NCCCDF

PURPOSE

Compute the non-central chi-square cumulative distribution function with degrees of freedom parameter υ and with non-centrality parameter δ.

DESCRIPTION

The non-central chi-square distribution with degrees of freedom υ and non-centrality parameter δ is the sum of υ independent normal distributions with standard deviation 1. The non-centrality parameter is one half the sum of squares of the normal means. The formula for the cumulative distribution function is:

$$F(x) = \sum_{i=0}^{\infty} \frac{e^{\frac{-\delta}{2}}\left(\frac{\delta}{2}\right)^i}{i!} F_c(x, \upsilon + 2i) \qquad x > 0 \qquad \textbf{(EQ 8-278)}$$

where δ is the non-centrality parameter, υ is the degrees of freedom parameter, and F_c is the central chi-square cumulative distribution function. See the documentation for the CHSCDF command for a description of the central chi-square distribution function.

This distribution is sometimes needed in the calculation of the power of a test.

SYNTAX

LET <y2> = NCCCDF(<y1>,<v>,<delta>) <SUBSET/EXCEPT/FOR qualification>

where <y1> is a positive number, variable or a parameter;

<y2> is a variable or a parameter (depending on what <y1> is) where the computed cdf value is stored;

<v> is a positive number, parameter or variable that specifies the degrees of freedom parameter;

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

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

EXAMPLES

LET A = NCCCDF(0.7,1,1)
LET A = NCCCDF(3,10,10)

NOTE 1

DATAPLOT uses algorithm AS 170 (see the REFERENCE section below) obtained from the statlib archive to compute the non-central chi-square cdf. It uses the DGAMI and DLNGAM routines from the SLATEC library rather than the corresponding algorithms from the Applied Statistics series to compute the log gamma and incomplete gamma functions.

NOTE 2

The standard chi-square cdf function, CHSCDF, is limited to integer degrees of freedom. The NCCCDF function can be used to find cdf values of a central chi-square distribution with non-integer degrees of freedom.

DEFAULT

None

SYNONYMS

None

RELATED COMMANDS

NCCNCP	=	Compute the non-central chi-square non-centrality parameter function.
NCCPPF	=	Compute the non-central chi-square percent point function.
CHSPDF	=	Compute the chi-square probability density function.
CHSPPF	=	Compute the chi-square percent point function.
CHSCDF	=	Compute the chi-square cumulative distribution function.
NCFCDF	=	Compute the non-central F cumulative distribution function.
NCFPPF	=	Compute the non-central F percent point function.
NCBCDF	=	Compute the non-central beta cumulative distribution function.
NCBPPF	=	Compute the non-central beta percent point function.
NCTCDF	=	Compute the non-central t cumulative distribution function.

NCTPPF	=	Compute the non-central t percent point function.
NORCDF	=	Compute the normal cumulative distribution function.
NORPDF	=	Compute the normal probability density function.
NORPPF	=	Compute the normal percent point function.

REFERENCE

"Computation of Probability and Non-centrality Parameter of a Non-central Chi-squared Distribution," Narula and Desu, Applied Statistics, Vol. 30, No. 3, 1981, pp. 349-352.

"Continuous Univariate Distributions," Johnson and Kotz, Wiley and Sons, 1970.

"Statistical Distributions," 2nd Edition, Evans, Hastings, and Peacock, 1970 (chapter 9).

APPLICATIONS

Hypothesis Testing

IMPLEMENTATION DATE

94/9

PROGRAM

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TITLE AUTOMATIC
Y1LABEL PROBABILITY
X1LABEL X
PLOT NCCCDF(X,10,1) FOR X = 0.1 0.2 20
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