

## RJ

## PURPOSE

Compute Carlson's elliptic integral of the third kind.

## DESCRIPTION

Carlson's elliptic integral of the third kind is defined as:

$$RJ(x, y, z, \rho) = \frac{3}{2} \int_0^{\infty} \frac{1}{(t + \rho)(t + x)(t + y)(t + z)} dt \quad (\text{EQ Aux-302})$$

The parameters x, y, and z must all be non-negative with at most one of them being zero. The p parameter must be non-zero.

## SYNTAX

LET <a> = RJ(<x>,<y>,<z>,<p>) <SUBSET/EXCEPT/FOR qualification>

where <x> is a non-negative number, parameter, or variable;

<y> is a non-negative number, parameter, or variable;

<z> is a non-negative number, parameter, or variable;

<p> is a non-zero number, parameter, or variable;

<a> is a variable or a parameter (depending on what, <p>, <x>, <y>, and <z> are) where the computed values are stored;

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

## EXAMPLES

LET A = RJ(2,1,3,1)

LET A = RJ(X,0,4,1)

LET X2 = RJ(1,1,Y,P)

## NOTE 1

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

## NOTE 2

DATAPLOT computes Legendre elliptic integrals by computing the equivalent Carlson elliptic integrals. See the documentation for the ELLIP1, ELLIP2, ELLIP3, ELLIPC1, and ELLIPC2 functions for details on computing Legendre elliptic functions in DATAPLOT.

## DEFAULT

None

## SYNONYMS

None

## RELATED COMMANDS

RF	=	Compute the Carlson elliptic integral of the first kind.
RC	=	Compute the degenerate Carlson elliptic integral.
RD	=	Compute the Carlson elliptic integral of the second kind.
ELLIPC1	=	Compute the Legendre complete elliptic integral of the first kind.
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.

## REFERENCE

"Algorithms for Incomplete Elliptic Integrals by Duplication," Carlson, ACM Transactions on Mathematical Software, 7, pp. 398-403.

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

## APPLICATIONS

Special Functions

## IMPLEMENTATION DATE

94/9

## PROGRAM

```
TITLE AUTOMATIC
MULTIPLY 2 2; MULTIPLY CORNER COORDINATES 0 0 100 100
PLOT RF(X,1,2,2) FOR X = 0.1 0.1 10
PLOT RF(1,Y,2,2) FOR Y = 0.1 0.1 10
PLOT RF(1,1,Z,2) FOR Z = 0.1 0.1 10
PLOT RF(1,1,2,P) FOR P = 0.1 0.1 10
END OF MULTIPLY
```

