EWEPPF

PURPOSE

Compute the standard form of the exponentiated-Weibull percent point function with shape parameters γ and θ.

DESCRIPTION

The standard form of the exponentiated Weibull probability density function is:

$$f(x, \gamma, \theta, \sigma) = (\gamma\theta)[1 - e^{-x^\gamma}]^{\theta - 1} e^{-x^\gamma} x^{\gamma - 1} \qquad 0 < x < \infty \qquad \textbf{(EQ Aux-126)}$$

where γ and θ are positive shape parameters.

The percent point function is the inverse of the cumulative distribution function. The cumulative distribution sums the probability from 0 to the given x value. The percent point function takes a cumulative probability value and computes the corresponding x value. The formula for the standard form of the percent point function is:

$$G(p, \gamma, \theta) = [-\log(1 - p^{1/\theta})]^{1/\gamma} \qquad \textbf{(EQ Aux-127)}$$

SYNTAX

LET <y> = EWEPPF(<p>,<gamma>,<theta>) <SUBSET/EXCEPT/FOR qualification>

where <p> is a variable, number, or parameter in the range 0 to 1;

<y> is a variable or a parameter (depending on what <p> is) where the computed exponentiated Weibull ppf value is stored;

<gamma> is a positive number, parameter, or variable that specifies the first shape parameter;

<theta> is a positive number, parameter, or variable that specifies the second shape parameter;

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

EXAMPLES

LET A = DWEPPF(0.9,2)
LET A = DWEPPF(A1,8)

NOTE 1

The Weibull distribution can be based on either the minimum order statistic (SET MINMAX = 1) or the maximum order statistic (SET MINMAX = 2). Currently, the exponentiated Weibull distribution is only supported for the minimum order statistic case.

NOTE 2

The general form of the exponentiated Weibull probability density function is:

$$f(x, \gamma, \theta, \sigma) = \frac{\gamma\theta}{\sigma}\left[1 - e^{-\left(\frac{x}{\sigma}\right)^\gamma}\right]^{\theta - 1} e^{-\left(\frac{x}{\sigma}\right)^\gamma} \left(\frac{x}{\sigma}\right)^{\gamma - 1} \qquad 0 < x < \infty \qquad \textbf{(EQ Aux-128)}$$

where γ and θ are positive shape parameters and σ is a scale parameter. The formula for the general form of the percent point function is:

$$G(p, \gamma, \theta, \sigma) = \sigma[-\log(1 - p^{1/\theta})]^{1/\gamma} \qquad \textbf{(EQ Aux-129)}$$

DEFAULT

None

SYNONYMS

None

RELATED COMMANDS

EWECDF	=	Compute the exponentiated Weibull cumulative distribution function.
EWEPDF	=	Compute the exponentiated Weibull probability density function.
WEICDF	=	Compute the Weibull cumulative distribution function.
WEICDF	=	Compute the Weibull probability density function.
WEIPPF	=	Compute the Weibull percent point function.

REFERENCE

"The Exponentiated Weibull Family: A Reanalysis of the Bus-Motor- Failure Data," Mudholkar, Srivastava, and Freimer, Technometrics, November, 1995 (pp. 436-445).

APPLICATIONS

Reliability Analysis

IMPLEMENTATION DATE

95/9

PROGRAM

```
LET G = DATA 1 1 1 0.5 0.5 0.5 2 2 2
LET C = DATA 0.5 1 2 0.5 1 2 0.5 1 2
.
MULTIPLOT 3 3; MULTIPLOT CORNER COORDINATES 0 0 100 100
TITLE AUTOMATIC
LOOP FOR K = 1 1 9
    LET G1 = G(K)
    LET C1 = C(K)
    X1LABEL GAMMA = ^G1
    X2LABEL THETA = ^C1
    PLOT EWEPPF(P,G1,C1) FOR P = 0.01 0.01 0.99
END OF LOOP
END OF MULTIPLOT
```