CFEI Equation Builder Advisory - Advanced

There are several options for producing clear, easy-to-read equations in eCollege. Which option is right for you will depend on a number of factors, including how complex the equations are, whether or not they need to be in line with other alphabetic text, and your comfort with various Math coding languages like MathML and LaTeX. You can choose one of the following options for creating your equations:

1. Basic- Use the built-in eCollege Equation editor for basic equations and problems that don't have a text component.

2. Intermediate- Use MathType software to build complex equations and paste the MathML Code into the eCollege Equation Editor to be rendered into a .gif.

3. Advanced- Code complex equations in LaTeX or TeX and use MathJax script and CDN (servers) to render code in eCollege page as individual symbols, resulting in the ability to display equations as stand-alone objects or inline with text in word problems.

This is the Advanced Process guide. For best results, always enter equations that require the use of the eCollege Equation Editor while using Internet Explorer, for PC, or Firefox for Mac.

Creating the Code

There are two advanced processes for integrating equations into eCollege uses LaTeX or TeX coding and MathJax javascript and CDN (servers) to render that code in eCollege pages as individual symbols, resulting in the ability to display equations as stand-alone objects or in line with text in word problems. To learn more about LaTeX typesetting, visit http://latex-project.org/

If you already know how to code in LaTeX or TeX typesetting language, code an equation on your own and skip the steps involving Microsoft Office Word. The following is an example of this coding:

```
\begin{aligned}
\dot{x} & = \sigma(y-x) \\
\dot{y} & = \rho x - y - xz \\
\dot{z} & = -\beta z + xy
\end{aligned}
```

If you do not know how to code LaTeX or TeX, you can use MathType in Microsoft Word to generate TeX code for you.

First, open a Microsoft Word document. Find the MathType add-in tab in the menu.

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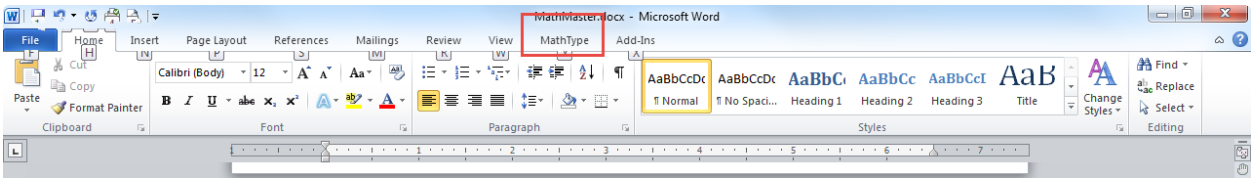
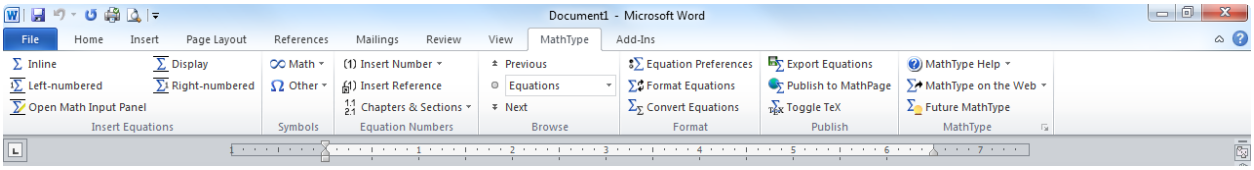
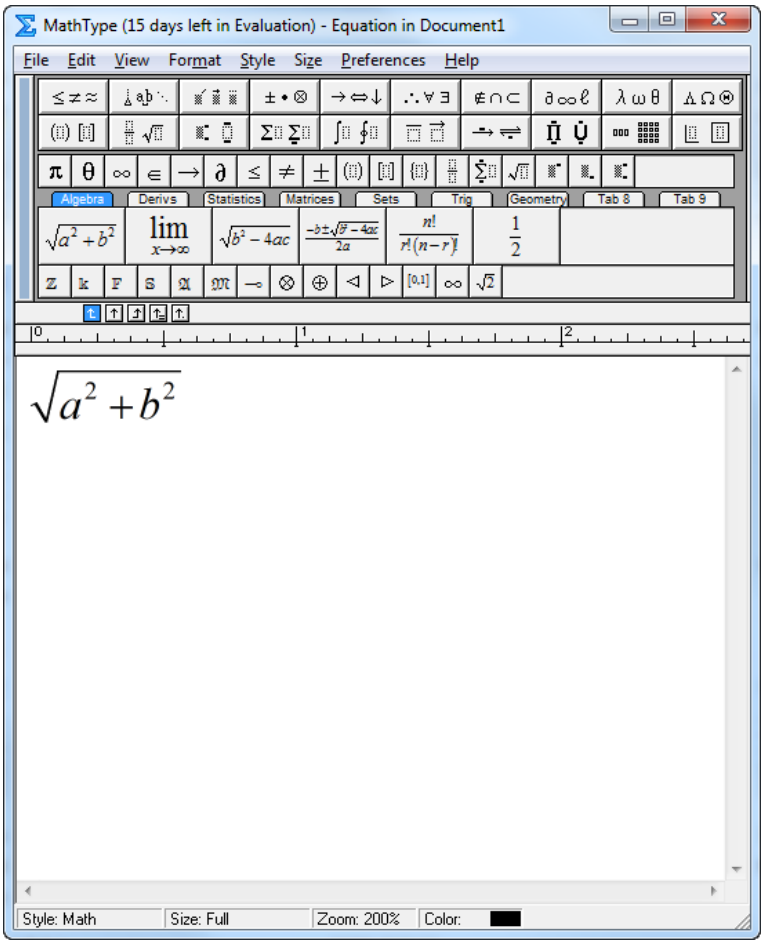


Open that tab and select the options that are most applicable for the equation you would like to build. If you'd like for your math to display inline with text, select "Inline." If you'd like it to be displayed separately, select "Display."



This will open the MathType editor. Build your equation within the editor just like you would in the intermediate steps.



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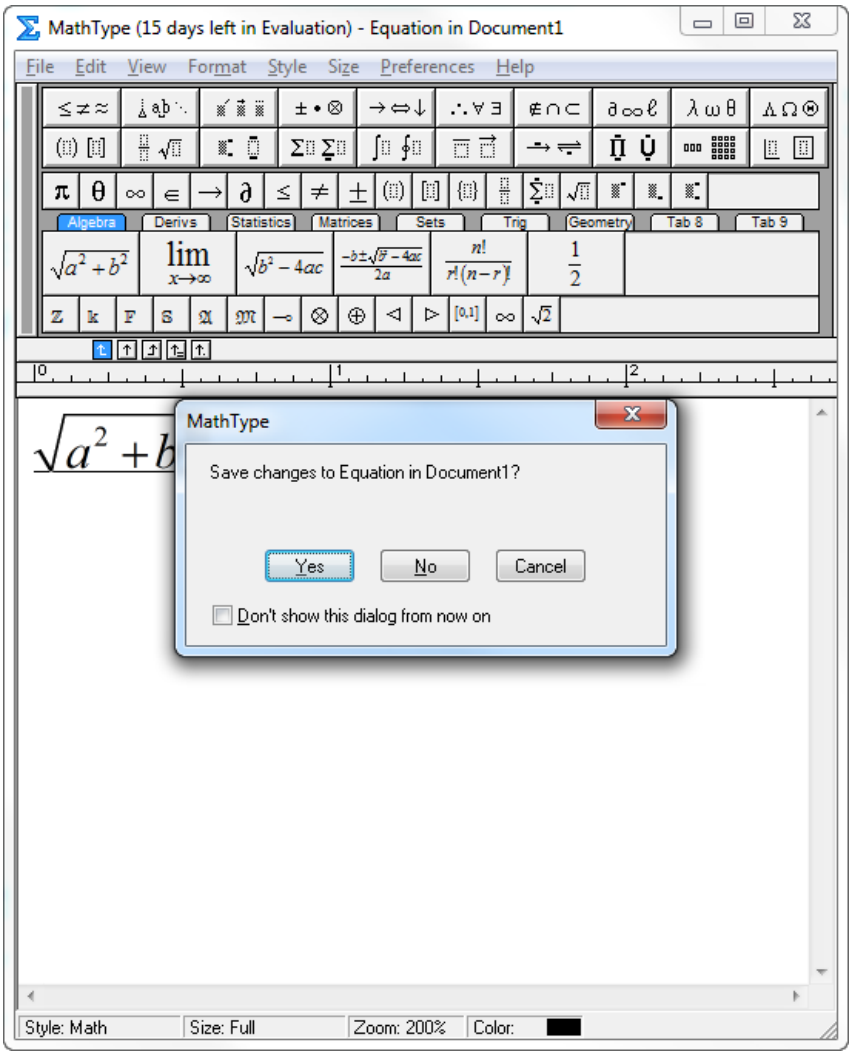
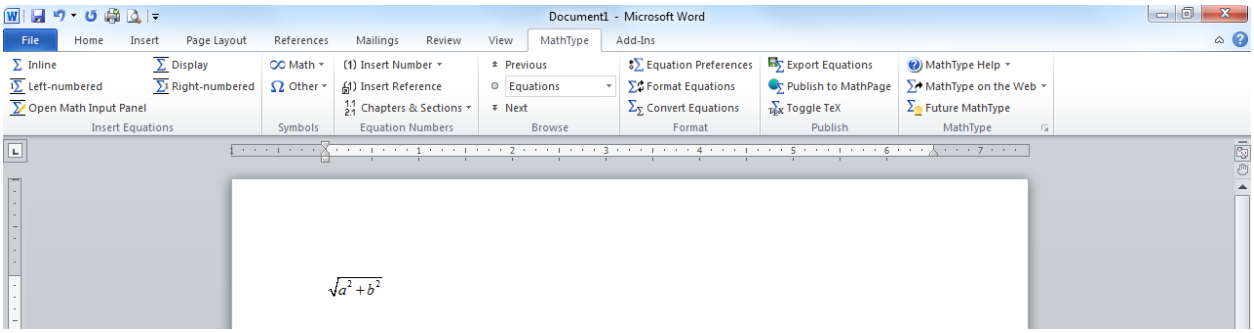
When you're finished, hit the X at the top of the MathType editor to close it. You'll be prompted with a dialogue box.



Select "Yes." This will transport your equation from MathType into Microsoft Office Word.



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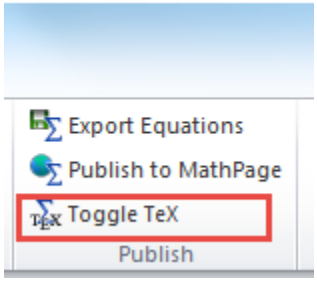
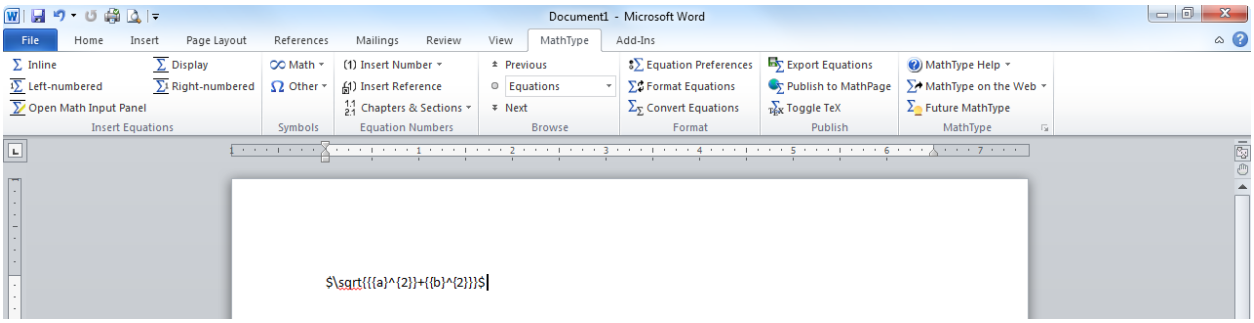
In the MathType Add-In Ribbon in Microsoft Office Word, select the option to “Toggle TeX.”



This will automatically convert your equation into TeX coding.



Rendering the Code with Javascript

Now that you have either coded your own equation or used MathType in Microsoft Office Word to generate TeX coding, you can move on to the second step of the advanced process. To make this coding appear as an equation in an online environment, it has to be rendered by a javascript. MathJax is a free resource that provides javascript and servers to render this code into equations. To use this resource, copy the following script:

```
<script type="text/x-mathjax-config">
  MathJax.Hub.Config({tex2jax: {inlineMath: [['$','$'], ['\\(','\\)']]}});
</script>
<script type="text/javascript"
src="http://cdn.mathjax.org/mathjax/latest/MathJax.js?config=TeX-AMS-
MML_HTMLorMML">
</script>
```

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If you've done your own coding and would like to have your equation display as a large, standalone font, surround it in $$...$$, like this:

```
$$\begin{aligned}
\dot{x} & = \sigma(y-x) \\
\dot{y} & = \rho x - y - xz \\
\dot{z} & = -\beta z + xy
\end{aligned}$$
```

This is called a dilimeter, and will tell MathJax servers how to render your code into font. If you'd prefer for it to be in-line with text, use dilimeters \(…\) instead.

```
When $a \ne 0$, there are two solutions to \(ax^2 + bx + c = 0\)
```

If you'd like to use both, you can do so by changing the dilmeter for specific sections of the equation.

```
When $a \ne 0$, there are two solutions to \(ax^2 + bx + c = 0\) and they are

$$x = {-b \pm \sqrt{b^2-4ac} \over 2a}.$$
```

Now, push these two bits of scripting together, like this:

```
<script type="text/x-mathjax-config">
  MathJax.Hub.Config({tex2jax: {inlineMath: [['$','$'], ['\\(','\\)']]}});
</script>
<script type="text/javascript"
src="http://cdn.mathjax.org/mathjax/latest/MathJax.js?config=TeX-AMS-
MML_HTMLorMML">
</script>
$$\begin{aligned}
\dot{x} & = \sigma(y-x) \\
\dot{y} & = \rho x - y - xz \\
\dot{z} & = -\beta z + xy
\end{aligned}$$
```

Or this:

```
<script type="text/x-mathjax-config">
  MathJax.Hub.Config({tex2jax: {inlineMath: [['$','$'], ['\\(','\\)']]}});
</script>
<script type="text/javascript"
src="http://cdn.mathjax.org/mathjax/latest/MathJax.js?config=TeX-AMS-
MML_HTMLorMML">
</script>
When $a \ne 0$, there are two solutions to \(ax^2 + bx + c = 0\) and they are
$$x = {-b \pm \sqrt{b^2-4ac} \over 2a}.$$
```

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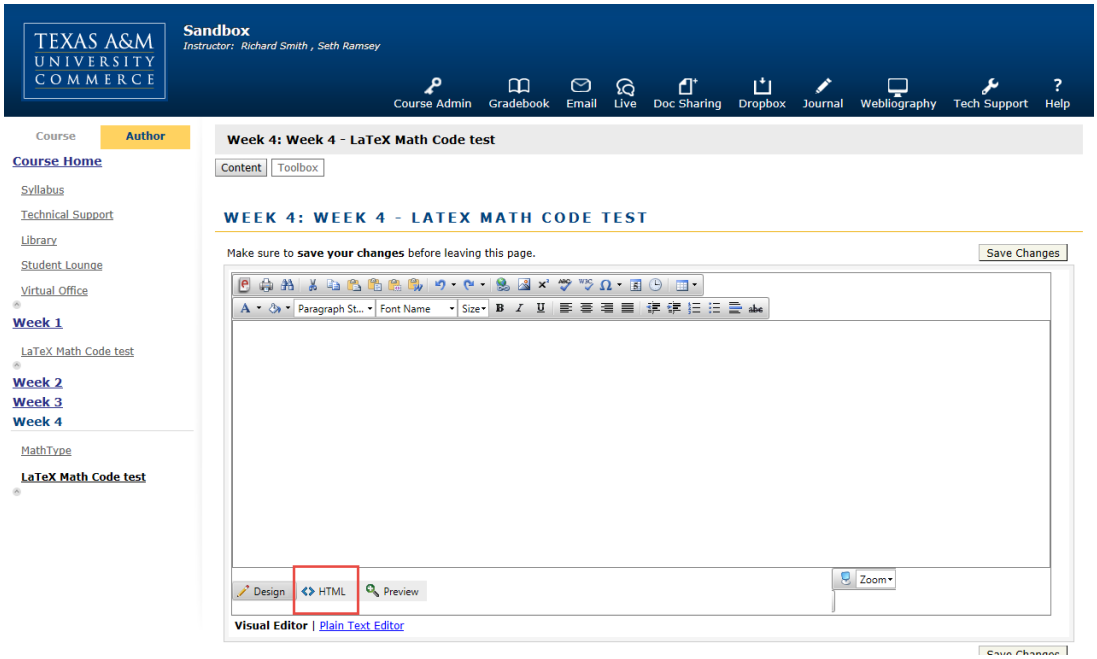
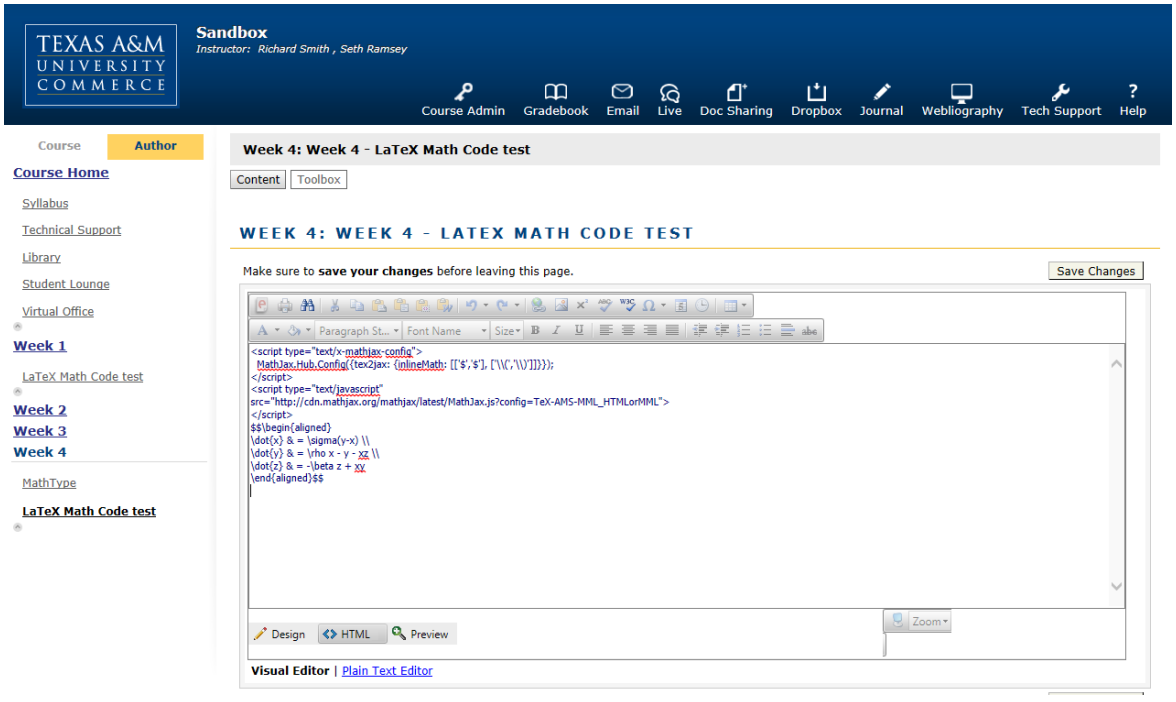
Open your eCollege Course Item, and switch to HTML view.



Copy your code and paste it into the HTML editor.



Save your changes. In Author mode, you'll notice that the text in your Rich Text Editor doesn't look any different than normal coded text.

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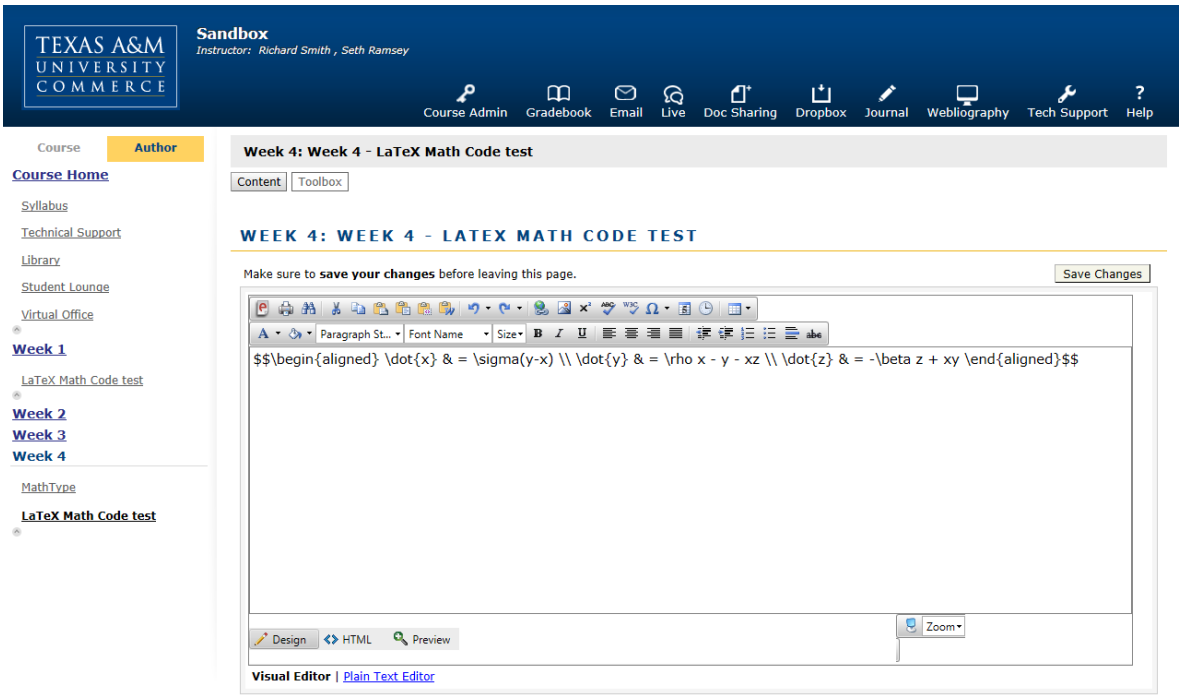
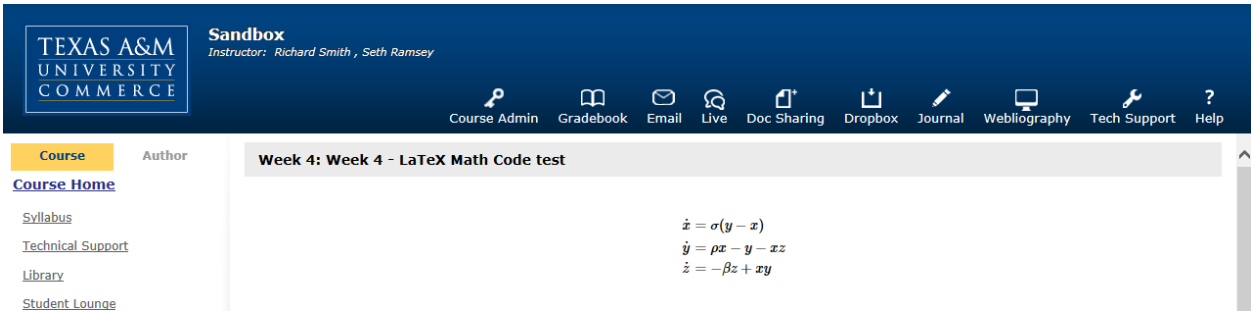
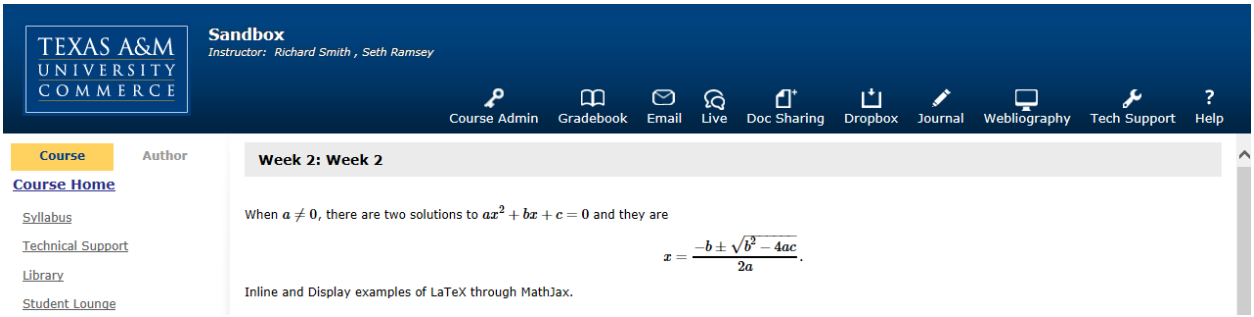


However, you'll notice that once you switch into Course view, the code is rendered into a clean, clear equation for your students to view.



This is a displayed code without any in-line text. An equation that features both in-line text and a displayed equation would look like this:



While coding in LaTeX has a steep learning curve, it does offer the most control to instructors who want to build equations that display to their specifications.

Accessibility

The Faculty Center supports the University's mission to ensure all online materials are produced to meet accessibility accommodation standards. The current recommendation for ensuring all students are able to access equations built with the eCollege equation editor or rendered using LaTeX and MathJax is for instructors to write out all equations in text format within the visual editor so that they may easily be read by screenreading software. Additionally, instructors may choose to create short audio clips using Camtasia or other recording software, and embed them along with the visual equations. This will allow students of all abilities to access either a visual or audio cue, or both.