

EWECDF**PURPOSE**

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

DESCRIPTION

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

$$f(x, \gamma, \theta, \sigma) = (\gamma\theta)[1 - e^{-x^\gamma}]^{\theta-1} e^{-x^\gamma} x^{\gamma-1} \quad 0 < x < \infty \quad \text{(EQ Aux-120)}$$

where γ and θ are positive shape parameters. The formula for the cumulative distribution function is:

$$F(x, \gamma, \theta) = [1 - e^{-(x)^\gamma}]^\theta \quad 0 < x < \infty \quad \text{(EQ Aux-121)}$$

SYNTAX

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

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

<y> is a variable or a parameter (depending on what <x> is) where the computed exponentiated Weibull pdf 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 = EWECDF(3,2,0.5)

LET A = EWECDF(X,G,T)

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:

$$f(x, \gamma, \theta, \sigma) = \frac{\gamma\theta}{\sigma} \left[1 - e^{-\left(\frac{x}{\sigma}\right)^\gamma} \right]^{\theta-1} e^{-\left(\frac{x}{\sigma}\right)^\gamma} \left(\frac{x}{\sigma}\right)^{\gamma-1} \quad 0 < x < \infty \quad \text{(EQ Aux-122)}$$

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

$$F(x, \gamma, \theta, \sigma) = \left[1 - e^{-\left(\frac{x}{\sigma}\right)^\gamma} \right]^\theta \quad 0 < x < \infty \quad \text{(EQ Aux-123)}$$

DEFAULT

None

SYNONYMS

None

RELATED COMMANDS

EWEPDF	=	Compute the exponentiated Weibull probability density function.
EWEPDF	=	Compute the exponentiated Weibull percent point 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

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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
LET START = DATA 0.01 0 0 0.01 0.01 0 0 0 0
LET INC = DATA 0.001 0.01 0.01 0.001 0.01 0.01 0.01 0.01 0.01
LET STOP = DATA 0.5 5 5 1 5 5 5 5

MULTIPLY 3 3; MULTIPLY CORNER COORDINATES 0 0 100 100
TITLE AUTOMATIC
LOOP FOR K = 1 1 9
  LET G1 = G(K)
  LET C1 = C(K)
  LET FIRST = START(K)
  LET LAST = STOP(K)
  LET INCT = INC(K)
  X1LABEL GAMMA = ^G1
  X2LABEL THETA = ^C1
  PLOT EWECDF(X,G1,C1) FOR X = FIRST INCT LAST
END OF LOOP
END OF MULTIPLY
    
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