DNFCDF

PURPOSE

Compute the doubly non-central F cumulative distribution function with degrees of freedom parameters ν_1 and ν_2 and with non-centrality parameters λ_1 and λ_2.

DESCRIPTION

The F distribution is the ratio of 2 central chi-square distributions:

$$F = (U/\nu_1)/(V/\nu_2)$$

where U and V are 2 independent chi-square distributions with ν_1 and ν_2 degrees of freedom respectively. The doubly non-central F distribution is the ratio of 2 non-central chi-square distributions. That is:

$$f(x) = (X1/\nu_1)/(X2/\nu_2)$$

where X1 and X2 are non-central chi-square distributions with degrees of freedom parameters ν_1 and ν_2 and non-centrality parameters λ_1 and λ_2 respectively. There is a series representation for the cumulative distribution function. However, since it is rather complicated, it is not given here. It is given in the Reeve's paper (see the REFERENCE section below).

SYNTAX

LET <y2> = DNFCDF(<y1>,<v1>,<v2>,<lambda1>,<lambda2>) <SUBSET/EXCEPT/FOR qualification>
where <y1> is a number, variable or a parameter containing non-negative values;
<y2> is a variable or a parameter (depending on what <y1> is) where the computed cdf value is stored;
<v1> is a non-negative number, parameter or variable that specifies the first degrees of freedom parameter;
<v2> is a non-negative number, parameter or variable that specifies the second degrees of freedom parameter;
<lambda1> is a non-negative number, parameter or variable that specifies the first non-centrality parameter;
<lambda2> is a non-negative number, parameter or variable that specifies the second non-centrality parameter;
and where the <SUBSET/EXCEPT/FOR qualification> is optional.

EXAMPLES

```
LET A = DNFCDF(2,3,3,5,5)
LET A = DNFCDF(2,10,10,5,5)
LET Y = DNFCDF(1.1,14,15,10000,10000)
```

NOTE 1

This function uses code written by Charles Reeves while he was a member of the Statistical Engineering Division at NIST. The algorithm is described in the paper listed in the REFERENCE section below. This algorithm is based on a series representation given by Bulgren (see the REFERENCE below) of the exact form of the doubly non-central F distribution.

NOTE 2

Both the degrees of freedom parameters and the non-centrality parameters can be non-negative real numbers. The non-centrality parameters are restricted to values under 10,000. The compute time increases as the value of the non-centrality parameters increases.

NOTE 3

DATAPLOT also supports the central F and the singly non-central F distributions (see the documentation for FCDF and NCFCDF). The DNFCDF function can be used for these cases as well by setting one or both non-centrality parameters to zero. However, it uses a different algorithm.

DEFAULT

None

SYNONYMS

None

RELATED COMMANDS

DNFPPF	=	Compute the doubly non-central F percent point function.
NCFCDF	=	Compute the singly non-central F cumulative distribution function.
NCFPPF	=	Compute the singly non-central F percent point function.
FCDF	=	Compute the F cumulative distribution function.

FPDF	=	Compute the F probability density function.
FPPF	=	Compute the F percent point function.
DNTCDF	=	Compute the doubly non-central t cumulative distribution function.
DNTPPF	=	Compute the doubly non-central t 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.
NORCDF	=	Compute the normal cumulative distribution function.
NORPDF	=	Compute the normal probability density function.
NORPPF	=	Compute the normal percent point function.
TCDF	=	Compute the t cumulative distribution function.
TPDF	=	Compute the t probability density function.
TPPF	=	Compute the t percent point function.

REFERENCE

"An Algorithm for Computing the Doubly Non-Central F C.D.F. to a Specified Accuracy," Charles Reeve, SED Note 86-4, November, 1986.

"On Representations of the Doubly Non-Central F Distribution," W. G. Bulgren, Journal of the American Statistical Association, Vol. 66, No. 333, 1971 (pp. 184-186).

APPLICATIONS

Power Functions

IMPLEMENTATION DATE

94/9

PROGRAM

```
TITLE AUTOMATIC
X1LABEL X
Y1LABEL PROBABILITY
PLOT DNFCDF(X,3,10,5,5) FOR X = 0 0.1 6
```