GAMPDF

PURPOSE

Compute the standard form of the gamma probability density function.

DESCRIPTION

The standard form of the gamma probability density function is:

$$f(x) = \frac{x^{(\gamma - 1)} e^{(-x)}}{\Gamma(\gamma)} \qquad \text{for } x \geq 0 \qquad \textbf{(EQ 8-219)}$$

where γ is a positive number that is the shape parameter and Γ is the standard gamma function. The mean and standard deviation of the standard gamma distribution are γ and sqrt(γ) respectively. The input value can be any non-negative real number.

SYNTAX

LET <y2> = GAMPDF(<y1>,<gamma>) <SUBSET/EXCEPT/FOR qualification>

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

<y2> is a variable or a parameter (depending on what <y1> is) where the computed gamma cdf 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 = GAMCDF(3,1.5)
LET Y = GAMCDF(X1,GAMMA)

NOTE 1

The general form of the gamma probability density function is:

$$f(x) = \frac{\left(\frac{x - \mu}{\beta}\right)^{(\gamma - 1)} e^{-\left(\frac{x - \mu}{\beta}\right)}}{\beta\Gamma(\gamma)} \qquad \text{for } x \geq \mu \qquad \textbf{(EQ 8-220)}$$

The parameter μ is a location parameter and the parameter β is a scale parameter. See topic (3) under the General considerations section at the beginning of this chapter for a discussion of generating pdf values for the general form of the distribution. The general gamma distribution has a mean and standard deviation of γ*β and β*sqrt(γ) respectively.

NOTE 2

If γ is 1, this distribution reduces to the exponential distribution. If γ is a positive integer, the gamma distribution is called the Erlang distribution. The gamma distribution with $\gamma = (\nu/2)$, $\mu = 0$, and $\beta = 2$ where ν is a positive integer is a chi-square distribution with ν degrees of freedom.

DEFAULT

None

SYNONYMS

None

RELATED COMMANDS

GAMCDF	=	Compute the gamma cumulative distribution 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.
EXPCDF	=	Compute the exponential cumulative distribution function.
EXPPDF	=	Compute the exponential probability density function.
EXPPPF	=	Compute the exponential 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," Johnson and Kotz, Houghton Mifflin, 1970 (chapter 17).

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

APPLICATIONS

Data Analysis, Reliability

IMPLEMENTATION DATE

94/9

PROGRAM

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MAJOR YTIC NUMBER 6; MINOR YTIC NUMBER 1
YLIMITS 0 1; YTIC DECIMAL 1
XLIMITS 0 10; XTIC OFFSET 0.6 0.6
TITLE GAMPDF FOR VARIOUS VALUES OF GAMMA
X1LABEL X; Y1LABEL PROBABILITY
SEGMENT 1 COORDINATES 79 88 84 88; SEGMENT 1 PATTERN SOLID
SEGMENT 2 COORDINATES 79 84 84 84; SEGMENT 2 PATTERN DASH
SEGMENT 3 COORDINATES 79 80 84 80; SEGMENT 3 PATTERN DOT
SEGMENT 4 COORDINATES 79 76 84 76; SEGMENT 4 PATTERN DA2
LEGEND 1 GAMMA = 1; LEGEND 1 COORDINATES 78 87
LEGEND 2 GAMMA = 0.5; LEGEND 2 COORDINATES 78 83
LEGEND 3 GAMMA = 2; LEGEND 3 COORDINATES 78 79
LEGEND 4 GAMMA = 5; LEGEND 4 COORDINATES 78 75
LEGEND JUSTIFICATION RIGHT; LINES SOLID DASH DOT DASH2
PLOT GAMPDF(X,1) FOR X = 0.1 0.1 5.5 AND
PLOT GAMPDF(X,0.5) FOR X = 0.1 0.1 5.5 AND
PLOT GAMPDF(X,2) FOR X = 0.1 0.1 5.5 AND
PLOT GAMPDF(X,5) FOR X = 0.1 0.1 10
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