be expressed in terms of the gamma percent point function as follows:

$$G(p,\gamma) = \text{GAMPPF}(2((p-0.5),\gamma)) \qquad p \geq 0.5 \qquad \textbf{(EQ Aux-90)}$$

$$G(p,\gamma) = \text{-GAMPPF}(2((0.5-p),\gamma)) \qquad p < 0.5 \qquad \textbf{(EQ Aux-91)}$$

where GAMPPF is the gamma percent point function.

The double gamma distribution is simply the gamma distribution reflected about x = 0 when x is negative, or the distribution of ABS(x) when x has a gamma distribution.

SYNTAX

LET <y> = DGAPPF(<p>,GAMMA) <SUBSET/EXCEPT/FOR qualification>

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

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

<GAMMA> is a positive number or parameter that specifies the tail length parameter;

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

EXAMPLES

LET A = DGAPPF(0.9,2)

LET A = DGAPPF(A1,8)

NOTE 1

This distribution is also referred to as the reflected gamma distribution in the literature. DATAPLOT refers to it as the double gamma to be consistent with the terminology used by the double exponential and double Weibull distributions.

NOTE 2

The general form of the double gamma distribution is:

$$f(x) = \left(\frac{1}{2}\right)\frac{\left(\frac{|x-\mu|}{\beta}\right)^{(\gamma-1)} e^{-\left(\frac{|x-\mu|}{\beta}\right)}}{\beta\Gamma(\gamma)} \qquad \textbf{(EQ 8-92)}$$

where μ and β are the positive location scale parameters respectively.

DEFAULT

None

SYNONYMS

None

RELATED COMMANDS

DGACDF	=	Compute the double gamma cumulative distribution function.
DGAPDF	=	Compute the double gamma probability density function.
GAMCDF	=	Compute the gamma cumulative distribution function.
GAMPDF	=	Compute the gamma probability density function.

GAMPPF	=	Compute the gamma percent point function.
DWECDF	=	Compute the double Weibull cumulative distribution function.
DWEPDF	=	Compute the double Weibull probability density function.
DWEPPF	=	Compute the double Weibull percent point function.
DEXCDF	=	Compute the double exponential cumulative distribution function.
DEXPDF	=	Compute the double exponential probability density function.
DEXPPF	=	Compute the double exponential percent point function.

REFERENCE

"Continuous Univariate Distributions - 1," 2nd. Ed., Johnson, Kotz, and Balakrishnan, Wiley and Sons, 1994 (page 387).

APPLICATIONS

Life Testing

IMPLEMENTATION DATE

96/1

PROGRAM

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TITLE AUTOMATIC
X1LABEL X
Y1LABEL PROBABILITY
LET G = DATA 1 2 5 0.5
LEGEND 1 COORDINATES 25 87
MULTIPLOT 2 2; MULTIPLOT CORNER COORDINATES 0 0 100 98
LOOP FOR K = 1 1 4
    LET GAMMA = G(K)
    LEGEND 1 GAMMA = ^GAMMA
    PLOT DGAPPF(P,GAMMA) FOR P = 0.01 0.01 0.99
END OF LOOP
END OF MULTIPLOT
```