

**POCH1****PURPOSE**

Compute a generalization of Pochhammer's symbol starting from the first order.

**DESCRIPTION**

Pochhammer's symbol represents ascending factorials and is defined to be:

$$(n)_k = n(n+1) \dots (n+k-1) \quad (\text{EQ Aux-282})$$

for integer n and k. This reduces to  $(n+k-1)/(n-1)!$ .

Analogous to the fact that the integer factorial function can be generalized to real numbers via the gamma function, Pochhammer's symbol can also be generalized to real numbers. Pochhammer's generalized symbol starting from the first order is defined to be:

$$\text{POCH1}(x, a) = \frac{\Gamma(a+x) - 1}{\Gamma(a) x} \quad (\text{EQ Aux-283})$$

where  $\Gamma$  is the gamma function. See the documentation for the GAMMA command for a description of the gamma function.

**SYNTAX**

LET <y> = POCH1(<x>,<a>) <SUBSET/EXCEPT/FOR qualification>

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

<a> is a number, parameter, or variable;

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

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

**EXAMPLES**

LET P = POCH1(2.3,1)

LET A = POCH1(X,A1)

LET X2 = POCH1(X1,4.2)

**NOTE 1**

DATAPLOT uses the routine DPOCH1 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.

**NOTE 2**

Pochhammer's symbol is defined to be ...

**DEFAULT**

None

**SYNONYMS**

None

**RELATED COMMANDS**

POCH	=	Compute a generalization of Pochhammer's symbol.
GAMMA	=	Compute the gamma function.
LOGGAMMA	=	Compute the log (to base e) gamma function.
GAMMAIP	=	Compute an alternate form of the incomplete gamma function.
GAMMAIC	=	Compute the complementary incomplete Gamma function.
GAMMAR	=	Compute the reciprocal gamma function.
TRICOMI	=	Compute Tricomi's incomplete gamma function.
DIGAMMA	=	Compute the digamma function.

## REFERENCE

"Handbook of Mathematical Functions, Applied Mathematics Series, Vol. 55," Abramowitz and Stegun, National Bureau of Standards, 1964 (chapter 6).

"The Special Functions and their Approximations, Volume 1," Luke, Academic Press, 34, (1969).

## APPLICATIONS

Special Functions

## IMPLEMENTATION DATE

94/9

## PROGRAM

```
TITLE AUTOMATIC
MULTIPLY 2 2; MULTIPLY CORNER COORDINATES 0 0 100 100
LET A = 0.1; XILABEL A = ^A
PLOT POCH1(X,A) FOR X = 0.01 0.01 3
LET A = 0.5; XILABEL A = ^A
PLOT POCH1(X,A) FOR X = 0.01 0.01 3
LET A = 1.0; XILABEL A = ^A
PLOT POCH1(X,A) FOR X = 0.01 0.01 3
LET A = 2.5; XILABEL A = ^A
PLOT POCH1(X,A) FOR X = 0.01 0.01 3
END OF MULTIPLY
```

