PEQ1

PURPOSE

Compute the real or complex component of the first derivative of the Weierstrass P elliptic function of a complex number (equianharmonic case with unit period parallelogram).

DESCRIPTION

The Weierstrass elliptic function is described in detail in the Handbook of Mathematical Functions (see REFERENCE section below).

SYNTAX 1

LET <ar> = PEQ1(<xr>,<xc>) <SUBSET/EXCEPT/FOR qualification>
where <xr> is a number, parameter, or variable that specifies the the real component of the input;
<xc> is a number, parameter, or variable that specifies the the complex component of the input;
<ar> is a variable or a parameter (depending on what <xr> and <xc> are) where the computed values are stored;
and where the <SUBSET/EXCEPT/FOR qualification> is optional.

This syntax computes the real component.

SYNTAX 2

LET <ac> = PEQI1(<xr>,<xc>) <SUBSET/EXCEPT/FOR qualification>
where <xr> is a number, parameter, or variable that specifies the the real component of the input;
<xc> is a number, parameter, or variable that specifies the the complex component of the input;
<ac> is a variable or a parameter (depending on what <xr> and <xc> are) where the computed values are stored;
and where the <SUBSET/EXCEPT/FOR qualification> is optional.

This syntax computes the complex component.

EXAMPLES

```
LET AR = PEQ1(2,1)
LET AC = PEQI1(2,1)
LET AR = PEQ1(X,4)
LET AC = PEQI1(X,4)
```

NOTE 1

The Weierstrass elliptic functions are computed using algorithm 549 from the ACM Transactions on Mathematical Software (see the REFERENCE section below).

NOTE 2

If the input value corresponds to a lattice point, an error message is printed and the output value is set to the largest real number on the machine.

DEFAULT

None

SYNONYMS

None

RELATED COMMANDS

PEQ	=	Compute the real component of the Weierstrass elliptic function (equianharmonic case).
PLEM	=	Compute the real component of the Weierstrass elliptic function (lemniscatic case).
PLEM1	=	Compute the real component of the first derivative of the Weierstrass elliptic function (lemniscatic case).
SN	=	Compute the Jacobi elliptic function sn.
RF	=	Compute the Carlson elliptic integral of the first kind.
RD	=	Compute the Carlson elliptic integral of the second kind.
RJ	=	Compute the Carlson elliptic integral of the third kind.
ELLIP1	=	Compute the Legendre elliptic integral of the first kind.

REFERENCE

"Algorithm 549: Weierstrass' Elliptic Functions," Eckhardt, ACM Transactions on Mathematical Software, vol. 6 (pp. 112-120).

"Handbook of Mathematical Functions, Applied Mathematics Series, Vol. 55," Abramowitz and Stegun, National Bureau of Standards, 1964 (chapter 18).

APPLICATIONS

Special Functions

IMPLEMENTATION DATE

94/11

PROGRAM

```
X2LABEL DASH = COMPLEX COMPONENT
TITLE WEIERSTRASS ELLIPTIC FUNCTIONS
LINE SOLID DASH
MULTIPLOT 2 2; MULTIPLOT CORNER COORDINATES 0 0 100 100
LET C = 0.5
PLOT PEQ1(X,C) FOR X = 0 0.01 5 AND
PLOT PEQ1I(X,C) FOR X = 0 0.01 5
LET C = -0.5
PLOT PEQ1(X,C) FOR X = 0 0.01 5 AND
PLOT PEQ1I(X,C) FOR X = 0 0.01 5
LET C = 10
PLOT PEQ1(X,C) FOR X = 0 0.01 5 AND
PLOT PEQ1I(X,C) FOR X = 0 0.01 5
LET C = -10
PLOT PEQ1(X,C) FOR X = 0 0.01 5 AND
PLOT PEQ1I(X,C) FOR X = 0 0.01 5
END OF MULTIPLOT
```