

**DGAPDF****PURPOSE**

Compute the standard form of the double gamma probability density function with shape parameter  $\gamma$ .

**DESCRIPTION**

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

$$f(x) = \left(\frac{1}{2}\right) \frac{|x|^{(\gamma-1)} e^{-|x|}}{\Gamma(\gamma)} \quad (\text{EQ 8-87})$$

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

This is simply the gamma distribution reflected about  $x = 0$  when  $x$  is negative, or the distribution of  $\text{ABS}(x)$  when  $x$  has a gamma distribution.

**SYNTAX**

LET <y> = DGAPDF(<x>,<gamma>) <SUBSET/EXCEPT/FOR qualification>

where <x> is a number, a parameter, or a variable;

<y> is a variable or a parameter (depending on what <x> is) where the computed double gamma pdf value is saved;

<gamma> is a number or parameter that specifies the shape parameter;

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

**EXAMPLES**

LET A = DGAPDF(3,1.5)

LET X2 = DGAPDF(X1,GAMMA)

**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:

$$f(x) = \left(\frac{1}{2}\right) \frac{\left(\frac{|x-\mu|}{\beta}\right)^{(\gamma-1)} e^{-\left(\frac{|x-\mu|}{\beta}\right)}}{\beta\Gamma(\gamma)} \quad (\text{EQ 8-88})$$

where  $\mu$  and  $\beta$  are the positive location scale parameters respectively.

**DEFAULT**

None

**SYNONYMS**

None

**RELATED COMMANDS**

DGACDF	=	Compute the double gamma cumulative distribution function.
DGAPPF	=	Compute the double 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.
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 DGAPDF FOR X = -3 0.01 3
X1LABEL X
Y1LABEL PROBABILITY
LEGEND 1 COORDINATES 75 87
.
MULTIPLY 2 2; MULTIPLY CORNER COORDINATES 0 0 100 98
LEGEND 1 GAMMA = 1
PLOT DGAPDF(X,1) FOR X = -3.0 0.01 3
LEGEND 1 GAMMA = 2
PLOT DGAPDF(X,2) FOR X = -3.0 0.01 3
LEGEND 1 GAMMA = 5
PLOT DGAPDF(X,5) FOR X = -3.0 0.01 3
LEGEND 1 GAMMA = 0.5
PLOT DGAPDF(X,0.5) FOR X = -3.0 0.01 -0.01 AND
PLOT DGAPDF(X,0.5) FOR X = 0.01 0.01 3.0
END OF MULTIPLY
    
```

