

HFLCDF**PURPOSE**

Compute the half-logistic or the generalized half-logistic cumulative distribution function.

DESCRIPTION

The half-logistic distribution has the following probability density function:

$$f(x) = \frac{2e^{-x}}{(1+e^{-x})^2} \quad x \geq 0 \quad \text{(EQ Aux-197)}$$

The generalized form of this distribution has the probability density function:

$$f(x, k) = \frac{2\left(1 - kx^{\frac{1}{k}-1}\right)}{(1 + (1 - kx^{1/k}))^2} \quad 0 \leq x \leq \frac{1}{k}, k > 0 \quad \text{(EQ Aux-198)}$$

The corresponding cumulative distribution functions are:

$$F(x) = \frac{1 - e^{-x}}{1 + e^{-x}} \quad x \geq 0 \quad \text{(EQ Aux-199)}$$

and

$$F(x, k) = \frac{1 - (1 - kx^{1/k})}{1 + (1 - kx^{1/k})} \quad 0 \leq x \leq \frac{1}{k}, k > 0 \quad \text{(EQ Aux-200)}$$

The half-logistic distribution is formed by folding the standard logistic distribution (that is, the distribution of ABS(x) where x has a logistic distribution).

SYNTAX

LET <y> = HFLCDF(<x>, <k>) <SUBSET/EXCEPT/FOR qualification>

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

<k> is an optional number, parameter, or variable that specifies the shape parameter;

<y> is a variable or a parameter (depending on what <x> is) where the computed half-logistic cdf value is stored;

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

If the <k> parameter is omitted, the half-logistic cdf is computed. If <k> is given, the generalized half-logistic cdf is computed.

EXAMPLES

LET A = HFLCDF(3)

LET A = HFLCDF(0.8,0.4)

LET X2 = HFLCDF(X1)

LET X2 = HFLCDF(X1,K)

NOTE

DATAPLOT limits the value of the shape parameter to values less than or equal to 10.

DEFAULT

None

SYNONYMS

None

RELATED COMMANDS

HFLPDF	=	Compute the generalized half-logistic probability density function.
HFLPPF	=	Compute the generalized half-logistic percent point function.
LOGCDF	=	Compute the logistic cumulative distribution function.
LOGPDF	=	Compute the logistic probability density function.

LOGPPF	=	Compute the logistic percent point function.
LLGCDF	=	Compute the log-logistic cumulative distribution function.
LLGPDF	=	Compute the log-logistic probability density function.
LLGPPF	=	Compute the log-logistic percent point function.

REFERENCE

"Continuous Univariate Distributions - Vol. 2," 2nd. Ed., Johnson, Kotz, and Balakrishnan, John Wiley and Sons, 1994 (pp. 150-151).

APPLICATIONS

Lifetime Analysis

IMPLEMENTATION DATE

95/10

PROGRAM

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MULTIPLY 2 2; MULTIPLY CORNER COORDINATES 0 0 100 100
TITLE AUTOMATIC
X1LABEL HALF LOGISTIC DISTRIBUTION
PLOT HFLCDF(X) FOR X = 0 0.01 5
LET K = 0.5
X1LABEL HALF-LOGISTIC DISTRIBUTION - K = ^K
LET UL = 1/K; PLOT HFLCDF(X,K) FOR X = 0 0.01 UL
LET K = 1
X1LABEL HALF-LOGISTIC DISTRIBUTION - K = ^K
LET UL = 1/K; PLOT HFLCDF(X,K) FOR X = 0 0.01 UL
LET K = 2
X1LABEL HALF-LOGISTIC DISTRIBUTION - K = ^K
LET UL = 1/K; PLOT HFLCDF(X,K) FOR X = 0 0.01 UL
END OF MULTIPLY

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