Open Object Rexx

RxMath Math Functions Reference
Version 3.1.2 Edition
April 20, 2007

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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. Pasteing text into an editor could result in some characters outside of the standard ASCII character set. Specifically, single-qoute 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://rexxla.org/About_RexxLA/member.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 my contribute to or monitor. They are located on the *ooRexx Forums* (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) page. This list is for discussing ooRexx project development activities. It also supports a historical archive of past messages.

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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) 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) page. This list is only used for monitoring changes to the ooRexx bug tracking system.

Support Requests

You can create a support request at *ooRexx Support Request*
(http://sourceforge.net/tracker/?group_id=119701&atid=684731) page. Please be sure to log in to
Sourceforge before creating the request so that it will record your e-mail address. This will allow
SourceForge (and the ooRexx developers) a way to contact you when updates are made to your
request. Otherwise you will need to manually check back on this page to track any updates to the
request.

Also, please try to provide as much information in the support request as possible so that the
developers can determine the problem as quickly as possible.

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You can create a bug report at *ooRexx Bug Report*
(http://sourceforge.net/tracker/?group_id=119701&atid=684730) page. Please be sure to log in to
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SourceForge (and the ooRexx developers) a way to contact you when updates are made to your
report. Otherwise you will need to manually check back on this page to track any updates to the
report.

Also, 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.

Patch Reports

If you create an enhancement patch for ooRexx please post the pach using the *ooRexx Patch Report*
(http://sourceforge.net/tracker/?group_id=119701&atid=684732) page. Please be sure to log in to
Sourceforge before creating the report so that it will record your e-mail address. This will allow
SourceForge (and the ooRexx developers) a way to contact you when updates are made to your
report. Otherwise you will need to manually check back on this page to track any updates to the
report.

Also, please try to 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. Installation and Removal

The Rexx Mathematical Functions package is contained in the file rxmath.dll. This dynamic link library (DLL) must be placed in a directory listed in your PATH. To get access to the functions in the Rexx Mathematical Functions package, execute the following Rexx code:

```
call RxFuncAdd "MathLoadFuncs","rxmath","MathLoadFuncs"
call MathLoadFuncs
```

To unload the DLL, call the MathDropFuncs function and then exit all CMD.EXE shells. After you have exited from all command shells, the DLL is dropped by Windows® and can be deleted or replaced.

1.2. Error Handling

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 Rexx Mathematical Functions package returns ERROR.

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.

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

2.1. MathLoadFuncs()

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

Loads all functions in the Rexx Mathematical Functions package.

If you supply any parameters, they will be used only to deliver copyright information.

2.2. MathDropFuncs()

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

Drops all functions in the Rexx Mathematical Functions package.

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.

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PROGRAM OR THE EXERCISE OF ANY RIGHTS GRANTED HEREUNDER, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

B.7. General

If any provision of this Agreement is invalid or unenforceable under applicable law, it shall not affect the validity or enforceability of the remainder of the terms of this Agreement, and without further action by the parties hereto, such provision shall be reformed to the minimum extent necessary to make such provision valid and enforceable.

If Recipient institutes patent litigation against a Contributor with respect to a patent applicable to software (including a cross-claim or counterclaim in a lawsuit), then any patent licenses granted by that Contributor to such Recipient under this Agreement shall terminate as of the date such litigation is filed. In addition, if Recipient institutes patent litigation against any entity (including a cross-claim or counterclaim in a lawsuit) alleging that the Program itself (excluding combinations of the Program with other software or hardware) infringes such Recipient's patent(s), then such Recipient's rights granted under Section 2(b) shall terminate as of the date such litigation is filed.

All Recipient's rights under this Agreement shall terminate if it fails to comply with any of the material terms or conditions of this Agreement and does not cure such failure in a reasonable period of time after becoming aware of such noncompliance. If all Recipient's rights under this Agreement terminate, Recipient agrees to cease use and distribution of the Program as soon as reasonably practicable. However, Recipient's obligations under this Agreement and any licenses granted by Recipient relating to the Program shall continue and survive.

Everyone is permitted to copy and distribute copies of this Agreement, but in order to avoid inconsistency the Agreement is copyrighted and may only be modified in the following manner. The Agreement Steward reserves the right to publish new versions (including revisions) of this Agreement from time to time. No one other than the Agreement Steward has the right to modify this Agreement. IBM is the initial Agreement Steward. IBM may assign the responsibility to serve as the Agreement Steward to a suitable separate entity. Each new version of the Agreement will be given a distinguishing version number. The Program (including Contributions) may always be distributed subject to the version of the Agreement under which it was received. In addition, after a new version of the Agreement is published, Contributor may elect to distribute the Program (including its Contributions) under the new version. Except as expressly stated in Sections 2(a) and 2(b) above, Recipient receives no rights or licenses to the intellectual property of any Contributor under this Agreement, whether expressly, by implication, estoppel or otherwise. All rights in the Program not expressly granted under this Agreement are reserved.

This Agreement is governed by the laws of the State of New York and the intellectual property laws of the United States of America. No party to this Agreement will bring a legal action under this Agreement more than one year after the cause of action arose. Each party waives its rights to a jury trial in any resulting litigation.

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