

Symbolic Math Toolbox™

Release Notes

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Summary by Version

This table provides quick access to what's new in each version. For clarification, see “Using 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 V3.2.3 (R2008a)	No	No	Bug Reports	Printable Release Notes: PDF Current product documentation
V3.2.2 (R2007b)	No	No	Bug Reports Includes fixes	No
V3.2 (R2007a)	Yes Details	No	Bug Reports Includes fixes	No
V3.1.5 (R2006b)	Yes Details	Yes Summary	Bug Reports Includes fixes	No
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

Using Release Notes

Use release notes when upgrading to a newer version to learn about:

- New features
- Changes
- Potential impact on your existing files and practices

Review the release notes for other MathWorks™ products required for this product (for example, MATLAB® or Simulink®) for enhancements, bugs, and compatibility considerations that also might impact you.

If you are upgrading from a software version other than the most recent one, review the 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 release notes for V1.1 and V1.2.

What's in the Release Notes

New Features and Changes

- New functionality
- Changes to existing functionality

Version Compatibility Considerations

When a new feature or change introduces a reported incompatibility between versions, the **Compatibility Considerations** subsection explains the impact.

Compatibility issues reported after the product is released appear under Bug Reports at the MathWorks Web site. Bug fixes can sometimes result in incompatibilities, so you should also review the fixed bugs in Bug Reports for any compatibility impact.

Fixed Bugs and Known Problems

The MathWorks offers a user-searchable Bug Reports database so you can view Bug Reports. The development team updates this database at release time and as more information becomes available. This includes provisions for any known workarounds or file replacements. Information is available for bugs existing in or fixed in Release 14SP2 or later. Information is not available for all bugs in earlier releases.

Access Bug Reports using your MathWorks Account.

Version 3.2.3 (R2008a) Symbolic Math Toolbox™ and Extended Symbolic Math Toolbox™ Software

This table summarizes what's new in Version 3.2.3 (R2008a):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
No	No	Bug Reports Includes fixes	Printable Release Notes: PDF Current product documentation

There are no new features or changes in this version.

Version 3.2.2 (R2007b) Symbolic Math Toolbox™ and Extended Symbolic Math Toolbox™ Software

This table summarizes what's new in Version 3.2.2 (R2007b):

New Features and Changes	Version Compatibility Considerations	Fixed Bugs and Known Problems	Related Documentation at Web Site
No	No	Bug Reports Includes fixes	Printable Release Notes: PDF Current product documentation

There are no new features or changes in this version.

Version 3.2 (R2007a) Symbolic Math Toolbox™ and Extended Symbolic Math Toolbox™ Software

This table summarizes what's new in Version 3.2 (R2007a):

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

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

Maple10® Access Added for Linux® 64-bit Processors and Intel® Macintosh® Platforms

MATLAB® now supports Maple® Version 10 on 32-bit Windows®, 32- and 64-bit Linux® platforms, and the Intel® and PowerPC® Macintosh® platforms.

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

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 Details below	Yes—Details labeled as Compatibility Considerations , below. See also Summary.	Bug Reports Includes fixes	No

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

Change in call to code generation package using the maple function

Calling a function in code generation package using Maple® software 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 the code generation package of Maple software 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™ Software

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 7
- “Quotient and Remainder for Division of Integers and Polynomials” on page 8
- “Dirac and Step Functions” on page 9
- “Sorting Symbolic Expressions” on page 9
- “Coefficients of Multivariable Expressions” on page 9
- “Multidimensional Symbolic Arrays” on page 10
- “Conversion to Nondouble Numeric Data Types” on page 11
- “Logarithms to Base 2 and Base 10” on page 11
- “Modulus After Division” on page 12

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™ Software

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 V3.2.3 (R2008a)	None
V3.2.2 (R2007b)	None
V3.2 (R2007a)	None
V3.1.5 (R2006b)	<p>See the Compatibility Considerations subheading for each of these new features or changes:</p> <ul style="list-style-type: none"> • “Change in call to code generation package using the maple function” on page 6
V3.1.4 (R2006a)	None
V3.1.3 (R14SP3)	None
V3.1.1 (R14SP1)	None
V3.1 (R14)	None