

LGACDF**PURPOSE**

Compute the standard form of the log-gamma cumulative distribution function with shape parameter γ .

DESCRIPTION

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

$$f(x, \gamma) = \frac{e^{\gamma x - e^x}}{\Gamma(\gamma)} \quad \gamma > 0 \quad \text{(EQ Aux-227)}$$

where γ is the shape parameter and Γ is the gamma function (see the documentation for the GAMMA command for details of this function).

The cumulative distribution function has the formula:

$$F(x, \gamma) = I_{e^x}(\gamma) \quad \gamma > 0 \quad \text{(EQ Aux-228)}$$

where $I_a(x)$ is the incomplete gamma function ratio. See the documentation for the GAMMAIP command for the details of this function.

SYNTAX

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

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

<y> is a variable or a parameter (depending on what <x> is) where the computed log-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 = LGACDF(3,1.5)

LET X2 = LGACDF(X1,GAMMA)

NOTE 1

The general form of the log-gamma probability density function is:

$$f(x, \gamma, \mu, \sigma) = \frac{e^{\gamma \frac{x-\mu}{\sigma} - e^{\frac{x-\mu}{\sigma}}}}{\Gamma(\gamma)} \quad \gamma > 0, \sigma > 0 \quad \text{(EQ Aux-229)}$$

where μ is a location parameter and σ is a scale parameter.

NOTE 2

Prentice has given a reparameterized log-gamma probability density function that many analysts prefer. The pdf for this is given on page 90 of the Johnson, Kotz, and Balakrishnan book (see the Reference section below). DATAPLOT does not directly support the reparameterized form at this time.

DEFAULT

None

SYNONYMS

None

RELATED COMMANDS

LGACDF	=	Compute the log-gamma cumulative distribution function.
LGAPPF	=	Compute the log-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.
EVICDF	=	Compute the extreme value type 1 cumulative distribution function.

EV1PDF = Compute the extreme value type 1 probability density function.
 EV1PPF = Compute the extreme value type 1 percent point function.

REFERENCE

“Continuous Univariate Distributions - Vol. 2,” 2nd. Ed., Johnson, Kotz, and Balakrishnan, John Wiley and Sons, 1994 (pp. 89-90).

APPLICATIONS

Extreme Value Analysis, Lifetime Analysis

IMPLEMENTATION DATE

95/10

PROGRAM

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MULTIPLY 2 2; MULTIPLY CORNER COORDINATES 0 0 100 100
X1LABEL X
Y1LABEL PROBABILITY
.
LET GAMMA = 0.1
TITLE LOG-GAMMA CDF - GAMMA = ^GAMMA
PLOT LGACDF(X,GAMMA) FOR X = 0.01 0.01 5
LET GAMMA = 0.5
TITLE LOG-GAMMA CDF - GAMMA = ^GAMMA
PLOT LGACDF(X,GAMMA) FOR X = 0.01 0.01 5
LET GAMMA = 1.0
TITLE LOG-GAMMA CDF - GAMMA = ^GAMMA
PLOT LGACDF(X,GAMMA) FOR X = 0.01 0.01 5
LET GAMMA = 2.0
TITLE LOG-GAMMA CDF - GAMMA = ^GAMMA
PLOT LGACDF(X,GAMMA) FOR X = 0.01 0.01 5
END OF MULTIPLY
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