

LGNCDF**PURPOSE**

Compute the standard lognormal cumulative distribution function.

DESCRIPTION

A variable X is lognormally distributed if the variable $Y=LN(X)$ is normally distributed. The standard lognormal probability density function is:

$$f(x) = \frac{e^{-\frac{(\ln(x))^2}{2\sigma^2}}}{x\sigma\sqrt{2\pi}} \quad \text{for } x \geq 0 \quad \text{(EQ 8-253)}$$

where σ is a shape parameter. The cumulative distribution function of the lognormal distribution is calculated as $\Phi(LN(x)/\sigma)$ where Φ is standard normal cumulative distribution function.

SYNTAX

LET <y2> = LGNCDF(<y1>,<s>) <SUBSET/EXCEPT/FOR qualification>

where <y1> is a non-negative variable, a number, or a parameter;

<s> is an optional number or parameter that specifies the shape parameter (defaults to 1 if omitted);

<y2> is a variable or a parameter (depending on what <y1> is) where the computed lognormal cdf value is stored;

and where the <SUBSET/EXCEPT/FOR qualification> is optional.

EXAMPLES

LET A = LGNCDF(3)

LET A = LGNCDF(3,0.6)

LET Y = LGNCDF(X1,A)

NOTE

The general lognormal probability density function is:

$$f(x) = \frac{e^{-\frac{\left(\ln\left(\frac{x-\theta}{m}\right)\right)^2}{2\sigma^2}}}{(x-\theta)\sigma\sqrt{2\pi}} \quad \text{for } x \geq \theta \quad \text{(EQ 8-254)}$$

where θ is a location parameter and m is a scale parameter. See topic (3) under the General considerations section at the beginning of this chapter for a discussion of generating cdf values for the general form of the distribution.

Earlier versions of DATAPLOT only supported lognormal cdf values with a shape parameter of 1. The current version defaults the shape parameter to 1 if it is not specified.

DEFAULT

None

SYNONYMS

None

RELATED COMMANDS

LGNCDF	=	Compute the lognormal probability density function.
LGNPDF	=	Compute the lognormal percent point function.
HFNCDF	=	Compute the half-normal cumulative distribution function.
HFNPDF	=	Compute the half-normal probability density function.
HFNPDF	=	Compute the half-normal percent point function.
NORCDF	=	Compute the normal cumulative distribution function.
NORPDF	=	Compute the normal probability density function.
NORPDF	=	Compute the normal percent point function.

REFERENCE

“Continuous Univariate Distributions - 1,” Johnson and Kotz, Houghton Mifflin, 1970 (chapter 14).

“Statistical Distributions,” 2nd ed., Evans, Hastings, and Peacock, Wiley and Sons, 1993 (chapter 25).

APPLICATIONS

Fatigue life distribution, particle size distribution

IMPLEMENTATION DATE

94/4 (support for the shape parameter added 95/4)

PROGRAM

```
TITLE LGNCDF FOR SIGMA = 1, 0.6, 1.2
XLIMITS 0 10
XTIC OFFSET 0.2 0.2
XILABEL X
YILABEL PROBABILITY
LINE SOLID DASH DOT
PLOT LGNCDF(X) FOR X = 0.01 0.01 10.0 AND
PLOT LGNCDF(X,0.6) FOR X = 0.01 0.01 10 AND
PLOT LGNCDF(X,1.2) FOR X = 0.01 0.01 10
```

