

# Open Object Rexx™

## RxMath Math Functions Reference

Version 4.0.0 Edition

August 14, 2009



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by

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Thanks to Julian Choy for the ooRexx logo design.

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# About This Book

This book describes the Open Object Rexx Math Function Library.

This book is intended for people who plan to develop applications using Rexx. Its users range from the novice, who might have experience in some programming language but no Rexx experience, to the experienced application developer, who might have had some experience with Object Rexx.

This book is a reference rather than a tutorial. It assumes you are already familiar with object-oriented programming concepts.

Descriptions include the use and syntax of the language and explain how the language processor "interprets" the language as a program is running.

## 1. Related Information

See also: *Open Object Rexx: Reference*

## 2. How to Read the Syntax Diagrams

Throughout this book, syntax is described using the structure defined below.

- Read the syntax diagrams from left to right, from top to bottom, following the path of the line.

The >>--- symbol indicates the beginning of a statement.

The ---> symbol indicates that the statement syntax is continued on the next line.

The >--- symbol indicates that a statement is continued from the previous line.

The --->< symbol indicates the end of a statement.

Diagrams of syntactical units other than complete statements start with the >--- symbol and end with the ---> symbol.

- Required items appear on the horizontal line (the main path).

```
>>-STATEMENT--required_item-----><
```

- Optional items appear below the main path.

```
>>-STATEMENT--+-----+-----><
      +-optional_item-+
```

- If you can choose from two or more items, they appear vertically, in a stack. If you must choose one of the items, one item of the stack appears on the main path.

```
>>-STATEMENT--+required_choice1+-----><
      +-required_choice2-+
```

- If choosing one of the items is optional, the entire stack appears below the main path.

```
>>-STATEMENT--+-----+-----><
      +-optional_choice1-+
      +-optional_choice2-+
```

- If one of the items is the default, it appears above the main path and the remaining choices are shown below.

```

      +-default_choice--+
>>-STATEMENT--+-----+-----><
      +-optional_choice--+
      +-optional_choice--+

```

- An arrow returning to the left above the main line indicates an item that can be repeated.

```

      +-----+
      v             |
>>-STATEMENT----repeatable_item+-----><

```

A repeat arrow above a stack indicates that you can repeat the items in the stack.

- A set of vertical bars around an item indicates that the item is a fragment, a part of the syntax diagram that appears in greater detail below the main diagram.

```

>>-STATEMENT--| fragment |-----><

fragment:
|---expansion_provides_greater_detail-----|

```

- Keywords appear in uppercase (for example, PARM1). They must be spelled exactly as shown but you can type them in upper, lower, or mixed case. Variables appear in all lowercase letters (for example, parmX). They represent user-supplied names or values.
- If punctuation marks, parentheses, arithmetic operators, or such symbols are shown, you must enter them as part of the syntax.

The following example shows how the syntax is described:

```

      +-,-----+
      v             |
>>-MAX(----number+---)-----><

```

### 3. A Note About Program Examples in this Document

The program examples in this document are rendered in a mono-spaced font that is not completely compatible for cut-and-paste functionality. Pasting text into an editor could result in some characters outside of the standard ASCII character set. Specifically, single-quote and double-quote characters are sometimes converted incorrectly when pasted into an editor.

### 4. Getting Help

The Open Object Rexx Project has a number of methods to obtain help for ooRexx. These methods, in no particular order of preference, are listed below.

## 4.1. The Rexx Language Association Mailing List

The *Rexx Language Association* (<http://www.rexxla.org/>) maintains a mailing list for its members. This mailing list is only available to RexxLA members thus you will need to join RexxLA in order to get on the list. The dues for RexxLA membership are small and are charged on a yearly basis. For details on joining RexxLA please refer to the *RexxLA Home Page* (<http://rexxla.org/>) or the *RexxLA Membership Application* (<http://www.rexxla.org/rexxla/join.html>) page.

## 4.2. The Open Object Rexx SourceForge Site

The Open Object Rexx Project (<http://www.oorexx.org/>) utilizes *SourceForge* (<http://sourceforge.net/>) to house the *ooRexx Project* (<http://sourceforge.net/projects/oorexx>) source repositories, mailing lists and other project features. Here is a list of some of the most useful facilities.

### The ooRexx Forums

The ooRexx project maintains a set of forums that anyone may contribute to or monitor. They are located on the *ooRexx Forums* ([http://sourceforge.net/forum/?group\\_id=119701](http://sourceforge.net/forum/?group_id=119701)) page. There are currently three forums available: Help, Developers and Open Discussion. In addition, you can monitor the forums via email.

### The Developer Mailing List

You can subscribe to the oorexx-devel mailing list at *ooRexx Mailing List Subscriptions* ([http://sourceforge.net/mail/?group\\_id=119701](http://sourceforge.net/mail/?group_id=119701)) page. This list is for discussing ooRexx project development activities and future interpreter enhancements. It also supports a historical archive of past messages.

### The Users Mailing List

You can subscribe to the oorexx-users mailing list at *ooRexx Mailing List Subscriptions* ([http://sourceforge.net/mail/?group\\_id=119701](http://sourceforge.net/mail/?group_id=119701)) page. This list is for discussing using ooRexx. It also supports a historical archive of past messages.

### The Announcements Mailing List

You can subscribe to the oorexx-announce mailing list at *ooRexx Mailing List Subscriptions* ([http://sourceforge.net/mail/?group\\_id=119701](http://sourceforge.net/mail/?group_id=119701)) page. This list is only used to announce significant ooRexx project events.

### The Bug Mailing List

You can subscribe to the oorexx-bugs mailing list at *ooRexx Mailing List Subscriptions* ([http://sourceforge.net/mail/?group\\_id=119701](http://sourceforge.net/mail/?group_id=119701)) page. This list is only used for monitoring changes to the ooRexx bug tracking system.

### Bug Reports

You can create a bug report at *ooRexx Bug Report* ([http://sourceforge.net/tracker/?group\\_id=119701&atid=684730](http://sourceforge.net/tracker/?group_id=119701&atid=684730)) page. Please try to provide as much information in the bug report as possible so that the developers can determine the problem as

quickly as possible. Sample programs that can reproduce your problem will make it easier to debug reported problems.

#### Request For Enhancement

You can suggest ooRexx features at the *ooRexx Feature Requests* ([http://sourceforge.net/tracker/?group\\_id=119701&atid=684733](http://sourceforge.net/tracker/?group_id=119701&atid=684733)) page.

#### Patch Reports

If you create an enhancement patch for ooRexx please post the patch using the *ooRexx Patch Report* ([http://sourceforge.net/tracker/?group\\_id=119701&atid=684732](http://sourceforge.net/tracker/?group_id=119701&atid=684732)) page. Please provide as much information in the patch report as possible so that the developers can evaluate the enhancement as quickly as possible.

Please do not post bug patches here, instead you should open a bug report and attach the patch to it.

### **4.3. comp.lang.rexx Newsgroup**

The comp.lang.rexx (news:comp.lang.rexx) newsgroup is a good place to obtain help from many individuals within the Rexx community. You can obtain help on Open Object Rexx or on any number of other Rexx interpreters and tools.

# Chapter 1. Introduction

RxMath is a Rexx utility package that enables you to use enhanced mathematical functions.

The function names in the Rexx Mathematical Functions package are similar to the names of their corresponding mathematical functions.

The precision of calculation depends on:

- The value specified when the command is issued
- The numeric digits settings of the calling Rexx activity

**Note:** Precision is limited to 16 digits.

## 1.1. Using the RxMath package

The Rexx Mathematical Functions package is contained in the library *rxmath*, with the appropriate file name for the operating system. This library must be loadable by the operating system using the normal procedure for the system. For instance, on Windows the file must be placed in a directory listed in your PATH. When installing ooRexx from any of the installation packages, the details of where the file is placed are handled automatically.

Beginning with ooRexx 4.0.0, a more robust process is used to load external functions. To get access to the functions in the Rexx Mathematical Functions package, use a `::requires` directive. For example:

```
say 'The square root of 3 is:' RxCalcSqrt(3)
```

```
::requires 'rxmath' LIBRARY
```

Existing code that used the previous process to load external functions:

```
call rxfuncadd "MathLoadFuncs", "rxmath", "MathLoadFuncs"
```

does not need to be changed. However, both `MathLoadFuncs()` and `MathDropFuncs()` are nops in ooRexx 4.0.0 and later.

## 1.2. Error Handling and Function Returns

Error 40 (Incorrect call to routine) is raised if either the wrong number of arguments or incorrect data is passed to a function.

If a mathematical function fails, the function will return *nan*, *+infinity*, and *-infinity* as appropriate. These returns are consistent on all operating systems.

Where an error occurs, the variable MATHERRNO is set with additional information that further defines the source of the error.



# Chapter 2. Functions

Most function names in the Rexx Mathematical Functions package are similar to the names of their corresponding mathematical functions. Note that in ooRexx 4.0.0 and later, the `MathLoadFuncs()` and `MathDropFuncs()` are nops.

- `MathLoadFuncs()`
- `MathDropFuncs()`
- `RxCalcSqrt()`
- `RxCalcExp()`
- `RxCalcLog()`
- `RxCalcLog10()`
- `RxCalcSinH()`
- `RxCalcCosH()`
- `RxCalcTanH()`
- `RxCalcPower()`
- `RxCalcSin()`
- `RxCalcCos()`
- `RxCalcTan()`
- `RxCalcCotan()`
- `RxCalcPi()`
- `RxCalcArcSin()`
- `RxCalcArcCos()`
- `RxCalcArcTan()`

## 2.1. `MathLoadFuncs()`

```
>>-MathLoadFuncs()-----><
```

Beginning with ooRexx 4.0.0 this function is basically a nop. Use:

```
::requires 'rxmath' LIBRARY
```

to gain access to the functions in the package.

However, if this function is called with a single, string, parameter, the copyright information is printed.

## 2.2. MathDropFuncs()

```
>>-MathDropFuncs()-----><
```

This function is a nop in ooRexx 4.0.0 and later. It does nothing.

## 2.3. RxCalcSqrt()

```
>>-RxCalcSqrt(number--+-----+--)-----><
                    +--, precision--+
```

Returns the absolute value of the square root of number.

Parameters:

number

The number whose square root you wish to calculate.

precision

The precision of the calculation. If a value is not specified, the precision of the calling Rexx activity is used. If the precision exceeds 16 digits, the call will fail.

## 2.4. RxCalcExp()

```
>>-RxCalcExp(number--+-----+--)-----><
                    +--, precision--+
```

Returns the exponential function of number.

Parameters:

number

The number for which you wish to calculate the exponential function.

precision

The precision of the calculation. If a value is not specified, the precision of the calling Rexx activity is used. If the precision exceeds 16 digits, the call will fail.

## 2.5. RxCalcLog()

```
>>-RxCalcLog(number--+-----+--)-----><
                    +--, precision--+
```

Returns the natural logarithm (base e) of number.

Parameters:

number

The number for which you wish to calculate the natural logarithm.

precision

The precision of the calculation. If a value is not specified, the precision of the calling Rexx activity is used. If the precision exceeds 16 digits, the call will fail.

## 2.6. RxCalcLog10()

```
>>-RxCalcLog10(number---+-----+---)-----><
                    +--, precision--+
```

Returns the base 10 logarithm of number.

Parameters:

number

The number for which you wish to calculate the base 10 logarithm.

precision

The precision of the calculation. If a value is not specified, the precision of the calling Rexx activity is used. If the precision exceeds 16 digits, the call will fail.

## 2.7. RxCalcSinH()

```
>>-RxCalcSinH(number---+-----+---)-----><
                    +--, precision--+
```

Returns the hyperbolic sine of number, expressed in radians.

Parameters:

number

The number for which you wish to calculate the hyperbolic sine.

precision

The precision of the calculation. If a value is not specified, the precision of the calling Rexx activity is used. If the precision exceeds 16 digits, the call will fail.

## 2.8. RxCalcCosH()

```
>>-RxCalcCosH(number---+-----+---)-----><
                    +--, precision---+
```

Returns the hyperbolic cosine of number, expressed in radians.

Parameters:

number

The number for which you wish to calculate the hyperbolic cosine.

precision

The precision of the calculation. If a value is not specified, the precision of the calling Rexx activity is used. If the precision exceeds 16 digits, the call will fail.

## 2.9. RxCalcTanH()

```
>>-RxCalcTanH(number---+-----+---)-----><
                    +--, precision---+
```

Returns the hyperbolic tangent of number, expressed in radians.

Parameters:

number

The number for which you wish to calculate the hyperbolic tangent.

precision

The precision of the calculation. If a value is not specified, the precision of the calling Rexx activity is used. If the precision exceeds 16 digits, the call will fail.

## 2.10. RxCalcPower()

```
>>-RxCalcPower(number1, number2---+-----+---)-----><
                    +--, precision---+
```

Returns the value of mathematical expression number1 raised to the power of exponent number2.

Parameters:

number1

The mathematical expression to be raised to the power of exponent number2.

number2

The exponent to which number1 is to be raised.

precision

The precision of the calculation. If a value is not specified, the precision of the calling Rexx activity is used. If the precision exceeds 16 digits, the call will fail.

## 2.11. RxCalcSin()

```
>>-RxCalcSin(number-----)-----><
|                               +--D--+ |
+--, precision, --+--R--+--+
                               +--G--+
```

Returns the sine value for number, where number is the angle size, expressed in degree [D], radian [R], or grade [G] units.

Parameters:

number

The angle size, expressed in degree [D], radian [R], or grade [G] units.

precision

The precision of the calculation. If a value is not specified, the precision of the calling Rexx activity is used. If the precision exceeds 16 digits, the call will fail.

D

Indicates that the angle size is expressed in degrees. This is the default.

R

Indicates that the angle size is expressed in radians.

G

Indicates that the angle size is expressed in grades.

## 2.12. RxCalcCos()

```
>>-RxCalcCos(number-----)-----><
|                               +--D--+ |
+--, precision, --+--R--+--+
                               +--G--+
```

Returns the cosine value for number, where number is the angle size, expressed in degree [D], radian [R], or grade [G] units.

Parameters:

number

The angle size, expressed in degree [D], radian [R], or grade [G] units.

precision

The precision of the calculation. If a value is not specified, the precision of the calling Rexx activity is used. If the precision exceeds 16 digits, the call will fail.

D

Indicates that the angle size is expressed in degrees. This is the default.

R

Indicates that the angle size is expressed in radians.

G

Indicates that the angle size is expressed in grades.

## 2.13. RxCalcTan()

```
>>-RxCalcTan(number-----+-----)-----><
                |                +---D---+ |
                +---, precision, --+---R-----+
                               +---G---+
```

Returns the tangent value for number, where number is the angle size, expressed in degree [D], radian [R], or grade [G] units.

Parameters:

number

The angle size, expressed in degree [D], radian [R], or grade [G] units.

precision

The precision of the calculation. If a value is not specified, the precision of the calling Rexx activity is used. If the precision exceeds 16 digits, the call will fail.

D

Indicates that the angle size is expressed in degrees. This is the default.

R

Indicates that the angle size is expressed in radians.

G

Indicates that the angle size is expressed in grades.

## 2.14. RxCalcCotan()

```
>>-RxCalcCotan(number-----+---)-----><
                |                +---D---+ |
                +---, precision, ---+---R---+
                                +---G---+
```

Returns the cotangent value for number, where number is the angle size, expressed in degree [D], radian [R], or grade [G] units.

Parameters:

number

The angle size, expressed in degree [D], radian [R], or grade [G] units.

precision

The precision of the calculation. If a value is not specified, the precision of the calling Rexx activity is used. If the precision exceeds 16 digits, the call will fail.

D

Indicates that the angle size is expressed in degrees. This is the default.

R

Indicates that the angle size is expressed in radians.

G

Indicates that the angle size is expressed in grades.

## 2.15. RxCalcPi()

```
>>-RxCalcPi(-----+---)-----><
                +---, precision---+
```

Returns the value of pi.

Parameters:

precision

The precision of the calculation. If a value is not specified, the precision of the calling Rexx activity is used. If the precision exceeds 16 digits, the call will fail.

## 2.16. RxCalcArcSin()

```
>>-RxCalcArcSin(number-----+---)-----><
                |                +---D---+ |
```

```

    +--, precision, ----R-----+
                    +--G--+

```

Returns the arcsine of number, where the result can be expressed in degree [D], radian [R], or grade [G] units.

Parameters:

number

The number for which the arcsine is to be calculated.

precision

The precision of the calculation. If a value is not specified, the precision of the calling Rexx activity is used. If the precision exceeds 16 digits, the call will fail.

D

Indicates that the result is expressed in degrees. This is the default.

R

Indicates that the result is expressed in radians.

G

Indicates that the result is expressed in grades.

## 2.17. RxCalcArcCos()

```

>>-RxCalcArcCos(number-----+--)------><
                |           +--D--+ |
                +--, precision, ----R-----+
                                +--G--+

```

Returns the arccosine of number, where the result can be expressed in degree [D], radian [R], or grade [G] units.

Parameters:

number

The number for which the arccosine is to be calculated.

precision

The precision of the calculation. If a value is not specified, the precision of the calling Rexx activity is used. If the precision exceeds 16 digits, the call will fail.

D

Indicates that the result is expressed in degrees. This is the default.

R

Indicates that the result is expressed in radians.

G

Indicates that the result is expressed in grades.

## 2.18. RxCalcArcTan()

```
>>-RxCalcArcTan(number-----+---)-----><
                |           +---D---+ |
                +---, precision, ----R-----+
                               +---G---+
```

Returns the arctangent of number, where the result can be expressed in degree [D], radian [R], or grade [G] units.

Parameters:

number

The number for which the arctangent is to be calculated.

precision

The precision of the calculation. If a value is not specified, the precision of the calling Rexx activity is used. If the precision exceeds 16 digits, the call will fail.

D

Indicates that the result is expressed in degrees. This is the default.

R

Indicates that the result is expressed in radians.

G

Indicates that the result is expressed in grades.



# Appendix A. Notices

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2. in the case of each subsequent Contributor:
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  - b. additions to the Program;

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