Symbolic Math Toolbox Release Notes

Contents

Summary by Version

This table provides quick access to what's new in each version. For clarification, see "About Release Notes" on page 1.

Version (Release)	New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Latest Version V3.1.5 (R2006b)	Yes Details	Yes Summary	Bug Reports Includes fixes	Printable Release Notes: PDF Current product documentation
V3.1.4 (R2006a)	No	No	Bug Reports Includes fixes	No
V3.1.3 (R14SP3)	No	No	No bug fixes	No
V3.1.2 (R14SP2)	No	No	Bug Reports Includes fixes	No
V3.1.1 (R14SP1)	No	No	No bug fixes	No
V3.1 (R14)	Yes Details	No	No bug fixes	No

About Release Notes

Use release notes when upgrading to a newer version to learn about new features and changes, and the potential impact on your existing files and practices. Release notes are also beneficial if you use or support multiple versions.

If you are not upgrading from the most recent previous version, review release notes for all interim versions, not just for the version you are installing. For example, when upgrading from V1.0 to V1.2, review the New Features and Changes, Version Compatibility Considerations, and Bug Reports for V1.1 and V1.2.

New Features and Changes

These include

- New functionality

- Changes to existing functionality

- Changes to system requirements (complete system requirements for the current version are at the MathWorks Web site)

- Any version compatibility considerations associated with each new feature or change

Version Compatibility Considerations

When a new feature or change introduces a known incompatibility with the previous version, its description includes a **Compatibility Considerations** subsection that details the impact. For a list of all new features and changes that have compatibility impact, see the "Compatibility Summary for Symbolic Math Toolbox and Extended Symbolic Math Toolbox" on page 11.

Compatibility issues that become known after the product has been released are added to Bug Reports at the MathWorks Web site. Because bug fixes can sometimes result in incompatibilities, also review fixed bugs in Bug Reports for any compatibility impact.

Fixed Bugs and Known Problems

MathWorks Bug Reports is a user-searchable database of known problems, workarounds, and fixes. The MathWorks updates the Bug Reports database as new problems and resolutions become known, so check it as needed for the latest information.

Access Bug Reports at the MathWorks Web site using your MathWorks Account. If you are not logged in to your MathWorks Account when you link to Bug Reports, you are prompted to log in or create an account. You then can view bug fixes and known problems for R14SP2 and more recent releases.

The Bug Reports database was introduced for R14SP2 and does not include information for prior releases. You can access a list of bug fixes made in prior versions via the links in the summary table.

Related Documentation at Web Site

Printable Release Notes (PDF). You can print release notes from the PDF version, located at the MathWorks Web site. The PDF version does not support links to other documents or to the Web site, such as to Bug Reports. Use the browser-based version of release notes for access to all information.

Product Documentation. At the MathWorks Web site, you can access complete product documentation for the current version and some previous versions, as noted in the summary table.

Version 3.1.5 (R2006b) Symbolic Math Toolbox and Extended Symbolic Math Toolbox

This table summarizes what's new in version 3.1.5 (R2006b):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Yes	Yes — Details labeled as **Compatibility Considerations**, below. See also Summary.	No	Printable Release Notes: PDF Current product documentation

New features and changes introduced in this version are described here:

- "Change in call to code generation package using the maple function" on page 4

Change in call to code generation package using the maple function

Calling a function in Maple's code generation package now requires you to explicitly include the package name. For example,

```
maple('codegen[fortran](x^2-4)');
```

The generated code output using these methods is unaffected by this change.

Compatibility Considerations

In previous versions, functions in Maple's code generation package were made automatically available using the Maple `with` command, and did not require the package name. For example

```
maple('fortran(x^2-4)');
```

This sometimes caused a conflict when assigning to Maple variables having the same name as a function in the code generation package.

Version 3.1 (R14) Symbolic Math Toolbox and Extended Symbolic Math Toolbox

This table summarizes what's new in version 3.1 (R14):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
Yes Details below	No	No	No

New features and changes introduced in this version are described here:

- "Rounding Operations" on page 5

- "Quotient and Remainder for Division of Integers and Polynomials" on page 6

- "Dirac and Step Functions" on page 7

- "Sorting Symbolic Expressions" on page 7

- "Coefficients of Multivariable Expressions" on page 7

- "Multidimensional Symbolic Arrays" on page 8

- "Conversion to Nondouble Numeric Data Types" on page 9

- "Logarithms to Base 2 and Base 10" on page 9

- "Modulus After Division" on page 9

Rounding Operations

The following new functions perform rounding operations on symbolic arrays:

- ceil — Round a number x to the nearest integer greater than or equal to x.

- fix — Round toward zero.

- floor — Round a number x to the nearest integer less than or equal to x.

- frac — Compute the fractional part of a number.

- round — Round a number to the nearest integer.

For example,

```
x = sym([2.5; -9.639])
[fix(x) floor(x) round(x) ceil(x) frac(x)]

x =

        5/2
 -9639/1000



ans =

[         2,         2,         3,         3,       1/2]
[        -9,       -10,       -10,        -9, -639/1000]
```

Quotient and Remainder for Division of Integers and Polynomials

The new function quorem computes the quotient and remainder for division of integers and polynomials. For example,

```
syms x y
p = x^3-2*x+5
[q,r] = quorem(x^5,p)

p =

x^3-2*x+5

q =

x^2+2

r =

-5*x^2-10+4*x
```

Dirac and Step Functions

The following new functions compute the Dirac delta and Heaviside functions:

- `dirac` — Compute the Dirac delta function.

- `heaviside` — Compute the Heaviside step function.

For example,

```
dirac([-1 0 1])

ans =

     0    Inf      0
heaviside([-1 0 1])

ans =

     0    NaN      1
```

Sorting Symbolic Expressions

The new function sort sorts symbolic expressions. For example,

```
syms a b c d e x
sort([a c e b d])

ans =

[ a, b, c, d, e]
sort([a c e b d]*x.^(0:4).')

ans =

x^4*d+x^3*b+e*x^2+x*c+a
```

Coefficients of Multivariable Expressions

The new function coeffs computes coefficients of a multivariate polynomial.
For example,

```
syms c t x y
```

```
t = 2 + (3 + 4*log(x))^2 - 5*log(x);
coeffs(expand(t))

ans =

[ 11, 19, 16]


z = 3*x^2*y^2 + 5*x*y^3
         [c,t] = coeffs(z,y)

z =

3*x^2*y^2+5*x*y^3



c =
[ 3*x^2,    5*x]
t =

[ y^2, y^3]
```

Multidimensional Symbolic Arrays

The new function reshape reshapes symbolic arrays. For example,

```
syms x
A = reshape(x.^(1:9),1,3,3)


A(:,:,1) =

[    x, x^2, x^3]


A(:,:,2) =

[ x^4, x^5, x^6]
```

```
A(:,:,3) =

[ x^7, x^8, x^9]
```

Conversion to Nondouble Numeric Data Types

The following new functions enable you to convert symbolic arrays to nondouble numeric data types:

- int8 — Convert a symbolic matrix to signed 8-bit integers.
- int16 — Convert a symbolic matrix to signed 16-bit integers.
- int32 — Convert a symbolic matrix to signed 32-bit integers.
- int64 — Convert a symbolic matrix to signed 64-bit integers.
- single — Convert a number to single precision.
- uint8 — Convert a symbolic matrix to unsigned 8-bit integers.
- uint16 — Convert a symbolic matrix to unsigned 16-bit integers.
- uint32 — Convert a symbolic matrix to unsigned 32-bit integers.
- uint64 — Convert a symbolic matrix to unsigned 64-bit integers.

Logarithms to Base 2 and Base 10

The following new functions enable you to compute the logarithm of symbolic arrays to base 2 and base 10:

- log10 — Compute base 10 logarithm.
- log2 — Compute base 2 logarithm.

Modulus After Division

The new function mod computes modulus after division. For example,

```
syms x
mod(x^3-2*x+999,10)
        x^3+8*x+9

ans =
```

```
x^3+8*x+9
```

Compatibility Summary for Symbolic Math Toolbox and Extended Symbolic Math Toolbox

This table summarizes new features and changes that might cause incompatibilities when you upgrade from an earlier version, or when you use files on multiple versions. Details are provided with the description of the new feature or change.

Version (Release)	New Features and Changes with Version Compatibility Impact
Latest Version V3.1.5 (R2006b)	See the **Compatibility Considerations** subheading for each of these new features or changes: • "Change in call to code generation package using the maple function" on page 4
V3.1.4 (R2006a)	None
V3.1.3 (R14SP3)	None
V3.1.1 (R14SP1)	None
V3.1 (R14)	None