

DWEPPF**PURPOSE**

Compute the standard form of the double Weibull percent point function with tail length parameter γ .

DESCRIPTION

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

$$f(x, \gamma) = (\gamma)|x|^{\gamma-1}e^{-|x|^\gamma} \quad \text{(EQ Aux-106)}$$

for any real x where γ is the positive tail length parameter

This is simply the Weibull distribution reflected about $x = 0$ when x is negative. For the Weibull distribution, DATAPLOT makes a distinction between the Weibull distribution based on the minimum order statistic and the Weibull distribution based on the maximum order statistic. However, the double Weibull distribution has the same formula in either case.

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 double Weibull percent point function can be expressed in terms of the Weibull percent function, with MINMAX set to 1, as follows: where WEIPPF is the Weibull percent point function.

$$G(p, \gamma) = \text{WEIPPF}(2((p - 0.5), \gamma)) \quad p \geq 0.5 \quad \text{(EQ Aux-107)}$$

$$G(p, \gamma) = -\text{WEIPPF}(2((0.5 - p), \gamma)) \quad p < 0.5 \quad \text{(EQ Aux-108)}$$

SYNTAX

LET <y> = DWEPPF(<p>, GAMMA) <SUBSET/EXCEPT/FOR qualification>

where <p> is a variable, number, or parameter containing values between 0 and 1;

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

<GAMMA> is a positive number or parameter that specifies the tail length parameter;

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

EXAMPLES

LET A = DWEPPF(0.9,2)

LET A = DWEPPF(A1,8)

NOTE

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

$$f(x, \gamma, \mu, \alpha) = \left(\frac{\gamma}{2\alpha}\right) \left|\frac{x-\mu}{\alpha}\right|^{\gamma-1} e^{-\left|\frac{x-\mu}{\alpha}\right|^\gamma} \quad \text{(EQ Aux-109)}$$

for any real x where μ is a location parameter and α is a positive scale parameter.

DEFAULT

None

SYNONYMS

None

RELATED COMMANDS

| | | |
|--------|---|--|
| DWECDF | = | Compute the double Weibull cumulative distribution function. |
| DWEPDF | = | Compute the double Weibull probability density function. |
| WEICDF | = | Compute the Weibull cumulative distribution function. |
| WEIPDF | = | Compute the Weibull probability density function. |
| WEIPPF | = | Compute the Weibull percent point function. |
| DEXCDF | = | Compute the double exponential cumulative distribution function. |
| DEXPDF | = | Compute the double exponential probability density function. |
| DEXPPF | = | Compute the double exponential percent point function. |

REFERENCE

"Continuous Univariate Distributions - Vol. 1," 2nd. ed., Johnson, Kotz, and Balakrishnan, 1994 (page 688).

APPLICATIONS

Reliability Analysis

IMPLEMENTATION DATE

95/9

PROGRAM

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TITLE DWEPPF FOR P = 0.01 0.01 0.99
YILABEL X
X1LABEL PROBABILITY
LET G = DATA 1 2 5 0.5
LEGEND 1 COORDINATES 22 87
XLIMITS 0 1
MINOR XTIC NUMBER 1
XTIC DECIMAL 1
MULTIPLY 2 2; MULTIPLY CORNER COORDINATES 0 0 100 100
LOOP FOR K = 1 1 4
    LET GAMMA = G(K)
    LEGEND 1 GAMMA = ^GAMMA
    PLOT DWEPPF(P,GAMMA) FOR P = 0.01 .01 0.99
END OF LOOP
END OF MULTIPLY

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