

# Mathematica OX server Manual

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# 1 Mathematica Functions

This chapter describes interface functions for Mathematica ox server `ox_math`. These interface functions are defined in the file ‘`mathematica.rr`’. You need to load the file before using the interface functions. by the command `load("m")$`. The file ‘`mathematica.rr`’ is at ‘`$(OpenXM_HOME)/lib/asir-contrib`’.

Note: `ox_reset` does not work.

```
[258] load("mathematica.rr")$
m Version 19991113. mathematica.start, mathematica.tree_to_string, mathematica.n_Ei
[259] mathematica.start();
ox_math has started.
ox_math: Portions copyright 2000 Wolfram Research, Inc.
See OpenXM/Copyright/Copyright.mathlink for details.
0
[260] mathematica.n_Eigenvalues([[1,2],[4,5]]);
[-0.464102,6.4641]
```

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## 1.1 Functions

### 1.1.1 `mathematica.start`

```
mathematica.start()
:: Start ox_math on the localhost.
```

*return* Integer

- Start `ox_math` on the localhost. It returns the descriptor of `ox_math`.
- Set `Xm_noX = 1` to start `ox_math` without a debug window.
- The descriptor is stored in the variable `M_proc`.

```
P = mathematica.start()
```

Reference

```
ox_launch
```

### 1.1.2 `mathematica.tree_to_string`

```
mathematica.tree_to_string(t)
:: translates Mathematica tree data t into a string that can be understandable
by asir as far as possible.
```

*return* String

*t* List

- *t* is a Mathematica tree data which is generated by `ox_math`.
- This function translates Mathematica tree data *t* into a string that may be understandable by `asir`.
- This function translates *t* into a prefix or infix expression that may be understandable by `asir`. The first element of the list *t* is a key word string of the Mathematica object. If this function recognizes the key word, it translates *t* into the form that can be understandable by `asir`. If it cannot recognize the key word, it translates *t* into a function call with the function name `m_`(the key word).

```
[267] mathematica.start();
0
[268] ox_execute_string(0,"Expand[(x-1)^2]");
0
[269] A=ox_pop_cmo(0);
[Plus,1,[Times,-2,x],[Power,x,2]]
[270] mathematica.tree_to_string(A);
(1)+((-2)*(x))+((x)^(2))
[271] eval_str(@);
x^2-2*x+1
[259] mathematica.tree_to_string(["List",1,2]);
[1 , 2]
[260] mathematica.tree_to_string(["Plus",2,3]);
(2)+(3)
[261] mathematica.tree_to_string(["Complex",2.3,4.55]);
mathematica.complex(2.3 , 4.55)
[362] mathematica.tree_to_string(["Plus",["Complex",1.2,3.5],1/2]);
(mathematica.complex(1.2 , 3.5))+(1/2)
[380] eval_str(@);
(1.7+3.5*0i)
```

#### Reference

`ox_pop_cmo`, `eval_str`, `mathematica.rtomstr`

#### 1.1.3 mathematica.rtomstr

`mathematica.rtomstr(t)`

:: translate the object *t* into a string that can be understandable by Mathematica as far as possible.

*return* String

*t* Object

- It translates the object *t* into a string that can be understandable by Mathematica as far as possible. For example, `asir` uses `[, ]` to express a list, but `Mathematica` uses `{, }`. This function makes this sort of translations.

```
[259] mathematica.rtomstr([1,2,3]);
{1,2,3}
[260] mathematica.rtomstr([[1,x,x^2],[1,y,y^2]]);
```

$$\{\{1,x,x^2\},\{1,y,y^2\}\}$$

Let us see one more example. The following function `mathematica.inverse(M)` outputs the inverse matrix of the matrix `M` by calling `ox_math`. It translates `asir` matrix `M` into a Mathematica expression by `r_tostr(M)` and makes Mathematica compute the inverse matrix of `M` by `ox_execute_string`.

```
def inverse(M) {
    P = 0;
    A = mathematica.rtomstr(M);
    ox_execute_string(P,"Inverse["+A+"]");
    B = ox_pop_cmo(B);
    C = mathematica.tree_to_string(B);
    return(eval_str(C));
}
```

```
[269] M=[[1,x,x^2],[1,y,y^2],[1,z,z^2]];
[[1,x,x^2],[1,y,y^2],[1,z,z^2]]
[270] A=mathematica.inverse(M)$
[271] red(A[0][0]);
(z*y)/(x^2+(-y-z)*x+z*y)
```

#### Reference

`ox_execute_string`, `ToExpression(Mathematica)`, `mathematica.tree_to_string`

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