

Mathematical Functions

The following mathematical functions are supported in arithmetic processing statements (ADD, COMPUTE, DIVIDE, MULTIPLY, SUBTRACT) and in logical condition criteria:

Function	Format/Length	Explanation
ABS(<i>field</i>)	same as <i>field</i>	Absolute value of <i>field</i> .
ATN(<i>field</i>)	F8	Arc tangent of <i>field</i> .
COS(<i>field</i>)	F8	Cosine of <i>field</i> . If the value of the <i>field</i> is equal to or greater than 10^{17} , COS(<i>field</i>) will be "1".
EXP(<i>field</i>)	F8	Exponentiation of exponent <i>field</i> to base e, that is, e^{field} , where e is Euler's number.
FRAC(<i>field</i>)	same as <i>field</i>	Fractional part of <i>field</i> .
INT(<i>field</i>)	same as <i>field</i>	Integer part of <i>field</i> .
LOG(<i>field</i>)	F8	Natural logarithm of <i>field</i> .
SGN(<i>field</i>)	same as <i>field</i>	Sign of <i>field</i> (-1, 0, +1).
SIN(<i>field</i>)	F8	Sine of <i>field</i> . If the value of the <i>field</i> is equal to or greater than 10^{17} , SIN(<i>field</i>) will be "0".
SQRT(<i>field</i>)	(*)	Square root of <i>field</i> . A negative value in the argument field will be treated as positive. The maximum number of digits before the decimal point of the argument is 22.
TAN(<i>field</i>)	F8	Tangent of <i>field</i> . If the value of the <i>field</i> is equal to or greater than 10^{17} , TAN(<i>field</i>) will be "0".
VAL(<i>field</i>)	same as target field	Extract numeric value from an alphanumeric <i>field</i> . The content of the <i>field</i> must be the alphanumeric (code page or Unicode) character representation of a numeric value. Leading or trailing blanks in the <i>field</i> will be ignored; decimal point and leading sign character will be processed. If the target field is not long enough, decimal digits will be truncated (see also <i>Field Truncation and Field Rounding</i> in the section <i>Rules for Arithmetic Assignment</i> of the <i>Programming Guide</i>).

* These functions are evaluated as follows:

- If *field* has format/length F4, format/length of $\text{SQRT}(\text{field})$ will be F4.
- If *field* has format/length F8 or I, format/length of $\text{SQRT}(\text{field})$ will be F8.
- If *field* has format N or P, format/length of $\text{SQRT}(\text{field})$ will be $Nn.7$ or $Pn.7$ respectively (where *n* is automatically calculated to be large enough).

A *field* to be used with a mathematical function - except VAL - may be a constant or a scalar; its format must be numeric (N), packed numeric (P), integer (I), or floating point (F).

A *field* to be used with the VAL function may be a constant, a scalar, or an array; its format must be alphanumeric.

Mathematical Functions Example:

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** Example 'MATHEX': Mathematical functions
*****
DEFINE DATA LOCAL
1 #A      (N2.1) INIT <10>
1 #B      (N2.1) INIT <-6.3>
1 #C      (N2.1) INIT <0>
1 #LOGA   (N2.6)
1 #SQRTA  (N2.6)
1 #TANA   (N2.6)
1 #ABS    (N2.1)
1 #FRAC   (N2.1)
1 #INT    (N2.1)
1 #SGN    (N1)
END-DEFINE
*
COMPUTE #LOGA = LOG(#A)
WRITE NOTITLE '=' #A 5X 'LOG'           40T #LOGA
*
COMPUTE #SQRTA = SQRT(#A)
WRITE          '=' #A 5X 'SQUARE ROOT' 40T #SQRTA
*
COMPUTE #TANA = TAN(#A)
WRITE          '=' #A 5X 'TANGENT'     40T #TANA
*
COMPUTE #ABS = ABS(#B)
WRITE          // '=' #B 5X 'ABSOLUTE' 40T #ABS
*
COMPUTE #FRAC = FRAC(#B)
WRITE          '=' #B 5X 'FRACTIONAL' 40T #FRAC
*
COMPUTE #INT = INT(#B)
WRITE          '=' #B 5X 'INTEGER'     40T #INT
*
COMPUTE #SGN = SGN(#A)
WRITE          // '=' #A 5X 'SIGN'     40T #SGN
*
COMPUTE #SGN = SGN(#B)
WRITE          '=' #B 5X 'SIGN'       40T #SGN
*
COMPUTE #SGN = SGN(#C)
WRITE          '=' #C 5X 'SIGN'       40T #SGN
*
END

```

Output of program MATHEX:

#A:	10.0	LOG	2.302585
#A:	10.0	SQUARE ROOT	3.162277
#A:	10.0	TANGENT	0.648360
#B:	-6.3	ABSOLUTE	6.3
#B:	-6.3	FRACTIONAL	-0.3
#B:	-6.3	INTEGER	-6.0
#A:	10.0	SIGN	1
#B:	-6.3	SIGN	-1
#C:	0.0	SIGN	0