

CHPPF**PURPOSE**

Compute the chi percent point function with degrees of freedom parameter v .

DESCRIPTION

The distribution of the positive square root of a variable having a chi-square distribution is a chi-distribution. The chi-distribution has the following probability density function:

$$f(x, v) = \frac{e^{-\frac{x^2}{2}} x^{v-1}}{2^{\frac{v}{2}-1} \Gamma\left(\frac{v}{2}\right)} \quad x > 0, v > 0 \quad (\text{EQ Aux-67})$$

where Γ is the gamma function. The percent point function is the inverse of the cumulative distribution function. The cumulative distribution sums the probability from 0 to the given x value. The percent point function takes a cumulative probability value and computes the corresponding x value. The input value should be between 0 and 1 and the degrees of freedom should be a positive real number. The chi percent point function is computed numerically.

SYNTAX

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

where <y1> is a positive number, parameter, or variable in the range 0 to 1;

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

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

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

EXAMPLES

LET A = CHPPF(0.9,10)

LET A = CHPPF(A1,10)

LET X2 = CHPPF(X1,10)

NOTE 1

DATAPLOT uses a bisection method to compute the chi ppf value. The algorithm for the central beta distribution is given in the Kennedy and Gentle book (see the REFERENCE section below). The algorithm for the chi-distribution is similar.

NOTE 2

The chi-distribution includes several distributions as special cases. If v is 1, the chi-distribution reduces to the half-normal distribution. If v is 2, the chi-distribution is a Rayleigh distribution. If v is 3, the chi-distribution is a Maxwell-Boltzmann distribution. A generalized Rayleigh distribution is a chi-distribution with a scale parameter equal to 1.

DEFAULT

None

SYNONYMS

None

RELATED COMMANDS

CHCDF	=	Compute the chi cumulative distribution function.
CHPDF	=	Compute the chi probability density function.
CHSCDF	=	Compute the chi-square cumulative distribution function.
CHSPDF	=	Compute the chi-square probability density function.
CHSPPF	=	Compute the chi-square percent point function.
WEICDF	=	Compute the Weibull cumulative distribution function.
WEIPDF	=	Compute the Weibull probability density function.
WEIPPF	=	Compute the Weibull 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

- “Continuous Univariate Distributions,” Johnson, Kotz, and Balakrishnan, John Wiley and Sons, 1994, (chapter 18).
 “Statistical Distributions,” 2nd ed., Evans, Hastings, and Peacock, John Wiley and Sons, 1993, (chapters 8 and 34).
 “Statistical Computing,” Kennedy and Gentle, Marcel-Dekker, 1978 (chapter 5).

APPLICATIONS

Reliability

IMPLEMENTATION DATE

95/4

PROGRAM

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LET STRING S1 = HALF-NORMAL DISTRIBUTION
LET STRING S2 = RAYLEIGH DISTRIBUTION
LET STRING S3 = MAXWELL-BOTZMAN DISTRIBUTION
LET STRING S4 = V=4
LET STRING S5 = V=5
LET STRING S6 = V=6
LET STRING S7 = V=7
LET STRING S8 = V=8
LET STRING S9 = V=9
TITLE AUTOMATIC
.
MULTIPLY 3 3
LOOP FOR K = 1 1 9
  X1LABEL ^S^K
  PLOT CHPPF(P,K) FOR P = 0.01 0.01 0.99
END OF LOOP
END OF MULTIPLY

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