

ELLIPC1**PURPOSE**

Compute Legendre's complete elliptic integral of the first kind.

DESCRIPTION

Legendre's elliptic integral of the first kind is defined as:

$$K(\alpha) = \text{ELLIP1}\left(\frac{\pi}{2}, \alpha\right) \quad (\text{EQ Aux-116})$$

where ELLIP1 is the Legendre elliptic integral of the first kind. See the documentation for ELLIP1 for details of this function. This function is often expressed as:

$$K(m) = \text{ELLIP1}\left(\frac{\pi}{2}, m\right) \quad (\text{EQ Aux-117})$$

where m is the $\sin^2(\alpha)$. The value $k = \sin(\alpha)$ is also used. In DATAPLOT, the input value is m , the $\sin^2(\alpha)$ (i.e., the second form). It is straightforward to convert the other 2 forms to this form.

SYNTAX

LET <y> = ELLIPC1(<m>) <SUBSET/EXCEPT/FOR qualification>
 where <m> is a number, variable, or parameter in the range 0 to 1;
 <y> is a variable or a parameter (depending on what <m> is where the computed values are stored;
 and where the <SUBSET/EXCEPT/FOR qualification> is optional.

EXAMPLES

```
LET A = ELLIPC1(0.15)
LET A = ELLIPC1(0.4)
LET Y = ELLIPC1(X)
```

NOTE

DATAPLOT computes Legendre elliptic integrals by computing the equivalent Carlson elliptic integrals. The Carlson elliptic integrals are computed using the RC, RD, RF, and RJ routines from the SLATEC Common Mathematical Library to compute this function. SLATEC is a large set of high quality, portable, public domain Fortran routines for various mathematical capabilities maintained by seven federal laboratories.

DEFAULT

None

SYNONYMS

None

RELATED COMMANDS

ELLIPC2	=	Compute the Legendre complete elliptic integral of the second kind.
ELLIP1	=	Compute the Legendre elliptic integral of the first kind.
ELLIP2	=	Compute the Legendre elliptic integral of the second kind.
ELLIP3	=	Compute the Legendre's elliptic integral of the third kind.
RC	=	Compute the degenerate Carlson elliptic integral.
RD	=	Compute the Carlson elliptic integral of the second kind.
RF	=	Compute the Carlson elliptic integral of the first kind.
RJ	=	Compute the Carlson elliptic integral of the third kind.

REFERENCE

"Handbook of Mathematical Functions, Applied Mathematics Series, Vol. 55," Abramowitz and Stegun, National Bureau of Standards, 1964 (chapter 17).

"Numerical Recipes in FORTRAN," 2nd. Edition, Press, Teukolsky, Vetterling, and Flannery, Cambridge University Press, 1992 (chapter 6).

APPLICATIONS

Special Functions

IMPLEMENTATION DATE

94/9

PROGRAM

TITLE AUTOMATIC

PLOT ELLIPC1(ALPHA) FOR ALPHA = 0.01 0.01 0.997

