ARSPPF

PURP OSE

Compute the arc-sine percent point function.

DESCRIPTION

The arc-sine distribution has the following probability density function:

$$f(x) = \frac{1}{\pi\sqrt{x(1-x)}} \qquad 0 < x < 1 \qquad \textbf{(EQ Aux-18)}$$

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 (i.e., the integral of the above function). The percent point function takes a cumulative probability value and computes the corresponding x value. The formula for the percent point function is:

$$G(p) = \left[\sin\left(\frac{p\pi}{2}\right)\right]^2 \qquad \textbf{(EQ Aux-19)}$$

The arc-sine distribution is a special case of the beta distribution with both parameters equal to 1/2. The generalized arc-sine distribution is the special case of the beta distribution where the 2 parameters sum to 1 but are not necessarily equal to 1/2. The generalized arc-sine probability functions can be computed using the beta probability distributions in DATAPLOT (see the Related Commands section below).

Johnson, Kotz, and Balakrishnan (see the Reference section below give a derivation of this distribution based on random walks.

SYNTAX

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

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

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

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

EXAMPLES

LET A = ARSPPF(0.9)

LET A = ARSPPF(A1)

DEFAULT

None

SYNONYMS

None

RELATED COMMANDS

ARSCDF	=	Compute the arc-sine cumulative distribution function.
ARSPDF	=	Compute the arc-sine probability density function.
BETCDF	=	Compute the beta cumulative distribution function.
BETCDF	=	Compute the beta probability density function.
BETPPF	=	Compute the beta percent point function.

REFERENCE

“Continuous Univariate Distributions - Volume 2,” 2nd Ed., Johnson, Kotz, and Balakrishnan, Wiley and Sons (pages 212, 253).

IMPLEMENTATION DATE

95/9

PROGRAM

```
TITLE AUTOMATIC
PLOT ARSPPF(P) FOR P = 0 0.01 1
```