IGPPF

PURPOSE

Compute the inverse Gaussian percent point function with shape parameter γ.

DESCRIPTION

The inverse Gaussian probability density function is:

$$f(x) = \left(\sqrt{\frac{\gamma}{2\pi x^3}}\right) e^{\frac{-\gamma(x-\mu)^2}{2\mu^2 x}} \qquad \text{for } x \geq 0 \qquad \textbf{(EQ 8-250)}$$

where γ and μ are the shape and location parameters respectively. DATAPLOT calculates the case where μ is 1, which is also known as the Wald distribution. See topic (3) under the General considerations section at the beginning of this chapter for a discussion of generating pp f values for the general form of the distribution.

The inverse Gaussian distribution does not have a simple closed form for the percent point function. It is calculated numerically using a bisection method. The input value should be between 0 and 1.

SYNTAX

LET <y2> = IGPPF(<y1>,<gamma>) <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 Inverse Gaussian ppf value is stored;
<gamma> is a positive number, parameter, or variable that specifies the shape parameter;
and where the <SUBSET/EXCEPT/FOR qualification> is optional.

EXAMPLES

LET A = IGPPF(0.9,10)
LET Y = IGPPF(P,10)

NOTE

The inverse Gaussian distribution is nearly symmetric and moderate tailed for small gamma. It is highly skewed and long tailed for large gamma. It approaches normality as gamma approaches zero.

DEFAULT

None

SYNONYMS

WALPPF

RELATED COMMANDS

IGCDF	=	Compute the inverse Gaussian cumulative distribution function.
IGPDF	=	Compute the inverse Gaussian probability density function.
WALPDF	=	Compute the Wald probability density function.
WALPPF	=	Compute the Wald percent point function.
WALCDF	=	Compute the Wald cumulative distribution function.
WALPDF	=	Compute the Wald probability density function.
WALPPF	=	Compute the Wald percent point function.
WALCDF	=	Compute the Wald cumulative distribution function.
FLPDF	=	Compute the fatigue-life probability density function.
FLPPF	=	Compute the fatigue-life percent point function.
FLCDF	=	Compute the fatigue-life cumulative distribution function.
RIGPDF	=	Compute the reciprocal inverse Gaussian probability density function.
RIGPPF	=	Compute the reciprocal inverse Gaussian percent point function.
RIGCDF	=	Compute the reciprocal inverse Gaussian cumulative distribution function.

REFERENCE

"Continuous Univariate Distributions - 1," Johnson and Kotz, Houghton-Mifflin, 1970 (chapter 15).

"Statistical Distributions," 2nd ed, Evans, Hastings, and Peacock, Wiley and Sons, 1993 (chapter 21).

APPLICATIONS

Reliability

IMPLEMENTATION DATE

90/5 (definition was modified 95/1 to be consistent with Johnson and Kotz)

PROGRAM

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TITLE PLOT IGPPF FOR VARIOUS VALUES OF GAMMA
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 = 2; LEGEND 2 COORDINATES 22 83
LEGEND 3 GAMMA = 5; LEGEND 3 COORDINATES 22 79
LEGEND 4 GAMMA = 0.5; LEGEND 4 COORDINATES 22 75
XLIMITS 0 1
MAJOR XTIC NUMBER 6
MINOR XTIC NUMBER 1
XTIC DECIMAL 1
LINES SOLID DASH DOT DASH2
PLOT IGPPF(X,1) FOR X = 0.01 .01 0.99 AND
PLOT IGPPF(X,2) FOR X = 0.01 .01 0.99 AND
PLOT IGPPF(X,5) FOR X = 0.01 .01 0.99 AND
PLOT IGPPF(X,0.5) FOR X = 0.01 .01 0.99
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