

VONPPF**PURPOSE**

Compute the Von Mises percent point function with shape parameter κ

DESCRIPTION

The Von Mises distribution has the following probability density function:

$$f(x) = \frac{e^{\kappa \cos(x)}}{2\pi I_0(\kappa)} \quad -\pi \leq x \leq \pi \quad (\text{EQ 8-352})$$

where κ is the shape parameter and I_0 is the modified Bessel function of order zero. The Von Mises distribution is a circular function with a period of 2π . If the input argument is outside the interval $(-\pi, \pi)$, DATAPLOT converts it to the equivalent argument in that interval.

A shape parameter of 0 reduces to a rectangular distribution on the $(-\pi, \pi)$ interval. The Von Mises distribution approaches a normal distribution as κ gets large.

The percent point function for the Von Mises distribution does not have a simple closed form. It is evaluated numerically with a bisection method.

SYNTAX

LET <y> = VONPPF(<p>,) <SUBSET/EXCEPT/FOR qualification>

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

 is a non-negative number, parameter, or variable; <y> is a parameter or variable (depending on what <p> and are) where the computed ppf value is stored;

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

EXAMPLES

LET A = VONPPF(0.9,1)

LET Y = VONPPF(0.95,2)

NOTE

The general form of the Von Mises probability density function is:

$$f(x) = \frac{e^{\kappa \cos(x - \mu)}}{2\pi I_0(\kappa)} \quad -\pi \leq x \leq \pi \quad (\text{EQ 8-353})$$

where μ is a location parameter. See topic (3) under the General considerations section at the beginning of this chapter for a discussion of generating ppf values for the general form of the distribution. As κ approaches infinity, the density concentrates to a single point (the location parameter μ).

DEFAULT

None

SYNONYMS

None

RELATED COMMANDS

VONCDF	=	Compute the Von Mises cumulative distribution function.
VONPDF	=	Compute the Von Mises probability density function.
SEMCDF	=	Compute the semi-circular cumulative distribution function.
SEMPDF	=	Compute the semi-circular probability density function.
SEMPPF	=	Compute the semi-circular 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

“Algorithm 518, Incomplete Bessel Function I0: The Von Mises Distribution,” Hill, ACM Transactions on Mathematical Software, Vol. 3, No. 3, September 1977, Pages 279-284.

“Algorithm AS 86: The Von Mises Distribution Function,” Mardia, Applied Statistics, 24, 1975 (pp. 268-272).

“Statistical Distributions,” 2nd. Edition, Evans, Hastings, and Peacock, John Wiley and Sons, 1993, (chapter 39).

APPLICATIONS

Data Analysis

IMPLEMENTATION DATE

94/10

PROGRAM

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XLIMITS 0 1
MAJOR XTIC NUMBER 6
MINOR XTIC NUMBER 1
XTIC DECIMAL 1
TITLE VON MISES PERCENT POINT FUNCTIONS
XILABEL PROBABILITY
YLABEL X
LINE SOLID DASH DOT
PLOT VONPPF(P,0) FOR P = 0.01 .01 0.99 AND
PLOT VONPPF(P,0.5) FOR P = 0.01 .01 0.99 AND
PLOT VONPPF(P,5) FOR P = 0.01 .01 0.99
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