# DNFPPF

## PURPOSE

Compute the doubly non-central F percent point function with degrees of freedom parameters $\nu_1$ and $\nu_2$ and non-centrality parameters $\lambda_1$ and $\lambda_2$.

## 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 $\nu_1$ and $\nu_2$ 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 $\nu_1$ and $\nu_2$ and non-centrality parameters $\lambda_1$ and $\lambda_2$ respectively. There is no simple closed form for the percent point function. It is calculated numerically.

## SYNTAX

LET <y> = DNFPPF(<p>,<v1>,<v2>,<lambda1>,<lambda2>) <SUBSET/EXCEPT/FOR qualification>
where <p> is a number, variable or a parameter containing values in the interval (0,1);
<y> is a variable or a parameter (depending on what <p> is) where the computed ppf 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 = DNFPPF(0.75,3,3,5,5)
LET A = DNFPPF(0.95,10,10,5,5)
LET Y = DNFPPF(0.82,14,15,10000,10000)
```

## NOTE 1

This function uses a bisection method to calculate the percent point function.

## 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. The degrees of freedom parameters need not be integers.

## NOTE 3

DATAPLOT also supports the central F and the singly non-central F distributions (see the documentation for FPPF and NCFPPF). The DNFPPF 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

| | | |
|---|---|---|
| DNFCDF | = | Compute the doubly non-central F cumulative distribution 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 DNFPPF(P,10,10,5,5) FOR P = 0.01 0.01 0.99
```