GAMPPF

PURPOSE

Compute the standard form of the gamma percent point function.

DESCRIPTION

The standard form of the gamma probability density function is:

$$f(x) = \frac{x^{(\gamma - 1)} e^{(-x)}}{\Gamma(\gamma)} \qquad \text{for } x \geq 0 \qquad \textbf{(EQ 8-221)}$$

where γ is a positive number that is the shape parameter and Γ is the complete gamma function.

The gamma percent point function does not have a simple closed form. It is calculated numerically using a bisection method. The input value is a real number between 0 and 1.

SYNTAX

LET <y2> = GAMPPF(<y1>) <SUBSET/EXCEPT/FOR qualification>

where <y1> is a variable, a number, or a parameter in the range 0 to 1;
<y2> is a variable or a parameter (depending on what <y1> is) where the computed gamma ppf value is stored;
<gamma> is a number or parameter that specifies the shape parameter;
and where the <SUBSET/EXCEPT/FOR qualification> is optional.

EXAMPLES

LET A = GAMPPF(0.9)
LET Y = GAMPPF(P)

NOTE 1

The general form of the gamma probability density function is:

$$f(x) = \frac{\left(\frac{x-\mu}{\beta}\right)^{(\gamma - 1)} e^{-\left(\frac{x-\mu}{\beta}\right)}}{\beta\Gamma(\gamma)} \qquad \text{for } x \geq \mu \qquad \textbf{(EQ 8-222)}$$

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 ppf values for the general form of the distribution.

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.
GAMPDF	=	Compute the gamma probability density 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

94/4

PROGRAM

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MAJOR XTIC NUMBER 6
MINOR XTIC NUMBER 1
XLIMITS 0 1
XTIC DECIMAL 1
YLIMITS 0 12
SEGMENT 1 COORDINATES 16 88 21 88; SEGMENT 1 PATTERN SOLID
SEGMENT 2 COORDINATES 16 84 21 84; SEGMENT 2 PATTERN DASH
SEGMENT 3 COORDINATES 16 80 21 80; SEGMENT 3 PATTERN DOT
SEGMENT 4 COORDINATES 16 76 21 76; SEGMENT 4 PATTERN DA2
LEGEND 1 GAMMA = 1; LEGEND 1 COORDINATES 22 87
LEGEND 2 GAMMA = 0.5; LEGEND 2 COORDINATES 22 83
LEGEND 3 GAMMA = 2; LEGEND 3 COORDINATES 22 79
LEGEND 4 GAMMA = 5; LEGEND 4 COORDINATES 22 75
LINES SOLID DASH DOT DASH2
TITLE PLOT GAMPPF FOR VARIOUS VALUES OF GAMMA
PLOT GAMPPF(X,1) FOR X = 0.01 .01 0.99 AND
PLOT GAMPPF(X,0.5) FOR X = 0.01 .01 0.99 AND
PLOT GAMPPF(X,2) FOR X = 0.01 .01 0.99 AND
PLOT GAMPPF(X,5) FOR X = 0.01 .01 0.99
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