

# M-Code L<sup>A</sup>T<sub>E</sub>X Package with L<sup>y</sup>X

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## 1 Download and Installation

1. The M-Code package can be downloaded from the Matlab site. The M-Code package and L<sup>y</sup>X example can be downloaded from <http://www.jdreyer.com/projects/LyX/>.
2. Copy the mcode.sty file to the same directory as the L<sup>y</sup>X file.
3. In the L<sup>y</sup>X menu go to Document > Settings and select the “L<sup>A</sup>T<sub>E</sub>X Preamble” tab option.
4. Add `\usepackage[numbered,autolinebreaks]{mcode}` to the text box as shown below. Change the options between the brackets [] accordingly. The m-code package supports bw, numbered, autolinebreaks, useliterate, framed, and final. These options are described in the mcode.sty file.

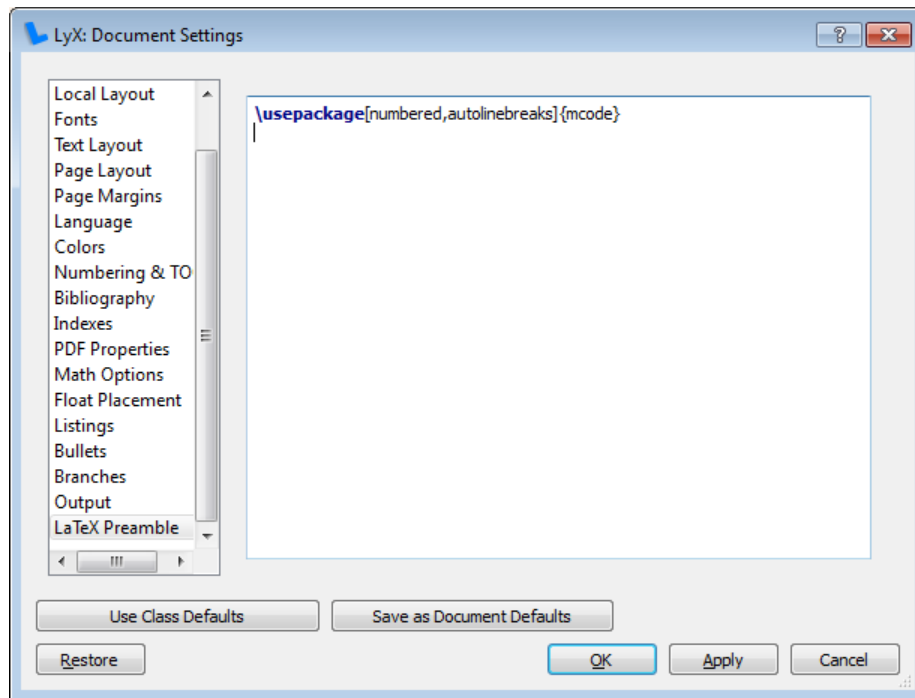


Figure 1: L<sup>y</sup>X Settings for using the m-code package

## 2 Example Usage of M-code Package in L<sup>y</sup>X

This example is taken from <http://mathworld.wolfram.com/QuadraticEquation.html>. A quadratic equation is a second-order polynomial equation in a single variable  $x$

$$ax^2 + bx + c = 0 \quad (1)$$

with  $a \neq 0$ . Because it is a second-order polynomial equation, the fundamental theorem of algebra guarantees that it has two solutions. These solutions may be both real, or both complex. The roots  $x$  can be found by completing the square,

$$x^2 + \frac{b}{ax} = -\frac{c}{a} \quad (2)$$

$$\left(x + \frac{b}{2a}\right)^2 = -\frac{c}{a} + \frac{b^2}{4a^2} = \frac{b^2 - 4ac}{4a^2} \quad (3)$$

$$x + \frac{b}{2a} = \frac{\pm\sqrt{b^2 - 4ac}}{2a} \quad (4)$$

Solving for  $x$  then gives

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad (5)$$

This equation is known as the quadratic formula. Two methods for inserting a Matlab code using equation 5 are shown below.

### Matlab Code Directly Inserted into L<sup>A</sup>T<sub>E</sub>X File

A code block can be inserted by select *Insert > Program Listing*. Note that `|mcommentfont|ref` can be used to reference equations in the L<sup>A</sup>T<sub>E</sub>X document.

```
1 % Example Matlab Code for M-code LaTeX Package
2 clear all
3 a=3;
4 b=10;
5 c=5;
6
7 %Solve for x using Equation (5)
8 x1=(-b+sqrt(b^2-4*a*c))/(2*a);
9 x2=(-b-sqrt(b^2-4*a*c))/(2*a);
10 fprintf('The zeros are at %f and %f \n',x1, x2)
11
12 %Plot to obtain solutions using Equation (1)
13 x=[-5:0.1:5];
14 plot(x, a*x.^2+b*x+c)
```

### Matlab m-file Inserted into L<sup>A</sup>T<sub>E</sub>X File

To insert a m-file directly to L<sup>A</sup>T<sub>E</sub>X, select *Insert > T<sub>E</sub>X Code*. In the T<sub>E</sub>X Code block add `|lstinputlisting{/FilePath/MatLabFile.m}`. Note that it is not possible to reference equations used in the L<sup>A</sup>T<sub>E</sub>X document with this method.

```
1 % Example Matlab Code for M-code LaTeX Package
2 clear all
3
4 a=3;
5 b=10;
6 c=5;
7
8 %Solve for x
9 x1=(-b+sqrt(b^2-4*a*c))/(2*a);
10 x2=(-b-sqrt(b^2-4*a*c))/(2*a);
11 fprintf('The zeros are at %f and %f \n',x1, x2)
12
13 %Plot to obtain solutions
```

```
14 x=[-5:0.1:5];  
15 plot(x, a*x.^2+b*x+c)
```