

DNTPPF**PURPOSE**

Compute the doubly non-central t percent point function with degrees of freedom parameters ν and non-centrality parameters δ and λ .

DESCRIPTION

Given the random variable:

$$Y = Z/\text{SQRT}(X/\nu)$$

where Z is a normal distribution with mean δ and a standard deviation of 1 and X is a non-central chi-square distribution with ν degrees of freedom and a non-centrality parameter of λ , then Y has a doubly non-central t distribution. The percent point function does not have a simple closed form. It is calculated numerically.

SYNTAX

LET <y> = DNTPPF(<p>,<v>,<delta>,<lambda>) <SUBSET/EXCEPT/FOR qualification>

where <y1> is a number, variable or a parameter containing values in the interval (0,1);

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

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

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

<lambda> 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 = DNTCDF(0.90,3,3,5)

LET A = DNTCDF(0.95,10,10,5)

LET Y = DNTCDF(0.99,14,100,10000)

NOTE 1

This function uses a bisection method to calculate the percent point function. The algorithm is an adaptation of the one from the Kennedy and Gentle book for the beta percent point function (see the REFERENCE section below).

NOTE 2

The degrees of freedom parameter and the non-centrality parameters can be non-negative real numbers. The δ non-centrality parameter is restricted to value under 100 and the λ non-centrality parameter is restricted to values under 10,000. The compute time increases as the values of the non-centrality parameters increase.

NOTE 3

DATAPLOT also supports the central t and the singly non-central t distributions (see the documentation for TPPF and NCTPPF). The DNTCDF 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

DNTCDF	=	Compute the doubly non-central t cumulative distribution function.
NCTCDF	=	Compute the singly non-central t cumulative distribution function.
NCTPPF	=	Compute the singly non-central t percent point function.
TCDF	=	Compute the t cumulative distribution function.
TPDF	=	Compute the t probability density function.
TPPF	=	Compute the t percent point function.
DNFCDF	=	Compute the doubly non-central F cumulative distribution function.
DNFPPF	=	Compute the doubly non-central F 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.
FCDF	=	Compute the F cumulative distribution function.
FPDF	=	Compute the F probability density function.
FPPF	=	Compute the F 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.

“Series Representation of the Doubly Non-Central t-Distribution,” Marakatha Krishnan, Journal of the American Statistical Association, Vol. 63, No. 323, 1968 (pp. 1004-1012).

“Statistical Computing,” Kennedy and Gentle, Marcel-Dekker, 1978 (chapter 5).

APPLICATIONS

Hypothesis Testing

IMPLEMENTATION DATE

94/9

PROGRAM

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TITLE AUTOMATIC
XILABEL X
YILABEL PROBABILITY
PLOT DNTPPF(P,10,10,5) FOR P = 0.01 0.01 0.99
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