

**LGNPPF****PURPOSE**

Compute the lognormal percent point function.

**DESCRIPTION**

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

$$f(x) = \frac{e^{-\frac{(\ln(x))^2}{2\sigma^2}}}{x\sigma\sqrt{2\pi}} \quad \text{for } x \geq 0 \quad (\text{EQ 8-257})$$

where  $\sigma$  is a shape parameter. The lognormal percent point function is calculated by:

$$G(p) = e^{\sigma\Phi^{-1}(p)} \quad (\text{EQ 8-258})$$

where  $\Phi^{-1}$  is the percent point function of the standard normal distribution. The input value is a real number between 0 and 1.

**SYNTAX**

LET <y2> = LGNPPF(<y1>,<s>) <SUBSET/EXCEPT/FOR qualification>  
 where <y1> is a variable or a parameter in the range 0 to 1;  
 <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 ppf value is stored;  
 and where the <SUBSET/EXCEPT/FOR qualification> is optional.

**EXAMPLES**

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

**NOTE**

The general lognormal probability density function is

$$f(x) = \frac{e^{-\left(\ln\left(\frac{x-\theta}{m}\right)\right)^2}{2\sigma^2}}{(x-\theta)\sigma\sqrt{2\pi}} \quad \text{for } x \geq \theta \quad (\text{EQ 8-259})$$

where  $\theta$  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 ppf 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 cumulative distribution function.
LGNPDF	=	Compute the lognormal probability density function.
HFNCDF	=	Compute the half-normal cumulative distribution function.
HFNPDF	=	Compute the half-normal probability density function.
HFNPPF	=	Compute the half-normal percent point function.
NORCDF	=	Compute the normal cumulative distribution function.
NORPDF	=	Compute the normal probability density function.
NORPPF	=	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 95/1)

## PROGRAM

```
XLIMITS 0 1
MAJOR XTIC NUMBER 6
MINOR XTIC NUMBER 1
XTIC DECIMAL 1
XILABEL X
YILABEL PROBABILITY
TITLE AUTOMATIC
PLOT LGNPPF(X) FOR X = 0.01 .01 0.99
```

