EV1PDF

PURPOSE

Compute the standard form of the extreme value type I (also known as the Gumbel distribution) probability density function.

DESCRIPTION

For the minimum order statistic, the standard form of the extreme value type I probability density function is:

$$f(x) = e^{x}e^{(-e^{x})} = e^{(x-e^{x})} \quad \textbf{(EQ 8-173)}$$

For the maximum order statistic, the standard form of the extreme value type I probability density function is:

$$f(x) = e^{-x}e^{(-e^{-x})} = e^{(-x-e^{-x})} \quad \textbf{(EQ 8-174)}$$

This distribution has a mean of 0.5722... (Euler's number) and a standard deviation of π/sqrt(6). The input value can be any real number.

SYNTAX

LET <y2> = EV1PDF(<y1>) <SUBSET/EXCEPT/FOR qualification>
where <y1> is a variable, a number, or a parameter;
<y2> is a variable or a parameter (depending on what <y1> is) where the computed extreme value type I pdf value is saved;
and where the <SUBSET/EXCEPT/FOR qualification> is optional.

EXAMPLES

LET A = EV1PDF(3)
LET Y = EV1PDF(X1)

NOTE 1

The SET MINMAX command specifies whether the minimum or the maximum order statistic form is used. Entering SET MINMAX 2 specifies the maximum order statistic while SET MINMAX 1 specifies the minimum order statistic.

NOTE 2

For the minimum order statistic, the general form of the extreme value type I probability density function is:

$$f(x) = \left(\frac{1}{\beta}\right)e^{\frac{(x-\mu)}{\beta}}e^{-e^{\frac{x-\mu}{\beta}}} \quad \textbf{(EQ 8-175)}$$

For the maximum order statistic, the general form of the extreme value type I probability density function is:

$$f(x) = \left(\frac{1}{\beta}\right)e^{\left(\frac{-(x-\mu)}{\beta}\right)}e^{\left(-e^{\frac{-(x-\mu)}{\beta}}\right)} \quad \textbf{(EQ 8-176)}$$

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. This distribution has mean μ - 0.5722*β and standard deviation (π/sqrt(6))*β.

DEFAULT

None

SYNONYMS

None

RELATED COMMANDS

EV1CDF	=	Compute the extreme value type I cumulative distribution function.
EV1PPF	=	Compute the extreme value type I percent point function.
EV2CDF	=	Compute the extreme value type II cumulative distribution function.
EV2PDF	=	Compute the extreme value type II probability density function.
EV2PPF	=	Compute the extreme value type II percent point function.

WEICDF	=	Compute the Weibull cumulative distribution function.
WEIPDF	=	Compute the Weibull probability density function.

REFERENCE

"Continuous Univariate Distributions - 1," Johnson and Kotz, Houghton Mifflin, 1970 (chapter 21).

"Handbook of Mathematical Functions, Applied Mathematics Series, Vol. 55," Abramowitz and Stegum, National Bureau of Standards, 1964 (page 930).

APPLICATIONS

Extreme Value Analysis

IMPLEMENTATION DATE

94/4

PROGRAM

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MAJOR YTIC NUMBER 6; MINOR YTIC NUMBER 1
YLIMITS 0 0.5; YTIC DECIMAL 1
XLIMITS -4 4; XTIC OFFSET 0.6 0.6
SEGMENT 1 COORDINATES 16 88 21 88; SEGMENT 1 PATTERN SOLID
SEGMENT 2 COORDINATES 16 84 21 84; SEGMENT 2 PATTERN DASH
LEGEND 1 MINMAX = 2; LEGEND 1 COORDINATES 22 87
LEGEND 2 MINMAX = 1; LEGEND 2 COORDINATES 22 83
TITLE EV1PDF PLOT
X1LABEL X
Y1LABEL PROBABILITY
SET MINMAX 2
PLOT EV1PDF(X) FOR X = -4.5 0.01 4.5
PRE-ERASE OFF
LINES DASH; SET MINMAX 1
PLOT EV1PDF(X) FOR X = -4.5 0.01 4.5
```