

NCBCDF**PURPOSE**

Compute the non-central beta cumulative distribution function with shape parameters α and β and non-centrality parameter λ .

DESCRIPTION

The non-central beta distribution has the following cumulative distribution function:

$$F(x) = \sum_{j=0}^{\infty} \frac{e^{-\frac{\lambda}{2}} \left(\frac{\lambda}{2}\right)^j I_x(\alpha + j, \beta; 0)}{j!} \quad 0 \leq x \leq 1 \quad (\text{EQ 8-277})$$

where α and β are the shape parameters, λ is the non-centrality parameter, and I_x is the incomplete beta function ratio (see the documentation for the BETAI command in chapter 6 of this volume for details on this function). The incomplete beta function is the cumulative distribution function of the central beta distribution.

SYNTAX

LET <y2> = NCBCDF(<y1>,<a>,,<lambda>) <SUBSET/EXCEPT/FOR qualification>

where <y1> is a number, parameter, or variable containing values between 0 and 1;

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

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

<lambda> is a non-negative number, parameter, or variable that specifies the non-centrality parameter;

<y2> is a variable or a parameter (depending on what <x>, <a>, , and <l> are) where the computed cdf value is stored; and where the <SUBSET/EXCEPT/FOR qualification> is optional.

EXAMPLES

LET A = NCBCDF(0.3,10,8,1)

LET A = NCBCDF(A1,10,8,1.5)

LET Y = NCBCDF(X1,2,6,2)

NOTE

DATAPLOT uses algorithm AS 226 (see the REFERENCE section below) obtained from the statlib archive to compute the non-central beta cdf. It uses the DBETAI and DLNGAM routines from the SLATEC library rather than the corresponding algorithms from the Applied Statistics series to compute the log gamma and incomplete beta functions.

DEFAULT

None

SYNONYMS

None

RELATED COMMANDS

NCBPPF	=	Compute the non-central beta percent point function.
BETCDF	=	Compute the beta cumulative distribution function.
BETPDF	=	Compute the beta probability density function.
BETPPF	=	Compute the beta percent point function.
NCFCDF	=	Compute the non-central F cumulative distribution function.
NCFPPF	=	Compute the non-central F percent point function.
NCTCDF	=	Compute the non-central t cumulative distribution function.
NCTPPF	=	Compute the non-central t percent point function.
NCCCDF	=	Compute the non-central chi-square cumulative distribution function.
NCCPPF	=	Compute the non-central chi-square percent point function.
GAMCDF	=	Compute the gamma cumulative distribution function.
GAMPDF	=	Compute the gamma probability density function.
GAMPPF	=	Compute the gamma percent point function.

REFERENCE

“Computing Noncentral Beta Probabilities,” Lenth, Applied Statistics, Vol. 39, No. 2, 1987, pp. 241-244.

“Continuous Univariate Distributions,” Johnson and Kotz, Wiley and Sons, 1970.

“Statistical Distributions,” 2nd Edition, Evans, Hastings, and Peacock, 1970 (chapter 5).

APPLICATIONS

Data Analysis

IMPLEMENTATION DATE

94/9

PROGRAM

TITLE AUTOMATIC

XILABEL X

YILABEL PROBABILITY

PLOT NCBCDF(X,2,4,1) FOR X = 0 0.01 1

