ARSCDF

PURPOSE
Compute the arc-sine probability density function.

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

$$f(x) = \frac{1}{\pi\sqrt{x(1-x)}} \qquad 0 < x < 1 \qquad \textbf{(EQ Aux-15)}$$

The formula for the cumulative distribution is:

$$F(x) = \frac{2 \arcsin(\sqrt{x})}{\pi} \qquad 0 < x < 1 \qquad \textbf{(EQ Aux-16)}$$

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> = ARSCDF(<x>)   <SUBSET/EXCEPT/FOR qualification>
where <x> is a number, parameter, or variable;
    <y> is a variable or a parameter (depending on what <x> is) where the computed arc-sine cdf value is stored;
and where the <SUBSET/EXCEPT/FOR qualification> is optional.

EXAMPLES
LET A = ARSCDF(3)
LET Y = ARSCDF(X1)

DEFAULT
None

SYNONYMS
None

RELATED COMMANDS
ARSPDF	=	Compute the arc-sine probability density function.
ARSPPF	=	Compute the arc-sine percent point 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 ARSCDF(X) FOR X = 0.01 0.01 0.99