

LIBRETEXTS TRAINING MATERIALS



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LibreTexts Training Materials

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Chapter 1: Textbook Formatting

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1.1: Minicourse Skills Page - Headings, TOC, Elements (Example, Exercise, Theorem, Definition, etc.) and Figures/Images

Editing LibreTexts Pages

Creating a Table of Contents for a Page

A LibreTexts page with headings can have a table of contents (TOC) of its own, showing a clickable list of its subheading hierarchy. In order to have a meaningful TOC, you will need to have at least a couple headings on the page (like those just above this paragraph).

Exercise 1: If it is not already visible, we can turn it on.

1. First open the Page Settings by clicking on the + Page Settings bar (a gray bar) near the upper-left side of the page.
2. Change the option for **Show Page TOC** to **yes**.
3. Close the Page Settings by clicking on the top of the Page Settings window again.
4. Now reload the page to see the effect of this new setting.

Exercise 2: Explore the TOC by clicking on various subheadings. The browser should take you to the appropriate part of this page.

Exercise 3: Note that we can add a new subheading to this TOC by creating a new heading anywhere in the document.

Let's create a new subheading here. Click the Edit button on the black control bar near the top of the page. Type, "Creating a New Subheading" at the beginning of this paragraph, and then press "enter" (If you don't press enter then this entire paragraph will become the heading). Now place your cursor anywhere on the phrase and use the Paragraph Format option in the light blue menu bar above (probably currently marked "Normal") to select Heading 3 (since we have already used Heading 1 for the top page heading and Heading 2 for the current page subsection).

Now click Save. The TOC in the upper-right corner of the page should now show another subheading for this first section.

Adding Elements to a Page Using the Provided Templates

In this section, we'll add Notes, Definitions, Examples, Exercises and Theorems. See examples for some of these below.

Note

A Note has a built-in heading "Note" and is meant to set off an important or useful statement.

Definition: Key Word

A **Key Word** is a word with special significance in this topic.

Example 1.1.1

In an example, an index is automatically added, but you have to update these numbers to match those already on the page. Since the title of this LibreTexts page begins with "1.1:", LibreTexts knows to insert this section number before the index number when displaying this page in normal (not Edit) mode.

Note that the code for a page index is `\(\PageIndex{1}\)` .

Solution

Add text here.

Exercise 4: Now let's add an Exercise and a Theorem. First we will need to click the Edit button at the very top of the page on the black control bar.

Next, select the **Templates** option from the **Elements** menu on the LibreText page editing menu bar (at the top of the page immediately above the light blue bar with the Format option in it we used in Exercise 3. When you are in edit mode, these two menu lines are always positioned at the top of the visible page). There are a lot of options there. Left click on the down-ward pointing chevron to see them all.

To get a **Note** like that above, you would select: **Template:BoxNote**.

To get an **Example** like that above, you would select: **Template:BoxExample**.

To add an **Exercise**, just below this line, place your cursor there, navigate to the Elements menu, select **Template:BoxExercise**, and then click on the **Insert Template** button.

Place Exercise here:

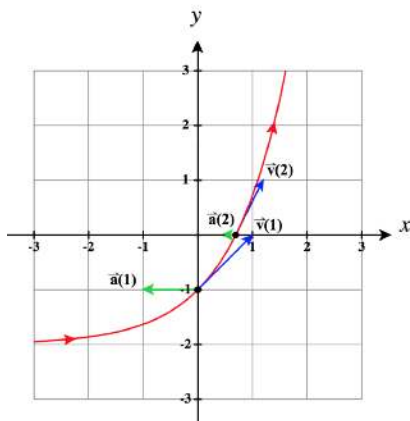
Similarly, to add a **Theorem**, place your cursor below the "Place Theorem here:" line below, navigate to the Elements menu, select **Template:BoxTheorem**, and then click on the **Insert Template** button.

Place Theorem here:

Note that, by default, exercises and theorems also provide a page index for you to update.

Adding an Image (not a Figure)

Here is an image element without a caption (not a Figure). We might choose this option if the image is meant to accompany an exercise in an exercise section, for example.



Right click on this image and select **Image Properties** to see the options we can adjust. One important option you will want to be sure to fill in meaningfully is the **alt text**. This will make the image accessible to readers with visual impairment. Another option you may wish to adjust is the alignment of the image.

Exercise 5: Now let's add a new image.

1. To add an image to a page (and not a captioned Figure), we don't use the Templates menu. Instead we can just click the **Image** option on the **Elements** menu (or just click the image icon just to the right of the hyperlink icon in the editing menu for the page).

If the image is already attached to the page (using the **Attach a file** button at the bottom of the page), we can just select it from the **Browse** tab. If it is an image on your computer, click the **Attach files** tab. Note that images already attached to this page are listed here as well and could be selected on this tab. Note also that some additional images have been provided in another page (named "Some Images for Practice") of this book and could be selected on the Browse menu for this exercise.

2. Either attach a new image from your computer or select one of the images already listed here.

Another option if you are creating your own images, say from Paint, you can save the image as a .png file on your computer. Then open the folder where this file has been saved, left click on the name of the image, and drag-and-drop it to the location you want it to be in your LibreText file. If it doesn't land exactly where you want it you can move it around later.

Place Image here:

- Now we will need to update the alt text, if it is not already meaningful, and the size of the image may need to be adjusted. The Medium size may be helpful on some of these, or you may need to use the Custom option to size it appropriately on the page.

Adding a Figure (with a Caption)

Below is an example of an ordinary Figure with a caption. This should be the default way most images are placed in the exposition of a text.

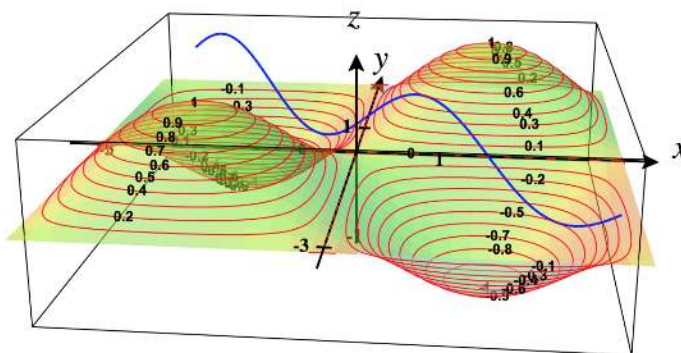


Figure 1.1.1: A surface with its contours shown in 3D.

Exercise 6: Now let's add a new Figure.

- To add a new Figure, select the **Template: AddFigureCenterCenter** template from the **Templates** in the **Elements** menu. Note that there are a few other Figure templates to choose from. These either place the figure on the right side of the screen or allow for multiple figures to be placed side-by-side (with one or multiple captions), following the steps we used above.
- The other thing you will need to do is update the caption so that it meaningfully describes the figure.

Add your Figure here:

Adding a Table (with a Caption)

Another element that can be put into a document is responsive table. This can be done by choosing the **Table** option from the **Elements** menu and indicating the number of rows and columns you need (this can always be changed later). If you right click on the table and select table properties you can choose to add a caption or a header to the table. It is desirable that tables are responsive so that they can be appropriately viewed, regardless of the device being used. You can observe this responsiveness by reducing the width of this window.

Number of Courses Offered Per Academic year

	Spring Semester	Summer Session	Fall Semester	Total
2017-2018	359	107	275	741

	Spring Semester	Summer Session	Fall Semester	Total
2018-2019	244	101	255	600

Exercise 7: Add a new table in the space below.

Add your new Table below this line:

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1.2: Minicourse Skills Page - Hiding Answers, Solutions or Notes

Introduction

Hidden Text opens up when a link word is clicked.

Why would we want to use this feature?

This feature can help students pause to think of their own answer before clicking on the link.

Where might you want hidden text?

- Solutions to odd exercises
- Answers to some examples
- Proofs for theorems

Add Hidden Text

- Click the **Edit** button on the top black taskbar.
- Click at the end of this list, below *Insert your Hidden Text here:*
- Select **Elements**.
- Choose **Templates**, then select **Template: AddHiddenText**
- Click **Insert template**.
- Now you can replace the **Answer** with whatever you want visible to the reader. This is what the reader will click on to view the hidden text.
- Next replace *Add texts here. Do not delete this text first.* with: This is hidden!! (or whatever you'd like).
- **SAVE** the page to see how it works!

Insert your Hidden Text here:

Modify an Example to have a Hidden Solution

Now let's hide the Solution to Example 1 below.

- Click the **Edit** button on the top black taskbar.
- Place your cursor at the start of the word **Solution** in the Example below.
- Select **Elements**.
- Choose **Templates**, then select **Template: AddHiddenText**
- Click **Insert template**.
- Now you can replace the **Answer** with the word **Solution**.
- Copy the text below Solution and paste it on top of *Add texts here. Do not delete this text first.*
- **SAVE** the page to see how it works!!

Example 1.2.1

Let $A = \{\text{John, Jim, Dave}\}$ and $B = \{\text{Mary, Lucy}\}$. Determine $A \times B$ and $B \times A$.

Solution

We find

$$A \times B = \{(\text{John, Mary}), (\text{John, Lucy}), (\text{Jim, Mary}), (\text{Jim, Lucy}), (\text{Dave, Mary}), (\text{Dave, Lucy})\},$$

$$B \times A = \{(\text{Mary, John}), (\text{Mary, Jim}), (\text{Mary, Dave}), (\text{Lucy, John}), (\text{Lucy, Jim}), (\text{Lucy, Dave})\}.$$

In general, $A \times B \neq B \times A$.

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1.3: Minicourse Skills Page - MathJax/LaTeX Formatting Conventions

Useful Formatting Conventions for Editing Math Textbooks in LibreTexts

LibreTexts makes it easy to edit both text and mathematical equations. For text, it's almost as easy as using a word processor. Math can be a little more challenging to lay out, since we need to use a variety of LaTeX called MathJax. But once you learn some of the basic commands, it will help you produce some beautiful looking mathematics.

One great way to learn LaTeX commands is to look at the commands in an existing page. But for faster progress, there are many resources online to learn how to represent any mathematics you may wish to render.

A great place to start is the [LibreTexts Adding and Editing Equations page in the Construction Guide](#). It includes information on how to enter subscripts, superscripts, integrals, overbraces, underbraces, cancelling expressions, fractions, matrices, and how to line up multiple expressions.

For fast rendering of complicated mathematics, there's also a great app called [MathPix](#) that you can get on your smart phone and computer that will allow you to scan or select an equation, and it will give you the LaTeX for it. Since your account synchs between the phone app and the computer, you can access the resulting LaTeX on your computer to copy and paste into LibreTexts. You can also select an image of an equation or expression on your computer screen. The free version allows 50 "snips" per month, but a full account costs something like \$5.00/month, if you end up using it a lot for a while.

Another great learning tool is the [Realtime MathJax](#) (LaTeX) page that allows you to enter a LaTeX expression that is not rendering in the way you expect, instantly see how it renders, and then allows you to quickly adjust the MathJax (LaTeX) element until it looks like you want it to.

As you may already know, we can render mathematics "inline" by putting MathJax codes between `\(` and `\)`.

For example, we can enter `\(\frac{\sqrt{2}}{2}\)` to obtain $\frac{\sqrt{2}}{2}$.

To get "display" mode, we use the delimiters, `\[` and `\]`. This will center the math on the next line, and also turn on `\displaystyle`. We'll discuss `\displaystyle` below.

So, for example, `\[\int_0^1 x^2 dx\]` gives us:

$$\int_0^1 x^2 dx \quad (1.3.1)$$

This minicourse is not aimed to teach you all of MathJax (or LaTeX), but I do want to show you some basic skills that will help you to adjust pages you may find in the LibreTexts math bookshelves to make them look better and follow some basic formatting conventions.

1. Equation numbering

In general, we'd like to avoid numbering equations unless they are key equations for the section.

But whenever we use display mathematics, the equations will automatically be numbered unless we tell it not to. The number is displayed to the right of the display mode equation, at the edge of the page, as you can see above.

The easiest way to do this is to add the `\nonumber` command at the end of the display math code.

Note that this equation is not automatically numbered since it is inline: $f(x) = x^2 + y^2$. In edit mode, this expression looks like `\(f(x) = x^2 + y^2\)`

Exercise 1: Remove the equation number from this equation while keeping it in display mode. In edit mode, the line below originally looks like `\[f(x) = x^2 + y^2\]`

$$f(x) = x^2 + y^2 \quad (1.3.2)$$

There are a couple ways to align equal signs in equations over multiple lines. One of the nicest is to use the `\begin{align*}` and `\end{align*}` codes along with a few other code commands to align and break the lines, as we'll

learn about in the next section. But if we forget to use the asterisk, every line of the equation will be numbered automatically.

Exercise 2: Remove the autonumbering on this aligned equation by adding asterisks at the end of the word "align". In edit mode, the lines below originally look like

```
\[ \begin{align} f'(x) &= 3 \cdot (x^2 + 1)^2 \cdot 2x \\ &= 6x(x^2 + 1)^2 \end{align} \]
```

$$f'(x) = 3 \cdot (x^2 + 1)^2 \cdot 2x \quad (1.3.3)$$

$$= 6x(x^2 + 1)^2 \quad (1.3.4)$$

2. Formatting functions correctly: sin x, cos x, ln x, arctan x, etc.

Consider: `\(cosx, tan(x), sin^2x, ln x\)` vs. `\(\cos x, \tan(x), \sin^2x, \ln x\)` yields:

cosx, tan(x), sin²x vs. *cos x, tan(x), sin² x*

As you can see, it's important to fix the LaTeX codes for all transcendental functions so they appear formatted properly and clearly. Note that there should be a backslash in front of each function name and there needs to be either a space or a parenthesis or a circumflex ^ immediately after the function name. Thus “\sinx” will not be understood, but “\sin x”, “\sin(x)”, and “\sin^2x” will all be understood correctly. Note that the last one is really equivalent to (sin x)².

3. Proper use of displaystyle

Avoid extraneous use of `\displaystyle` except in cases where it is needed, such as when using `\lim`, `\int` or `\sum` in inline math, that is, when using the `\( \)` delimiters for the LaTeX.

Note that `\displaystyle` is not needed when using `\[ \]` delimiters, since these already use displaystyle automatically.

Ex. We can remove the `\displaystyle` tag from `\[ \displaystyle f^5_0(5+2t)\,dt. \nonumber\]`

But it is needed in the following cases using `\int`, `\lim`, and `\sum` in inline mathematics. In these cases, it is only needed **once** for a whole inline expression, even if there are multiple integrals, limits, or sums.

Without `\displaystyle`:

Note that `\(\lim_{n \rightarrow \infty} \sum_{i=1}^n f(x_i)\Delta x_i = \int_a^b f(x) \, dx\)`.

yields:

Note that $\lim_{n \rightarrow \infty} \sum_{i=1}^n f(x_i) \Delta x_i = \int_a^b f(x) dx$.

With `\displaystyle`:

Note that `\(\displaystyle \lim_{n \rightarrow \infty} \sum_{i=1}^n f(x_i)\Delta x_i = \int_a^b f(x) \, dx\)`.

yields:

Note that $\lim_{n \rightarrow \infty} \sum_{i=1}^n f(x_i) \Delta x_i = \int_a^b f(x) dx$.

Rendering Fractions at appropriate sizes:

There are three useful fraction mode commands: `\frac`, `\dfrac`, `\tfrac`.

`\frac{1}{2}` will give a small `textsize` fraction when in inline mode (without a `\displaystyle` tag). As here: $\frac{1}{2}$

But it will become large when in display mode. So `\(\displaystyle \frac{1}{2}\)` gives us the large fraction: $\frac{1}{2}$.

But there are times where it look cleaner to use a `displaystyle` fraction in an inline expression or a `textsize` fraction in a display mode expression.

`\dfrac{1}{2}` will force `displaystyle` for the fraction only. `\tfrac{1}{2}` will force a small text size fraction when in display mode.

I recommend using the `\dfrac` mode whenever there are variables in the fraction and the expression is in inline mode. I recommend `\tfrac` for numerical fractions that are coefficients when in display mode.

For example: `\(f(x) = \dfrac{1}{x}\)` gives us $f(x) = \frac{1}{x}$, while `\(f(x) = \frac{1}{x}\)` would give us $f(x) = \frac{1}{x}$.

And `\(\displaystyle \int \tfrac{3}{4}x^5 dx\)` gives us: $\int \frac{3}{4}x^5 dx$, while `\(\displaystyle \int \frac{3}{4}x^5 dx\)` gives us: $\int \frac{3}{4}x^5 dx$.

Exercise 3: Add `\displaystyle` where it is needed in the examples below and remove it where it is not. Also consider fractions and the spacing of the differential in integrals.

There are various commands to control spacing in math mode (between `\(` and `\)` or `\[` and `\]`), including `\;`, `\:`, `\quad` and `\qquad`.

You may find it convenient to use the RealTimeMathJax link above to experiment with these. If you click on it, it will open up another window in your browser. Then you can copy and paste a few of the problems below into the textbox at the top and observe the results in the box below as you add and remove `\displaystyle` at the beginning of the code, or just change between a `\frac` and a `\dfrac`. (Note: To copy the code for these you must be in edit mode on this page).

$$\int_0^5 (5 + 2t) dt.$$

$$f(x) = \frac{x^2+1}{x}$$

$$\frac{1}{5} \int_0^2 \frac{x^2+1}{x} dx$$

$$\sum_{n=1}^{\infty} a_n$$

$$\lim_{x \rightarrow 3} f(x) = 9$$

$$\text{Note that } \lim_{n \rightarrow \infty} \sum_{i=1}^n f(x_i) \Delta x_i = \int_a^b f(x) dx.$$

4. Using `\left` and `\right`, `\big`, `\Big`, `\bigg`, and `\Bigg` to size grouping symbols appropriately.

The `\left` and `\right` LaTeX commands can be used to make matching grouping symbols resize appropriately according to what is between them.

For example, consider the following without these commands:

`\(\dfrac{d}{dx}(\dfrac{x}{x-1})\)`, `\(\dfrac{dy}{dx}|_{x=2}\)` and `\(\displaystyle \int_{-0^2}^{2^2} 2x dx = x^2|_{-0^2}^{2^2} = 2^2 - 0^2 = 4\)`

yield:

$$\frac{d}{dx}\left(\frac{x}{x-1}\right), \quad \frac{dy}{dx}\Big|_{x=2} \quad \text{and} \quad \int_0^2 2x dx = x^2\Big|_0^2 = 2^2 - 0^2 = 4$$

While `\(\dfrac{d}{dx}\left(\dfrac{x}{x-1}\right), \)` and `\(\left.\dfrac{dy}{dx}\right|_{x=2}\)` and
`\(\displaystyle \int_0^2 2x \, dx = x^2 \Big|_0^2 = 2^2 - 0^2 = 4\)`

yield:

$$\frac{d}{dx} \left(\frac{x}{x-1} \right), \left. \frac{dy}{dx} \right|_{x=2} \text{ and } \int_0^2 2x \, dx = x^2 \Big|_0^2 = 2^2 - 0^2 = 4$$

Note that there are several options to make the evaluation bar large. You can use the `\left` and `\right` commands, using a period after the `\left` command, or you can use the `\big`, `\Big`, `\bigg`, or `\Bigg` commands. These make the symbol to the right progressively larger.

Exercise 4: Address the size of the grouping symbols and the evaluation bar.

$$\begin{aligned} \int_0^5 10 + \cos\left(\frac{\pi}{2}t\right) dt &= \left(10t + \frac{2}{\pi} \sin\left(\frac{\pi}{2}t\right)\right) \Big|_0^5 \\ &= \left(50 + \frac{2}{\pi}\right) - \left(0 - \frac{2}{\pi} \sin 0\right) \approx 50.6. \end{aligned}$$

5. Aligning equal signs over multiple lines using `\begin{align*}` and `\end{align*}`

To align the equal signs of a chain equality, use `\begin{align*}` and `\end{align*}`. This structure can also be used to add text explanations to the left or right of the mathematical steps. See the two examples below.

Example A: What I found was:

```
\[\begin{align*} \dfrac{\partial^2 f}{\partial x^2} &= \dfrac{\partial}{\partial x} \left[ \dfrac{\partial f}{\partial x} \right] \\ &= \dfrac{\partial}{\partial x} [e^{-3y} + 2 \cos(2x - 5y)] \\ &= -4 \sin(2x - 5y). \end{align*} \]
```

that produced:

$$\begin{aligned} \frac{\partial^2 f}{\partial x^2} &= \frac{\partial}{\partial x} \left[\frac{\partial f}{\partial x} \right] \\ &= \frac{\partial}{\partial x} [e^{-3y} + 2 \cos(2x - 5y)] \\ &= -4 \sin(2x - 5y). \end{aligned}$$

To fix this, I needed to insert the `'&'` symbol in front of each equal sign (also works with `\approx` and other reasons to align multiple lines). I also inserted `'[6pt]'` after the `\` codes that indicate a break to a new line. This gives a wider spacing between the lines since there are so many fractions in each line. I usually use `'[4pt]'` or `'[5pt]'`, but `'[6pt]'` is nicer when there are fractions in each line.

Now:

```
\[\begin{align*} \dfrac{\partial^2 f}{\partial x^2} &= \dfrac{\partial}{\partial x} \left[ \dfrac{\partial f}{\partial x} \right] \\ &= \dfrac{\partial}{\partial x} [e^{-3y} + 2 \cos(2x - 5y)] \\ &= -4 \sin(2x - 5y). \end{align*} \]
```

produces:

$$\begin{aligned} \frac{\partial^2 f}{\partial x^2} &= \frac{\partial}{\partial x} \left[\frac{\partial f}{\partial x} \right] \\ &= \frac{\partial}{\partial x} [e^{-3y} + 2 \cos(2x - 5y)] \\ &= -4 \sin(2x - 5y). \end{aligned}$$

Exercise 5: Format this chain equality using `begin{align*}` and `end{align*}` commands. Also fix other issues with the trig functions and powers.

$$\begin{aligned}\frac{1}{12}(\cos(3x) - 9 \cos x) &= \frac{1}{12}(\cos(x + 2x) - 9 \cos x) \\ &= \frac{1}{12}(\cos(x) \cos(2x) - \sin(x) \sin(2x) - 9 \cos x) \\ &= \frac{1}{12}(\cos x (2 \cos^2 x - 1) - \sin x (2 \sin x \cos x) - 9 \cos x) \\ &= \frac{1}{12}(2 \cos_3 x - \cos x - 2 \cos x (1 - \cos^2 x) - 9 \cos x) \\ &= \frac{1}{12}(4 \cos_3 x - 12 \cos x) \\ &= \frac{1}{3} \cos_3 x - \cos x.\end{aligned}$$

Example B: I found the following code:

```
\( \int \sin^4 x \, dx = \int (\sin^2 x)^2 \, dx \) Rewrite \(\sin^4 x = (\sin^2 x)^2\).
\(\int (\frac{1}{2} - \frac{1}{2} \cos(2x))^2 \, dx \) Substitute \(\sin^2 x = \frac{1}{2} - \frac{1}{2} \cos(2x)\).
\(\int (\frac{1}{4} - \frac{1}{2} \cos(2x) + \frac{1}{4} \cos^2(2x)) \, dx \) Expand
\(\int (\frac{1}{4} - \frac{1}{2} \cos(2x) + \frac{1}{4} (\frac{1}{2} + \frac{1}{2} \cos(4x))) \, dx \)
```

that renders as:

$$\begin{aligned}\int \sin^4 x \, dx &= \int (\sin^2 x)^2 \, dx \text{ Rewrite } \sin^4 x = (\sin^2 x)^2. \\ &= \int \left(\frac{1}{2} - \frac{1}{2} \cos(2x)\right)^2 \, dx \text{ Substitute } \sin^2 x = \frac{1}{2} - \frac{1}{2} \cos(2x). \\ &= \int \left(\frac{1}{4} - \frac{1}{2} \cos(2x) + \frac{1}{4} \cos^2(2x)\right) \, dx \text{ Expand } \left(\frac{1}{2} - \frac{1}{2} \cos(2x)\right)^2. \\ &= \int \left(\frac{1}{4} - \frac{1}{2} \cos(2x) + \frac{1}{4} \left(\frac{1}{2} + \frac{1}{2} \cos(4x)\right)\right) \, dx.\end{aligned}$$

(Note that it does not show all steps to finish evaluating the integral here, but shows enough for us to learn from.)

To fix it, we can make it all one `\begin{align*} \end{align*}` structure, making sure we either keep it on one line or use **shift-enter** to keep it in the same paragraph structure. **Don't overlook this important detail -- do NOT start a new line with a simple "enter" -- instead use the "shift" plus "enter" combination!!** We also use `'&'` before each equal sign, so they align. We'll add `'\\[4pt]'` at the end of each line to insert a line break with 4 pt spacing. And to put the explanations in their own column, we add two ampersands before the text elements. We should also insert `\text` for the normal text words in the explanations.

Since it contains integrals, we should also either use display math mode (which would center it), or add the `\displaystyle` command.

An align environment is a table-like structure, and the `&` (ampersand) is a column separator. The first expression in each line of an align block is right justified, then the expression within each subsequent 'column' alternates between being left-justified and right-justified. So, a 'column' in each line will be right-justified if it is preceded by an even number (0, 2, 4...) of ampersands, and it will be left-justified if preceded by an odd number (1, 3, ...) of ampersands.

Since there was also a missing parenthesis in the last line, I added this in too.

Doing these things, we get:

```
\(\begin{align*} \displaystyle \int \sin^4 x \, dx &= \int (\sin^2 x)^2 \, dx && \text{Rewrite} \\ &\sin^4 x = (\sin^2 x)^2. \end{align*} \\ &= \int \left( \frac{1}{2} - \frac{1}{2} \cos(2x) \right)^2 \, dx && \text{Substitute} \\ &\sin^2 x = \frac{1}{2} - \frac{1}{2} \cos(2x). \\ &= \int \left( \frac{1}{4} - \frac{1}{2} \cos(2x) + \frac{1}{4} \cos^2(2x) \right) \, dx && \text{Expand} \\ &\left( \frac{1}{2} - \frac{1}{2} \cos(2x) \right)^2. \\ &= \int \left( \frac{1}{4} - \frac{1}{2} \cos(2x) + \frac{1}{4} \left( \frac{1}{2} + \frac{1}{2} \cos(4x) \right) \right) \, dx. \end{align*}
```

which renders as:

$$\begin{aligned} \int \sin^4 x \, dx &= \int (\sin^2 x)^2 \, dx && \text{Rewrite } \sin^4 x = (\sin^2 x)^2. \\ &= \int \left(\frac{1}{2} - \frac{1}{2} \cos(2x) \right)^2 \, dx && \text{Substitute } \sin^2 x = \frac{1}{2} - \frac{1}{2} \cos(2x). \\ &= \int \left(\frac{1}{4} - \frac{1}{2} \cos(2x) + \frac{1}{4} \cos^2(2x) \right) \, dx && \text{Expand } \left(\frac{1}{2} - \frac{1}{2} \cos(2x) \right)^2. \\ &= \int \left(\frac{1}{4} - \frac{1}{2} \cos(2x) + \frac{1}{4} \left(\frac{1}{2} + \frac{1}{2} \cos(4x) \right) \right) \, dx. \end{aligned}$$

Note that we could also improve the parentheses here using what we learned above. Doing this (and also adding an explanation for the last step), we get the code:

```
\(\begin{align*} \displaystyle \int \sin^4 x \, dx &= \int \left( \sin^2 x \right)^2 \, dx && \text{Rewrite} \\ &\sin^4 x = \left( \sin^2 x \right)^2. \\ &= \int \left( \frac{1}{2} - \frac{1}{2} \cos(2x) \right)^2 \, dx && \text{Substitute} \\ &\sin^2 x = \frac{1}{2} - \frac{1}{2} \cos(2x). \\ &= \int \left( \frac{1}{4} - \frac{1}{2} \cos(2x) + \frac{1}{4} \cos^2(2x) \right) \, dx && \text{Expand} \\ &\left( \frac{1}{2} - \frac{1}{2} \cos(2x) \right)^2. \\ &= \int \left( \frac{1}{4} - \frac{1}{2} \cos(2x) + \frac{1}{4} \left( \frac{1}{2} + \frac{1}{2} \cos(4x) \right) \right) \, dx && \text{Substitute} \\ &\cos^2(2x) = \frac{1}{2} + \frac{1}{2} \cos(4x). \end{align*}
```

which gives us:

$$\begin{aligned} \int \sin^4 x \, dx &= \int (\sin^2 x)^2 \, dx && \text{Rewrite } \sin^4 x = (\sin^2 x)^2. \\ &= \int \left(\frac{1}{2} - \frac{1}{2} \cos(2x) \right)^2 \, dx && \text{Substitute } \sin^2 x = \frac{1}{2} - \frac{1}{2} \cos(2x). \\ &= \int \left(\frac{1}{4} - \frac{1}{2} \cos(2x) + \frac{1}{4} \cos^2(2x) \right) \, dx && \text{Expand } \left(\frac{1}{2} - \frac{1}{2} \cos(2x) \right)^2. \\ &= \int \left(\frac{1}{4} - \frac{1}{2} \cos(2x) + \frac{1}{4} \left(\frac{1}{2} + \frac{1}{2} \cos(4x) \right) \right) \, dx && \text{Substitute } \cos^2(2x) = \frac{1}{2} + \frac{1}{2} \cos(4x). \end{aligned}$$

Exercise 6: Now, format this chain equality with explanations using `begin{align*}` and `end{align*}` commands.

Thus,

$$\begin{aligned} \int \frac{\sqrt{4-x^2}}{x} \, dx &= \int \frac{\sqrt{4-(2\sin\theta)^2}}{2\sin\theta} 2\cos\theta \, d\theta && \text{Substitute } x = 2\sin\theta \text{ and } dx = 2\cos\theta \, d\theta. \\ &= \int \frac{2\cos^2\theta}{\sin\theta} \, d\theta && \text{Substitute } \cos^2\theta = 1 - \sin^2\theta \text{ and simplify.} \\ &= \int \frac{2(1-\sin^2\theta)}{\sin\theta} \, d\theta && \text{Substitute } \sin 2\theta = 1 - \cos^2\theta. \end{aligned}$$

$$= \int (2 \csc \theta - 2 \sin \theta) d\theta \quad \text{Separate the numerator, simplify, and use } \csc \theta = \frac{1}{\sin \theta}.$$

$$= 2 \ln |\csc \theta - \cot \theta| + 2 \cos \theta + C \quad \text{Evaluate the integral.}$$

$$= 2 \ln \left| \frac{2}{x} - \frac{\sqrt{4-x^2}}{x} \right| + \sqrt{4-x^2} + C. \quad \text{Use the reference triangle to rewrite the expression in terms of } x \text{ and simplify.}$$

This page titled [1.3: Minicourse Skills Page - MathJax/LaTeX Formatting Conventions](#) is shared under a [CC BY-SA](#) license and was authored, remixed, and/or curated by [Paul Seeburger](#).

- [7.2: Trigonometric Integrals](#) by Edwin “Jed” Herman, Gilbert Strang is licensed [CC BY-NC-SA 4.0](#). Original source: <https://openstax.org/details/books/calculus-volume-1>.

1.4: Minicourse Skills Page - Content Reuse Practice

This page is for you to practice with transcluded materials in LibreTexts. Something like this will show up in any transcluded page, so it will be good to understand what it tells you. You may also want to use Content Reuse to add subsections of source pages to a page, or dynamic figures created with CalcPlot3D, Geogebra Applets, etc.

Reusing/Transcluding/Mirroring a Subsection of a Source Page

Between the two lines below is an example of a Content Reuse object (note that before you edit the page, this material appears to be part of this page).

2. Formatting functions correctly: $\sin x$, $\cos x$, $\ln x$, $\arctan x$, etc.

Consider: $\backslash(\cos x, \tan(x), \sin^2 x, \ln x \backslash)$ vs. $\backslash(\backslash\cos x, \backslash\tan(x), \backslash\sin^2 x, \backslash\ln x \backslash)$ yields:

$\cos x, \tan(x), \sin^2 x$ vs. $\cos x, \tan(x), \sin^2 x$

As you can see, it's important to fix the LaTeX codes for all transcendental functions so they appear formatted properly and clearly. Note that there should be a backslash in front of each function name and there needs to be either a space or a parenthesis or a circumflex $\wedge$ immediately after the function name. Thus “ $\backslash\sin x$ ” will not be understood, but “ $\backslash\sin x$ ”, “ $\backslash\sin(x)$ ”, and “ $\backslash\sin^2 x$ ” will all be understood correctly. Note that the last one is really equivalent to $(\sin x)^2$.

This example shows how we can pull in a subsection of another page and make it appear to be part of the current page. Using this approach we could intersperse content from another source with our own examples and subsections. The benefit of this is that any typos or formatting fixed in the original source page would immediately be updated on our page as well.

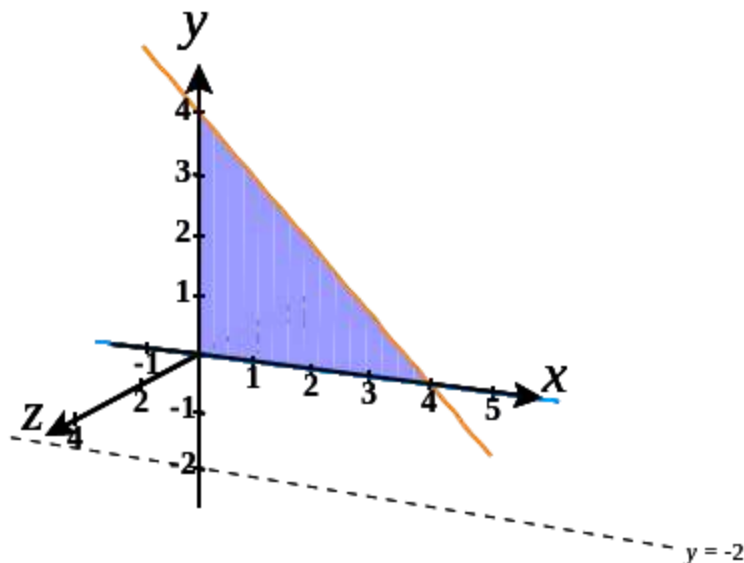
1. It's Your Turn: Use the Content Reuse feature to insert the **Equation Numbering** subsection from the **LaTeX Formatting Conventions** page in the space between the two lines below.

Go to: Elements > Content Reuse > Sandboxes > your username > 1.3: Minicourse Skills Page - MathJax/LaTeX Formatting Conventions > Equation Numbering

Note that if the **Show Title** option is checked, then the title of the section will be included in your document, otherwise just the text in that section will appear.

Transcluding a CalcPlot3D Dynamic Figure

Below is a dynamic figure created using CalcPlot3D. It is initially placed in its own page in the Simulations and Visualizations page on the Bookshelves. We can locate it and place a link to it in our page using the Content Reuse option on the Elements menu that displays above when you are editing a page.



2. It's Your Turn: Use the Content Reuse feature on the Elements menu to insert another CalcPlot3D figure below.

Go to: Elements > Content Reuse > click on the + sign in front of Home > click on the + sign in front of Learning Objects > click on the + sign in front of CalcPlot3D Interactive Figures > Then pick a CalcPlot3D image to insert.

Place CalcPlot3D figure here:

Transclusing a Whole Source Page (without using the Remixer)

You can also use this Content Reuse feature to directly transclude a page/section from a book in the Bookshelves (or somewhere else in Courses). That is, we don't even need to use the Remixer to do this, although the Remixer will make it a lot easier to transclude a whole series of pages into a book.

Remember that transcluded pages will adjust their chapter and section numbers (in titles, examples, figures, etc.) but will mirror any updates or corrections made to the original pages. This is ideal whenever you want your page to be the same as a page located elsewhere on LibreTexts and you understand the efficiency of only needing to correct or update the page in one place.

3. It's Your Turn: Create a New Page in this "Chapter" naming it **1.5: Linked Page** (or whatever you like). Save the page. Then edit it and use the Content Reuse feature to transclude a page from a textbook in the Bookshelves. (Any page will do.)

Steps to accomplish this:

- Look at the bread crumb trail in the blue bar just below the black control bar at the top of this page
- Click on the item at the far right to go up one level to the **Textbook Formatting** "book".

- Select New in the black control bar at the top. This will create a new page in your version of the **Textbook Formatting** book.
- Enter a name for this new page, like **1.5: Linked Page**, and then select save.
- Then in this new page (1.5: Linked Page), select Edit in the black control bar. Use the Elements > Content Reuse > click + sign in front of Home > click + sign in front of Bookshelves > navigate to a page you wish to transclude > Select this page.
- Save the new page and view it. It should appear as it would in the Bookshelves except that its numbering is 1.5 instead of whatever it was there.

4. It's Your Turn: Observe how changes to a transcluded page automatically appear on linked pages.

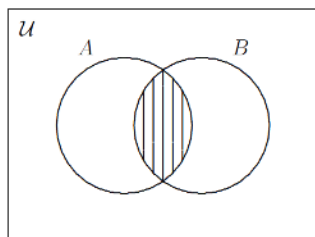
- Edit this page and use the Content Reuse feature to bring a copy of section 1.2 from this Textbook Formatting book into this page in the space between the two lines below. Save.

-
-
-
- Confirm that the contents of the mirrored/transcluded page are just above this line.
 - Now go to the Section 1.2 page and make some changes to it and save the modified page.
 - Come back here, reload the page, and observe that the modifications will be present here as well!

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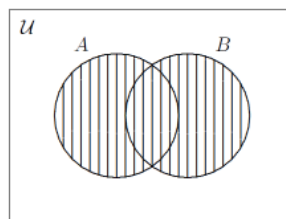
Some Images for Practice

These are some images for your practice in copying in an image.



$$A \cap B$$

Intersection

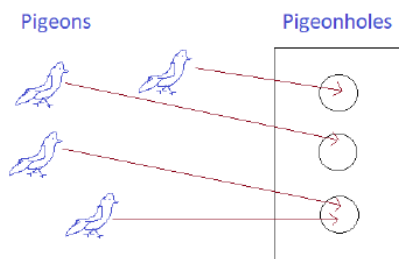


$$A \cup B$$

Union



BIG O



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CHAPTER OVERVIEW

Chapter 2: Other Important LibreTexts Skills

- [2.1: Remixing a Book to Your Sandbox](#)
- [2.2: Adding WeBWorK Problems to LibreTexts](#)
- [2.3: Adding H5P Problems to LibreTexts](#)
- [2.4: Hypothesis Annotation](#)
- [2.5: Inserting Dynamic Figures using CalcPlot3D](#)

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2.1: Remixing a Book to Your Sandbox

This page will cover the basics of how to use the **Remixer** to create a custom textbook in your sandbox.

Note that there are more detailed instructions for this process available here: [Construction Guide - How to Make a LibreTexts Remix](#).

Remixing a Custom Textbook:

Although a textbook on the LibreTexts platform can be created one Chapter and Section at a time, either written from scratch, copied from the source books one section at a time, or using the Content Reuse option to transclude/mirror existing source pages from the Bookshelves, the Remixer offers a much faster way to set up a custom course textbook from the source books on the Bookshelves or even from other customized course books in Campus Bookshelves.

If you choose to create a textbook from existing source pages, your remixed textbook will contain transcluded/mirrored links to the source pages rather than immediately creating distinct copies of them all. These sections can still be renumbered to match your chapter and section organization (and this will be reflected in Figures, Examples, Theorems, etc.), and the pages will update if any typos are fixed in the linked source pages. If you find any typos as you proofread your remixed book, please contact Paul Seeburger or someone else at LibreTexts to fix them for you. Once you become proficient at editing LibreText pages, you may also be given permission to go to the source pages to fix them yourself! To contact us about typos, either use the Leave Feedback button near the bottom of the relevant page (to the right of "Was this article helpful?") or email me or Delmar directly about it. Please be very specific, so we can quickly fix the issue(s).

Once your book is created, if you desire to customize the content of a section yourself, you can “fork” it, creating a distinct copy of the original page that is no longer linked to the source page. Your changes to it will not affect the original page on the Bookshelves and edits to the original will no longer affect your copied version. It is even possible to use the Reuse Content feature to transclude subsections of a page and to insert your own additional custom exposition before and after it. In fact, on any transcluded section, you will always have the option to add your own text or other materials at the top or bottom of the page, while leaving the rest of the section linked to the original source!

Now, before you are ready to Remix a new textbook, you will need to survey the textbooks on the Bookshelves and possibly also those that are in Campus Bookshelves. Once you know which books, chapters, and sections you wish to use to create your new custom course text, it's time to open the Remixer and get started!

Once you are logged into LibreTexts as an author/editor/viewer, you will see the following bar near the top of the page:



Unlike the other options (except Downloads), it does not matter what page you are on for the Remixer. It will take you to the same place. The first time you open the Remixer, it will look like the following:

The Remixer works best on Chrome browsers; if you do not see anything below this text within 15 seconds please switch to Chrome.

The OER Remixer tool allows the rapid assembly of customized Remixes from existing sources on our comprehensive and ever-growing libraries. See the Remixer Tutorial in Chapter 7 of the [Construction Guide](#) for more details for an explanation of the Remixer's interface and videos to a walkthrough videos of how to do basic tasks with the OER Remixer. Your [Remixing Map](#) is stored automatically on your computer as you build, so you do not have to complete your Remix in one setting. If you switch to a different computer, you will want to save the Map.

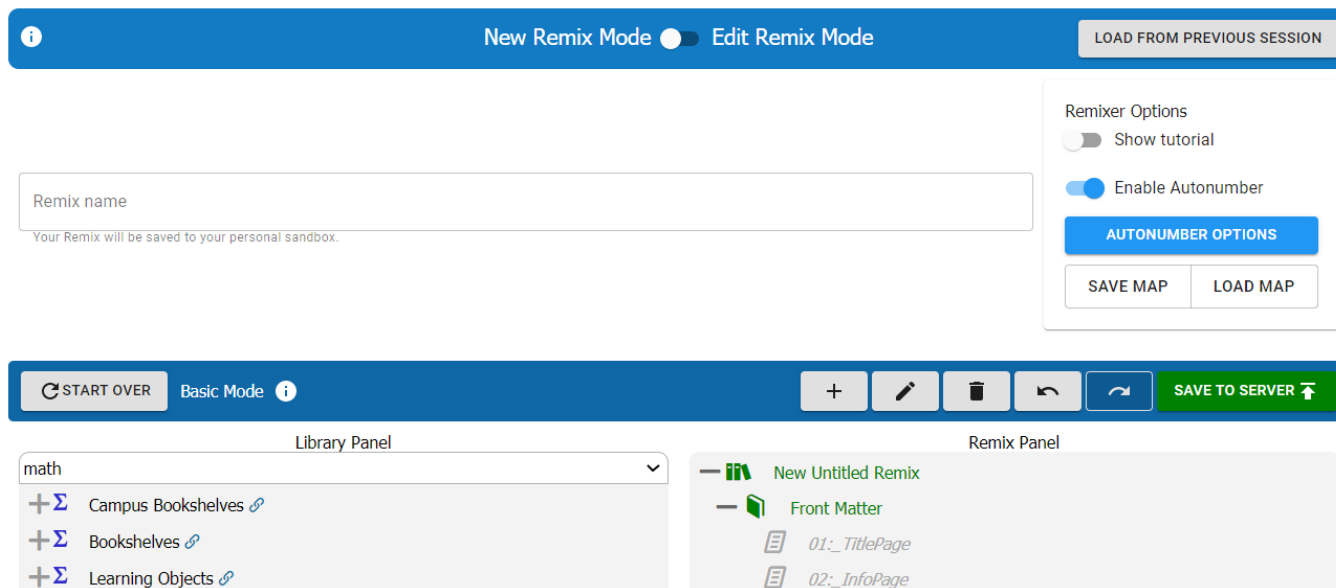


Figure 2.1.1: Initial view of the Remixer

Note that after you use the Remixer, it will store a cookie on your computer and will therefore remember what you last used the Remixer to do. If you want to go back to that Remix to continue working on it, click on the Load From Previous Session button in the upper-right corner. The Remixer will then show the last remix you worked on in the state in which you left it.

By default, the Remixer provides five empty untitled chapters. I usually don't want these empty chapters. To clear these quickly or to simply start over, we can click on the **Start Over** button with the circular arrow on the left side of the blue bar above the Library Panel. This will clear any content in the Remix Panel to the lower right. When you start over, you will be asked the number of provided empty Chapters and Sections (pages) in each chapter. I prefer to add empty pages to my custom books directly rather than using the Remixer, so I would usually choose 0 Chapters and 0 Pages per Chapter. You'll still be given Front Matter and Back Matter for your new book.

You can now name your textbook in the top textbox labeled **Remix name**. We recommend making this the course name, although, you can use whatever makes sense for your situation.

By default your Remixes (custom textbooks) will first be published to your Sandbox. Once you are ready for your custom textbook to go live, one of the curators will be glad to help you move it to your campus bookshelf located in Campus Bookshelves and give you editing rights to your book there so you will be able to continue to customize the book as you begin to use it.

As discussed above, by default the Remixer will create linked (transcluded) copies of the source pages when it creates your custom book. Note that this will still create your own "forked" and editable versions of the top level book page and chapter pages (those that show the sections in each chapter). This means you can add additional pages to these whenever you wish. As mentioned before, you can actually also add your own text before or after the transcluded content on any given page while keeping this content linked to the source. Or you can also "fork" the page, giving you a distinct full copy of the content that you can edit and customize to your heart's content. It will no longer update when typos are fixed in the original source pages, and your changes will not affect others using the source pages.

As you get started using the Remixer (or as a refresher later on), you can turn on the Remixer Tutorial by clicking the slider on the right under **Remixer Options** labeled **Show tutorial**. It contains a lot of useful information, some of it similar to what is found

here. There is also a chapter in the LibreTexts **Construction Guide** on Remixes. Although this tutorial covers the basic steps of the process, we recommend that you read that as well. There is a link to this guide on top of the Remix page (and a link to it at the top of this tutorial page too).

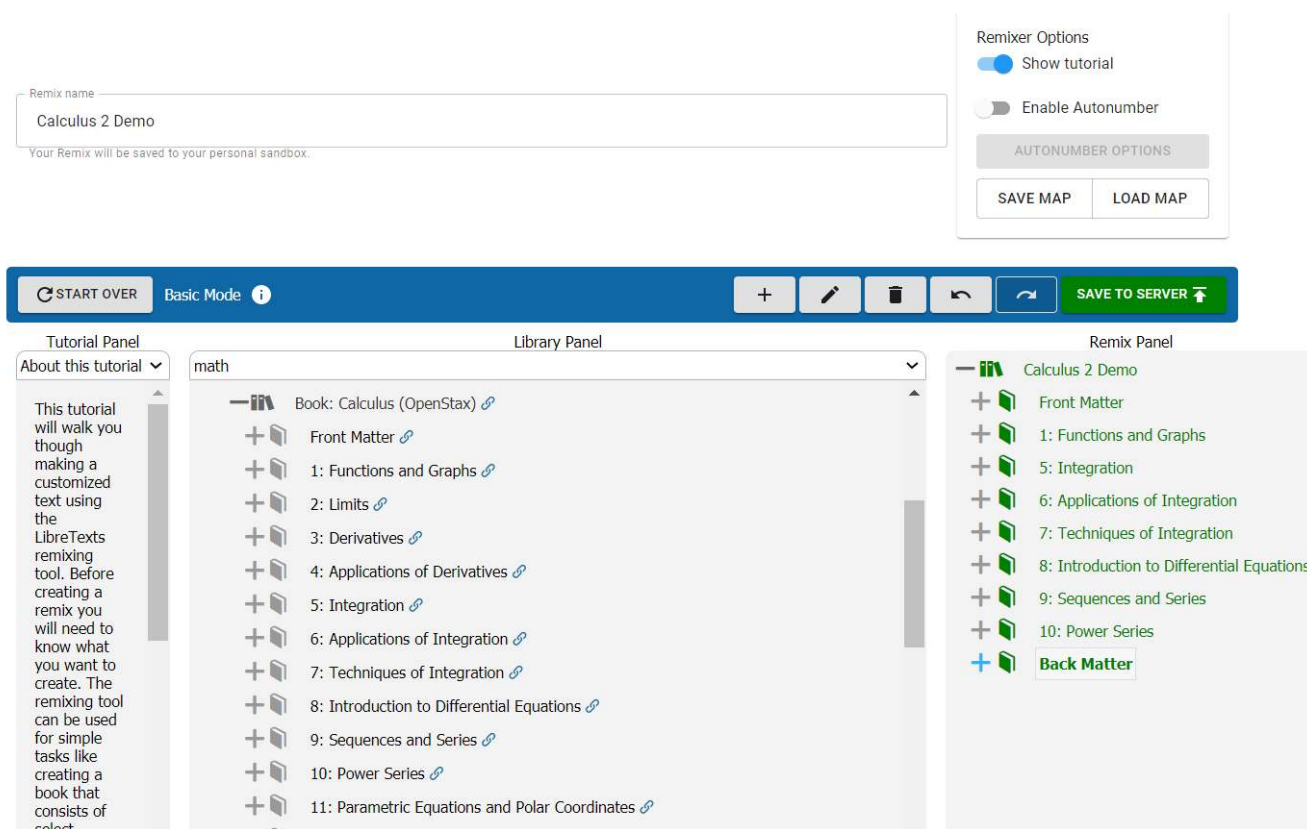
The **Autonumber** feature can be helpful, particularly if you are mixing content from multiple books or not using all the sections in some chapters of the original book. If turned on, it will facilitate the numbering of your chapters and sections to automatically start with Chapter 1 and Section 1.

But occasionally, Autonumber may adjust the numbering in ways that do not match your desires (e.g., if you want to start with Chapter 12). In that case, turn it off and go from there. You can turn it on or off at any time, but when it is on, it will take over and renumber all sections in your Remix.

Now find a book in the Library Panel on the left from which you wish to reuse content. Once you find it, you have several options.

- You can click and drag on the entire book, dragging it just above the top title layer in the Remix Panel on the right. This will allow you to copy the entire book all at once.
- You can click and drag a whole chapter at a time and drop it below the top title level of the Remix Panel, placing it in the order you wish it to appear in the book.
- You can also simply click and drag one section at a time and place it in your remixed book where you wish it to appear.

In the example shown below, a custom book was made for a Calculus 2 class from middle chapters of the OpenStax Calculus text in the Bookshelves. Note that Autonumber needed to be turned off in order to maintain the chapter numbers 5 - 10 rather than automatically converting them to chapters 2 - 7.



The screenshot displays the LibreTexts Remix interface. At the top, there's a 'Remix name' field containing 'Calculus 2 Demo' and a note 'Your Remix will be saved to your personal sandbox.' To the right, the 'Remixer Options' panel shows 'Show tutorial' as a toggle switch and 'Enable Autonumber' as a toggle switch that is currently turned off. Below these are 'SAVE MAP' and 'LOAD MAP' buttons.

The main interface is divided into three panels:

- Tutorial Panel:** Contains a dropdown menu 'About this tutorial' and a text area with instructions on how to use the remixing tool.
- Library Panel:** Displays a list of books and chapters. The selected book is 'Calculus (OpenStax)'. The chapters listed are: Front Matter, 1: Functions and Graphs, 2: Limits, 3: Derivatives, 4: Applications of Derivatives, 5: Integration, 6: Applications of Integration, 7: Techniques of Integration, 8: Introduction to Differential Equations, 9: Sequences and Series, 10: Power Series, and 11: Parametric Equations and Polar Coordinates.
- Remix Panel:** Shows the structure of the custom book. It includes 'Calculus 2 Demo' at the top, followed by 'Front Matter', '1: Functions and Graphs', '5: Integration', '6: Applications of Integration', '7: Techniques of Integration', '8: Introduction to Differential Equations', '9: Sequences and Series', '10: Power Series', and 'Back Matter' at the bottom.

Figure 2.1.2: A Calculus 2 Remix with Autonumber off.

If you create any sections you do not want, or if you did not click Start Over to clear the default chapters, you can use the delete button (a trash can icon) to delete them. There are undo and redo buttons, and a pencil icon to allow you rename sections or modify other settings. Many of these are more advanced settings, and it's recommended that you leave them at their default values unless you know what you are doing (or just want to experiment with them to see what they do).

If you already know there are a few Sections that you plan to write yourself, you can add these blank pages now and title them, using the button with the plus sign on it.

But these will be easy to add later as well. You will just go to the Chapter page in which you wish to add a Section and click the **New** button (which is just to the left of the Remixer button) on the author bar, select a Page/Section, enter a title for the page, save it (before editing it) and then click the Edit button again to add your content. (The first save sets some important settings.)



Just before publishing your new textbook, we recommend that you use the **Save Map** button to save your new Remix. This makes it easy to share the Remix with someone else or to load it back in to create another version of the text. Most of the time, we will not need this again, but it allows you to keep a record of your Remix that you could review later, if you desire.

Once you are happy with the Chapters and Sections in your new textbook, it's time to publish it to your Sandbox folder. Click on the green **SAVE TO SERVER** button. You should see something like the following screen:

[OER Remixer](#)

The Remixer works best on Chrome browsers; if you do not see anything below this text within 15 seconds please switch to Chrome.

The OER Remixer tool allows the rapid assembly of customized Remixes from existing sources on our comprehensive and ever-growing libraries. See the Remixer Tutorial in Chapter 7 of the [Construction Guide](#) for more details for an explanation of the Remixer's interface and videos to a walkthrough videos of how to do basic tasks with the OER Remixer. Your [Remixing Map](#) is stored automatically on your computer as you build, so you do not have to complete your Remix in one setting. If you switch to a different computer, you will want to save the Map.

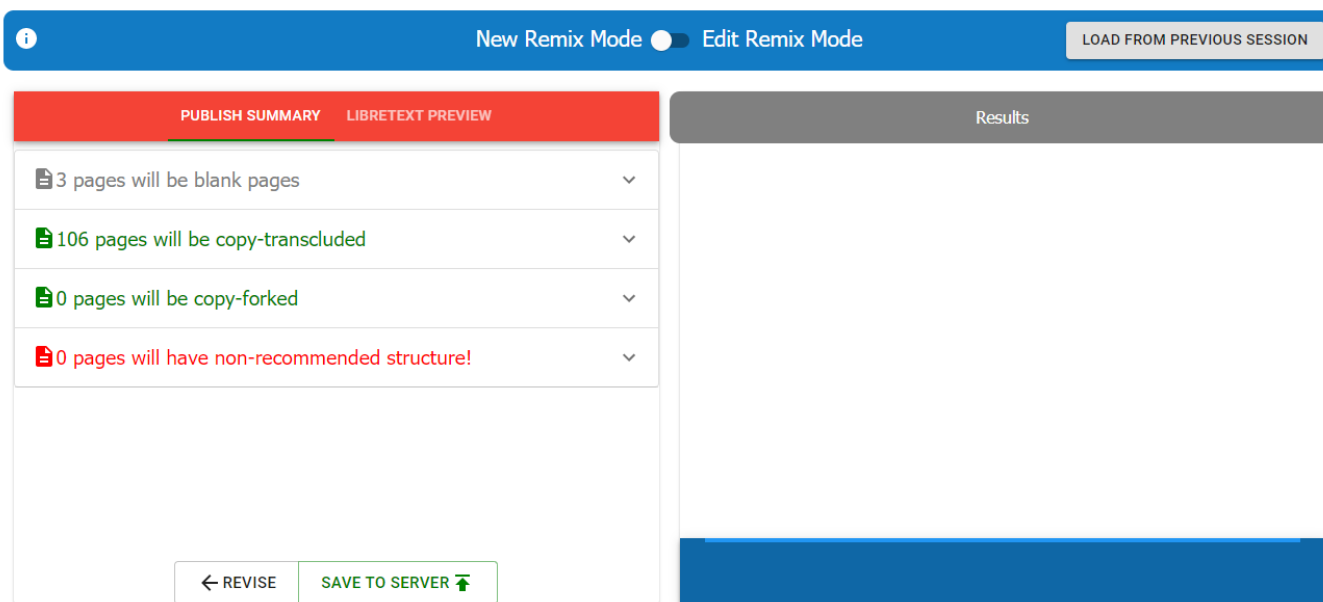


Figure 2.1.3: Summary view of the Remix before final publishing step.

The left panel displays a summary of the pages being created.

Now click the **SAVE TO SERVER** button again and you will see the progress being made on creating your new textbook, one section/page at a time. The results should look something like this:

The OER Remixer tool allows the rapid assembly of customized Remixes from existing sources on our comprehensive and ever-growing libraries. See the Remixer Tutorial in Chapter 7 of the [Construction Guide](#) for more details for an explanation of the Remixer's interface and videos to a walkthrough videos of how to do basic tasks with the OER Remixer. Your [Remixing Map](#) is stored automatically on your computer as you build, so you do not have to complete your Remix in one setting. If you switch to a different computer, you will want to save the Map.

Figure 2.1.4: Published Remix showing a log of completed steps and links to view the text, etc.

Note the text on right side of the blue bar in the lower right corner of the window, "Contact info@libretexts.org to move this Remix to a Campus Hub." As mentioned before, once you are ready for your textbook to go "live", you can have it published to your Campus folder in the Campus Bookshelves. If one does not yet exist for your institution, one will be created for you. Note that the book does NOT need to be completed before you place it in your Campus Hub. You will likely be continuing to customize it each semester you use it.

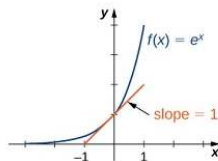
Now click the white text on the left side of the blue rectangle, “Your new Text will be available here”. This should open your new textbook in your Sandbox! And now you can begin to customize it. See image below for this textbook.

Moving your Remix to the Campus Hub

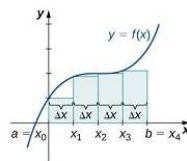
As user with an Instructor account, contact info@libretexts.org once you are ready to move this Remix to a Campus Hub.



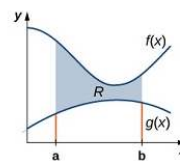
Front Matter



1: Functions and Graphs



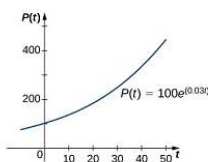
5: Integration



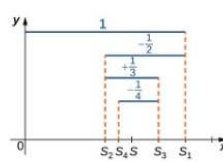
6: Applications of Integration



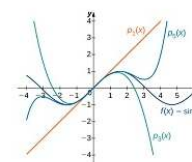
7: Techniques of Integration



8: Introduction to Differential Equations



9: Sequences and Series



10: Power Series

Figure 2.1.5: Image of the published Calculus 2 Demo Remix textbook

Note that a message is also displayed on the remix's title page reminding you how you can request for it to be moved to your Campus Hub.

Re-Remixing an Existing Textbook to Adjust its Contents:

Once you have created a course textbook, there are several options for adjusting its contents. You can, of course, add your own new material or “fork” and customize the existing sections. You can add new transcluded/mirrored content by using the Reuse Content option in a new Section/Page that you can add directly in your Chapter folders.

But it's also possible to use the Remixer to **Re-Remix** the book (or edit the remix), adjusting which sections you include and perhaps adjusting the section numbers and names all in one place. For example, when I created my MCC Intermediate Algebra LibreText, I realized that I needed to add a couple of additional sections to my book from another source book after I had already published it. This was quite easy to do using this feature!

Now let's say we want to remove Section 8.5 from the Calculus 2 book we created above and add an Appendix with Trig identities, etc.

1. First we need to enter the Remixer again. Click on the Remixer button from any page. Now move the selector button from **New Remix Mode** to **Edit Remix Mode**. See Figure 2.1.6 below.

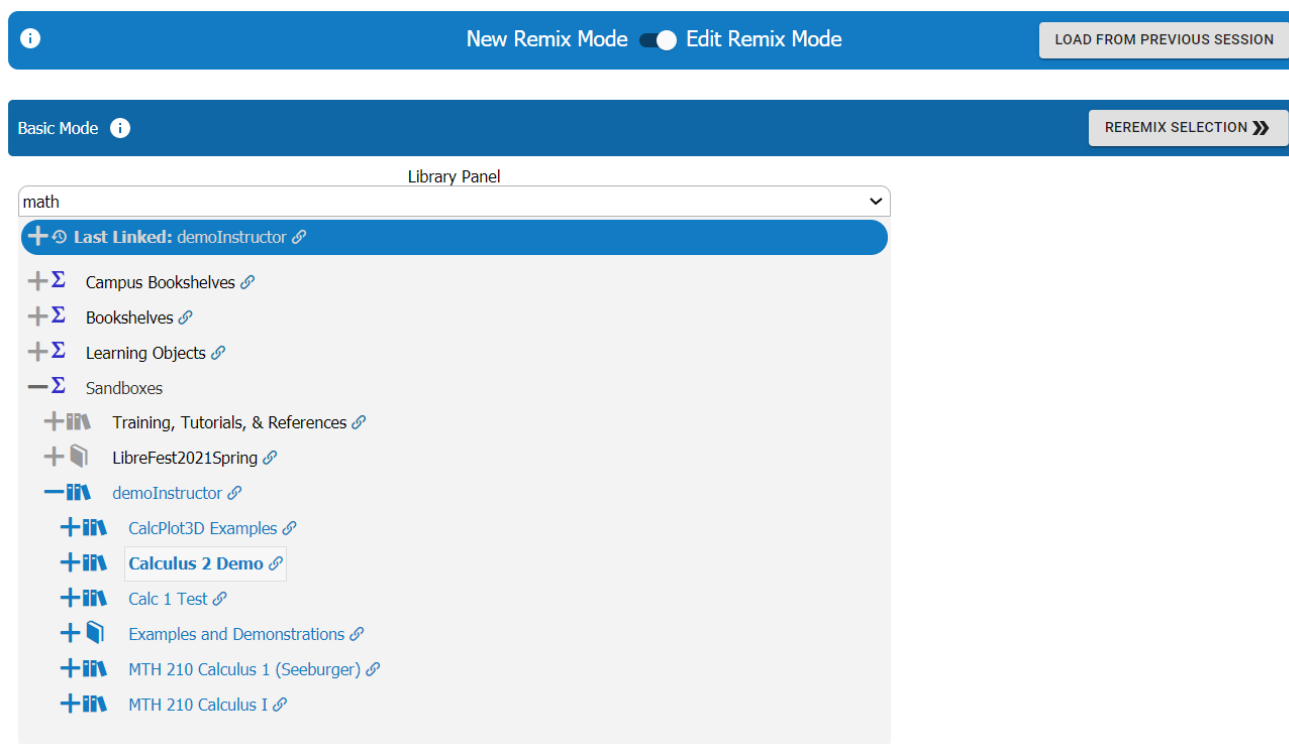


Figure 2.1.6: Re-Remixing the Calculus 2 Demo text.

2. The Remix window will change to appear like Figure 2.1.6 above.
3. Use the Library Panel on the left side to find the textbook in your Sandbox (or possibly in your college's folder in Campus Bookshelves) for which you wish to adjust the Remix. Click on it to select it and then click on the REREMIX SELECTION >> button to the upper right corner of the Remix control bar.
4. Now you can add and remove sections quickly. You can double-click on any sections you wish to rename (or renumber, if autonumber is off).

Note that deleted sections/pages are shown crossed out in red. Added sections are shown in green (even if renamed).

Sections that have only adjusted numbers or names would be shown in yellow.

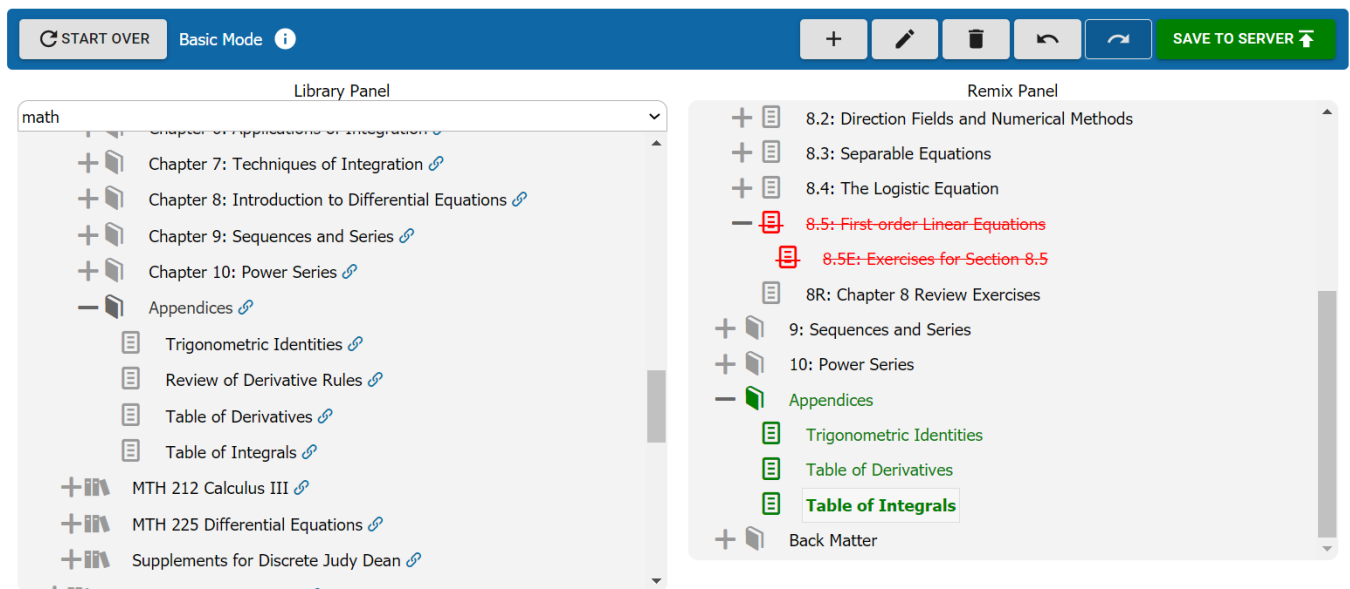


Figure 2.1.7: Editing the Calculus 2 Demo text remix by deleting Section 8.5 and adding Appendices

6. Once you are happy with the new version of your remix, click the green **SAVE TO SERVER** button on the right end of the Remixer control bar. A page like the following should appear:

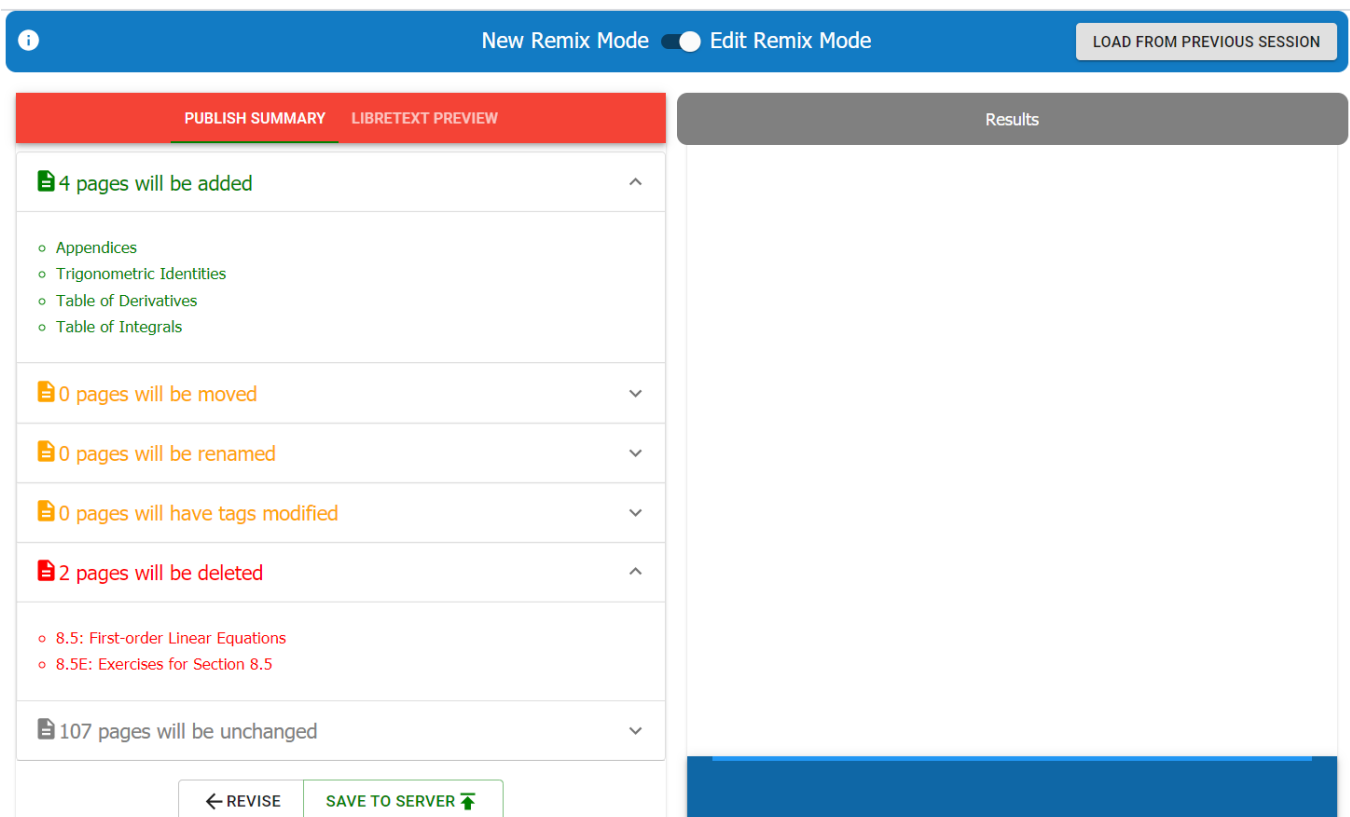


Figure 2.1.8: Summary page showing changes just before final publishing of re-remix

Note that a summary of all changes should appear here. We can click the downwards pointing chevrons to see details of the changes. (They change to upwards pointing chevrons to indicate you could then close these details.) See Figure 2.1.8 above.

7. Once you are ready to publish your adjusted Remix, click the **SAVE TO SERVER** button again.

Again a summary of the tasks done in adjusting your text should appear in the panel on the right. See below for an example:

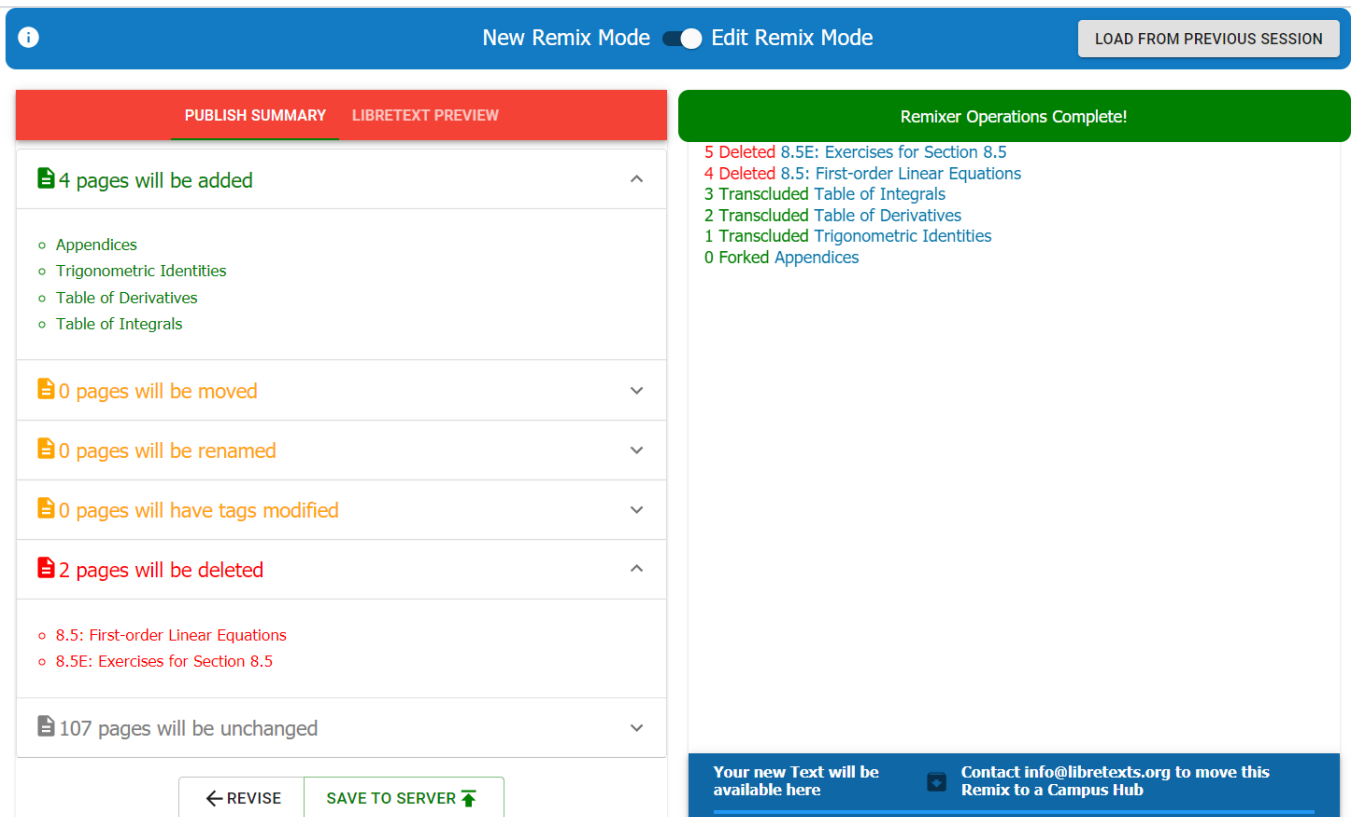


Figure 2.1.9: Summary of steps taken in publishing re-remix of Calculus 2 Demo text

9. Now click the blue text in the black rectangle in the lower right corner of the window, “Your new Text will be available here”. This should open your newly revised textbook in its home location (either your Sandbox or your Campus Hub).

Check it over to see that the changes you made look as you expected them to look.

Let us know if you have any questions on this process!

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2.2: Adding WeBWorK Problems to LibreTexts

Adding WeBWorK problems to check for student understanding at appropriate places in your LibreTexts can keep students engaged and help them work out the details of definitions, concepts, and theorems.

Although Adapt can allow you to incorporate graded "summative" problems (WeBWorK, H5P, MyOpenMath, etc.) into your LibreTexts, this tutorial will focus on various ways to insert WeBWorK problems into LibreText pages for formative feedback, i.e., to help students check and refine their understanding.

Browsing Available WeBWorK Problems

Two methods to browse available WeBWorK problems are:

1. Use the Library Browser in any WeBWorK course on a WeBWorK server
2. Use the LibreTexts Query Library to locate WeBWorK problems

Library Browser: Once logged into a WeBWorK course with appropriate permissions, you can use the Library Browser link to search the contents of this library for appropriate problems to insert in your LibreTexts. Here you will need the OPL address to insert a WeBWorK problem into a LibreTexts page. We'll discuss this more below.

If you do not have access to a WeBWorK server, it is possible that you could use the LibreTexts WeBWorK server to explore the OPL in this way. If you are interested in this possibility, please request access.

You may find this page about the WeBWorK OPL (Open Problem Library) helpful: https://webwork.maa.org/wiki/Open_Problem_Library

Browsing Query: First, you will need to access the LibreTexts [Query WeBWorK library page](#). Then you can use the topical folder names to dig through the contents of the OPL (Open Problem Library) that are housed in Query. Note that what you'll need to insert a WeBWorK problem from Query is its **page ID**. We'll discuss this more below. Also note that you do NOT need to be logged in to Query to browse problems.

One other thing to consider is that browsing Query may allow you to find other types of problems as well (not just WeBWorK). And these can be inserted into LibreTexts pages using the same method as we show for a WeBWorK problem below.

Inserting Formative WeBWorK Problems into a LibreTexts Page

Even when used formatively, there are currently three methods to insert WeBWorK problems into your LibreTexts pages. Each method has its advantages and the method you choose may depend to some degree on how much experience you have with WeBWorK.

Inserting a WeBWorK Problem Using its OPL (Open Problem Library) Address

This method is great for those who have access to WeBWorK and either know which problems they wish to use from their own assignments or can use the Library Browser in WeBWorK to locate appropriate problems and obtain their OPL address.

Say we found a problem in the OPL with the following address that we want to insert.

Library/Michigan/Chap7Sec1/Q77.pg

Select Elements > Templates > Template:QueryWebWork

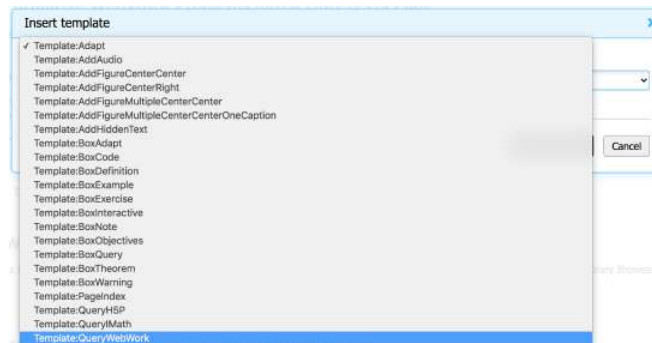


Figure 2.2.1: Selecting the WeBWorK template to use with an OPL address.

Once the template is added to the page, all you have to do is change the address of the problem to the one you located in the previous step. Note that you will need to click on the + sign on the DekiScript object to open the attributes for the template. See Figures 2.2.2 and 2.2.3 below.



Figure 2.2.2: New QueryWeBWorK template

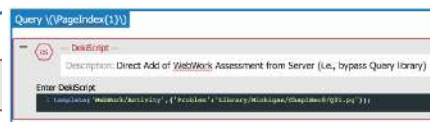


Figure 2.2.3: QueryWeBWorK template opened

Replacing the default OPL address in the code with the OPL WeBWorK problem address we found above gives us:

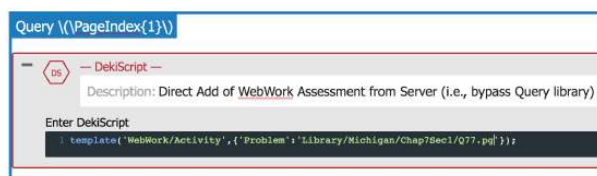


Figure 2.2.4: QueryWeBWorK template with new OPL problem address

Once the page is saved, this will render the problem as:

Note that this problem is labeled as a Query even though it did not come from the Query database. This is intentional, as these types of interactive questions are being called Queries in LibreTexts.

Inserting a WeBWorK Problem Using its Query ID

This method may be easier for anyone who is not as familiar with WeBWorK and/or who does not have access to a WeBWorK course and the OPL Library Browser. It uses the page ID for the corresponding problem in the LibreTexts Query problem database.

As mentioned above, another advantage of this approach is that it can be used to insert problems of any type that you find in the Query problem database. Just find the page ID and insert it in the template as we show below and the problem will render in your LibreTexts page.

Now from the Query database, let's say we found the following problem:

BDH-1-7-01.pg

Last updated: Mar 2, 2020 Page ID: 21088

◀ Bifurcations | BDH-1-7-03.pg ▶ PDF Readability Cite this page Donate

Determine the bifurcation value(s) for the one-parameter family

$$\frac{dy}{dt} = y^2 + k.$$

$k =$ [help \(numbers\)](#)

Determine which differential equation corresponds to each phase line. You should be able to state briefly how you know your choices are correct.

? ▾ 1. k equal to the bifurcation value

? ▾ 2. k smaller than the bifurcation value

? ▾ 3. k larger than the bifurcation value

Preview My Answers Submit Answers

Figure 2.2.5: WeBWork problem in Query

Note the **Page ID: 21088** just below the problem title. We will need this number to identify this problem in the template.

Now select Elements > Templates > Template:BoxQuery

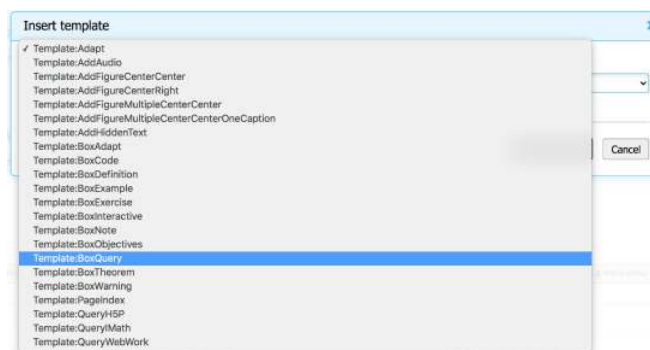


Figure 2.2.6: Selecting the BoxQuery template to use with a Page ID.

Once the template is added to the page, all you have to do is change the Page ID of the problem to the one you located in the previous step. Note that you will need to click on the + sign on the DekiScript object to open the attributes for the template. See Figures 2.2.7 and 2.2.8 below.



Figure 2.2.7: BoxQuery template



Figure 2.2.8: BoxQuery template opened

Replacing the default Page ID in the code with the Page ID for the WeBWork problem we found in the Query database (21088) above gives us:

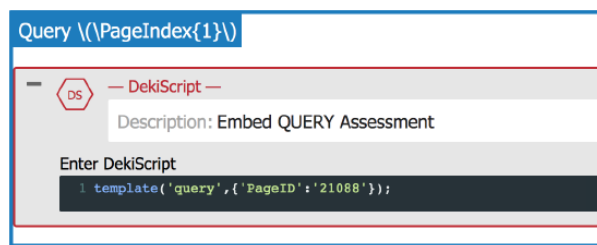


Figure 2.2.9: BoxQuery template with new Page ID

Once the page is saved, this will render the problem as:

Note that we can update the PageIndex appropriately as we insert new Query problems.

Inserting a WeBWorK Problem from Your own WeBWorK Server

This method is ideal for inserting your own created or customized problems in a LibreTexts page. It is currently still the least polished in its presentation, although this should soon be standardized to look like the other two methods above, using a new Template. This page will be updated once this is accomplished.

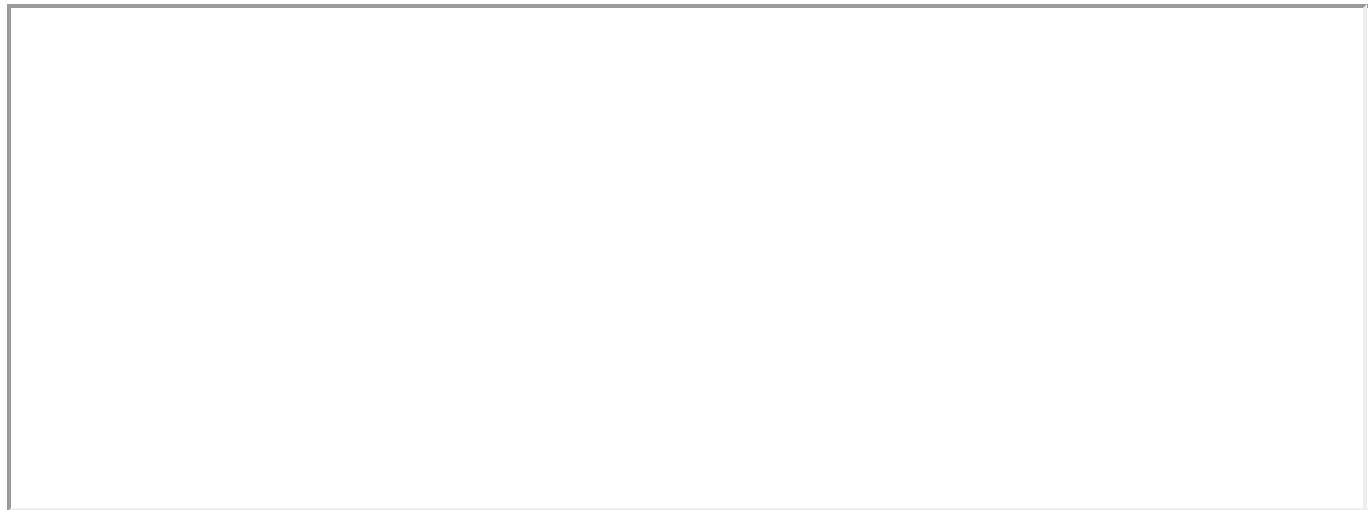
At this point, there is not a template for this method. We will be editing the HTML version of the page directly.

While editing the LibreTexts page that you wish to add a WeBWorK problem to, click the **</> HTML** button in the upper-right corner. This button toggles the editing mode between WYSIWYG and HTML. We can accomplish most editing tasks in LibreTexts without worrying about the HTML, but for this WeBWorK problem option, we need it.

You can copy-and-paste the following code to modify it appropriately to create your linked WeBWorK problem. The base WeBWorK server URL has been formatted to show it is code, but the rest of it should copy-and-paste correctly.

```
<div><iframe                                frameborder="1"                                height="250"                                src="
https://demo.webwork.rochester.edu/webwork2/html2xml ?
&answersSubmitted=0&
&sourceFilePath=Problems/CalcIII/DivCurl/ur_vc_12_9.pg&
&problemSeed=123567&
&courseID=seeburger_course&
&userID=daemon&
&course_password=daemon&
&showSummary=1&
&displayMode=MathJax&
&problemIdentifierPrefix=102&
&language=en&
&outputformat=sticky" width="100%"></iframe></div>
```

This code will generate the following WeBWorK problem, served up from an external WeBWorK server. Although it is not really a custom problem, it could be.



Note that you can specify your desired WeBWorK server and the path to the problem inside the course you set up for serving these problems. The courseID is the course name, and you need to create a user named “daemon” with password “daemon” and permission set to “login_proctor” in that course. Alternatively, you could use "anonymous" instead of "daemon". Just be consistent.

The path can be a Library problem too, although we recommend you use the QueryWebWork template described above unless you wish to use custom problems.

You can use the Library Browser in the WeBWorK course you use to locate any problem available there, even in your local customized problem sets.

Putting these WeBWorK Problems in a Query Box

If you wish it to look more like the other problems, we can use the BoxQuery template for that, although there may soon be a custom template for this feature as well with appropriate parameters.

To get the problem inside of a Query Box, I added the BoxQuery template, then switched to HTML mode and replaced the code:

```
<p class="mt-script-comment">Embed QUERY Assessment</p></br>
<pre class="script"></br>
template('query',{ 'PageID': '35292' });</pre>
```

with the HTML code for the desired WeBWorK problem.

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2.3: Adding H5P Problems to LibreTexts

Adding interactive problems/activities using H5P, WeBWorK, MyOpenMath or straight from the LibreStudio (H5P), Query, or Adapt can make your LibreTexts more interactive and provide immediate feedback to students on their understanding. Note that Adapt is a full online homework system that will allow you to grade student work, either completed in the Adapt interface or right in your LibreTexts. But this tutorial is focused on how to use these problems in a formative, non-graded way.

In this tutorial, we will cover how to add formative (concept check) H5P activities to your pages. First we'll cover how you can review the available H5P elements in the LibreStudio library, although there are not many math problems there yet. Then, although it is beyond the scope of this tutorial, we will briefly discuss how you can locate and import H5P activities you find elsewhere or even create your own H5P elements to add to the library!

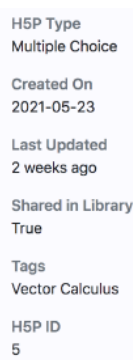
Note that there are not yet any math H5P activities/problems in Query, although this is one place you'll find available WeBWorK problems. In fact, since we have LibreStudio, we will not need to use Query for H5P activities.

Also note that this page is an expanded version of [Section 5.7 in the Construction Guide](#) that is focused on the LibreTexts Math library.

Browsing H5P Activities in LibreStudio

You can browse existing H5P content on LibreStudio and insert selected H5P activities into your LibreTexts pages without logging in.

Go to: <https://studio.libretexts.org>. You can use the filters shown on the left to narrow the search. If you select Mathematics, you will find at least two problems. Clicking on the title of a problem, you will see a column of attributes. In order to insert an H5P activity into a LibreTexts page, we will need the H5P ID number shown at the bottom of this list. See the figure below.



H5P Type
Multiple Choice
Created On
2021-05-23
Last Updated
2 weeks ago
Shared in Library
True
Tags
Vector Calculus
H5P ID
5

Figure 2.3.1: The attributes of an H5P activity in LibreStudio

Inserting an H5P Activity into a LibreTexts Page

The H5P template lets authors embed the H5P activity into a page (page > elements > template).



Figure 2.3.2: Selecting the template: Template:QueryH5P

Once the template is added to the page, all you have to do is change the ID number of the activity here to the one you located in the previous step (in the place of 5 in below template).

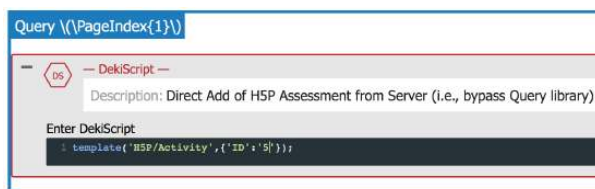


Figure 2.3.3: Adjusting the ID number to correspond to the problem you desire.

Logging in to LibreStudio

In order to import or create new H5P activities on LibreStudio, you will need to log in using a user account. If you do not yet have an account, you can register for one here: <https://studio.libretexts.org/user/register> using this LibreStudio registration code: **"LibreFest2021"**

We are in the process of tying all components of the LibreVerse together into one central authentication, but for now individual accounts are needed.

Importing H5P Activities into LibreStudio

Many H5P activities have been created for math on other H5P servers around the world. A Google search for H5P and Math will bring up a number of places to search. If you find an H5P activity you'd like to use or modify, most have a **Reuse** link to download it to your computer. You can then import the activity into LibreStudio by clicking on the **New H5P** button and then selecting the **Upload** option instead of **Create Content**. See Figures 2.3.4 and 2.3.5 below.



Figure 2.3.4: Click on the New H5P button to the left of the Author Menu.

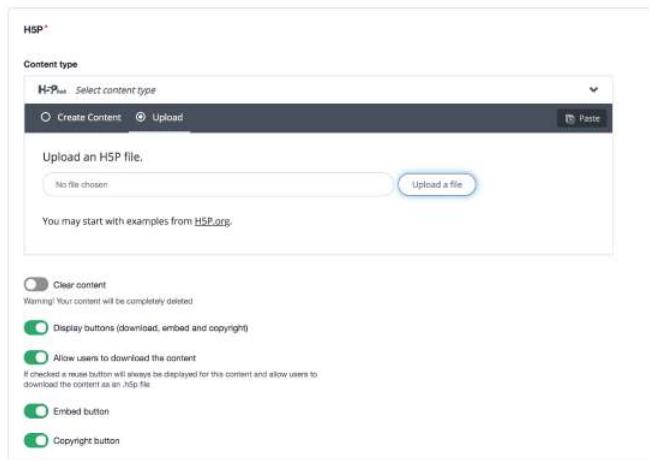


Figure 2.3.5: Clicking on the Upload option will display this dialog.

You can then use the **Upload a file** button to upload the H5P activity you saved to your computer from another location on the web. Note that you have a few options for what action items and information the H5P activity will display. If you import activities created by others, please be sure to give the authors proper credit.

Once you've imported an activity, you can either insert it into your LibreText as described above or you can modify it before doing so.

To modify an H5P activity you have either created or imported, use the Author menu to go to your Author Dashboard. Then locate the H5P activity you'd like to modify and click on the **Edit this resource** button near the right side of the activity object.

Creating New H5P Activities in LibreStudio

In the likely event you cannot find a problem that does exactly what you have in mind, you can create your own H5P activities right in LibreStudio!

See the H5P project site (<https://h5p.org/>) for full instructions on this process, and look at example problems there, in LibreStudio, and elsewhere to get ideas.

You will use the New H5P button in Figure \(\PageIndex{4}\) above and then follow the instructions on the H5P site to create a new activity using the Create Content option, as shown in Figure \(\PageIndex{6}\).

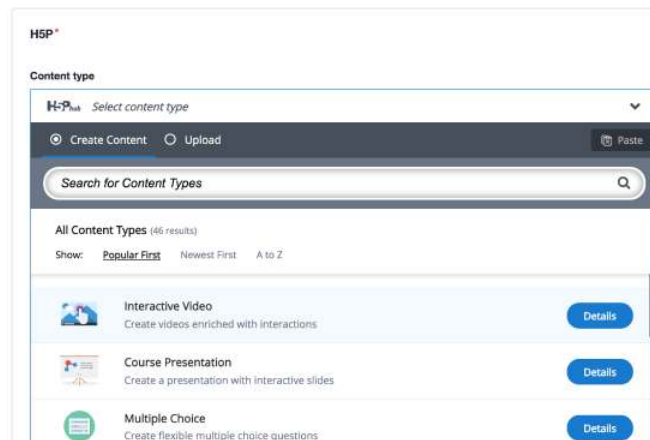


Figure 2.3.6: Use this dialog to create a new H5P activity.

Example H5P Activities

1. A Divergence problem from Calculus 3 (by Paul Seeburger).
2. A group of algebra problems presented as one H5P activity (by Bob Belford).

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2.4: Hypothesis Annotation

The following instructions on how to use the Hypothes.is Annotation system are taken directly from the Course Information of a Chemistry class taught by Bob Belford at the University of Arkansas Little Rock.

Hypothes.is Web Annotations

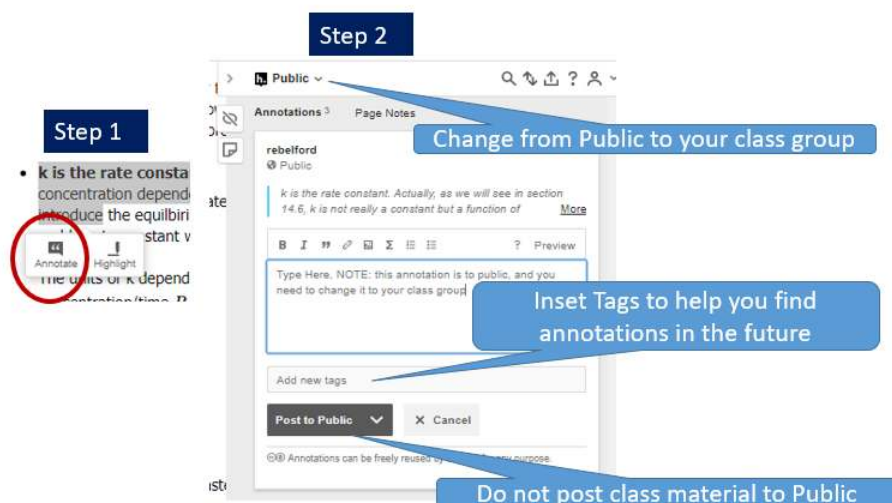
This class will use the Hypothes.is web annotation service that is integrated into LibreText. You need to go to <https://web.hypothes.is/> and create an account. Please start your username with your last name so you can easily be identified for grading purposes. You should follow it with an underscore and then anything you want, so my username could be belford_123. You will then need to join the class group, which is a private group. You will be sent an email invitation or contact your instructor, and you should only make annotations in the group.

The following YouTube gives a quick demonstration on the use of the Hypothes.is Web Annotation service.



Making Annotations

To make an annotation you simply highlight the text you want to annotate, choose "Annotate" and write in the overlay. Note, the first time you open up a page it will post to "Public" and you need to change that to your class group. Once you have started posting to the class group that will be the default option, but initially the default is public.



highlight text and write in the overlay. (Copyright; Belford, cc.0)

Figure 2.4.1: To annotate you simply

If you tag your annotation you can easily find it by going to your homepage in hypotheses.is and then filtering by tags. So you may want to make tags like "exam 1", or "nomenclature". If you then filter with your hypotheses.is user name and exam 1, you see those items you tagged. If you just do exam 1, you filter for everything the class tagged exam 1. You can then click the contextual link by the annotation, and hypotheses.is will open that page, navigate to the highlighted text and display the annotation. (Note: In LibreTexts the highlights are hidden by default, and you need to click the "eye" with the slash over it (figure 2.4.2)

Using the Hypothes.is Overlay to read discussions

By default the hypotheses.is overlay is closed and you do not see the annotations.

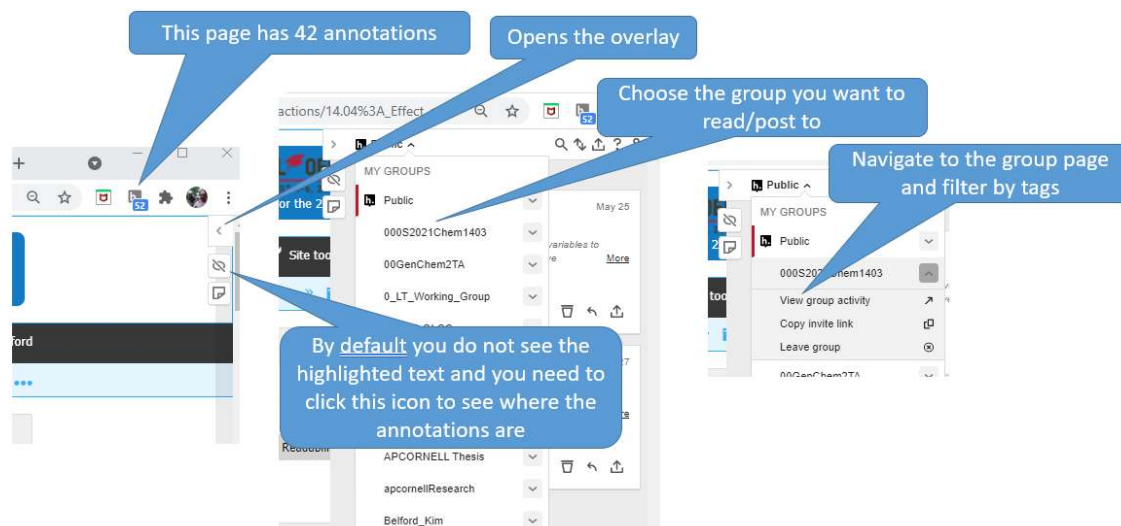


Figure 2.4.2 By

default the overlay is closed and annotations are hidden. This image shows how to pick a group and view group activity (Copyright; Belford CC0)

Figure 2.4.2 shows how to pick a group and view group activity.

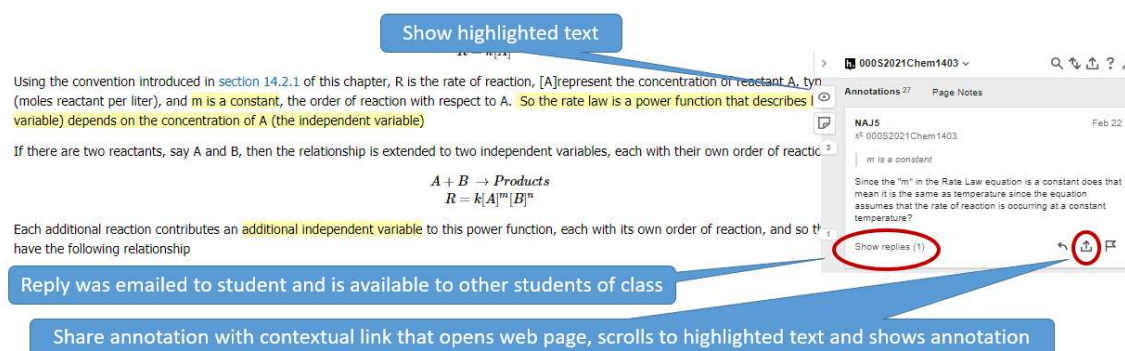
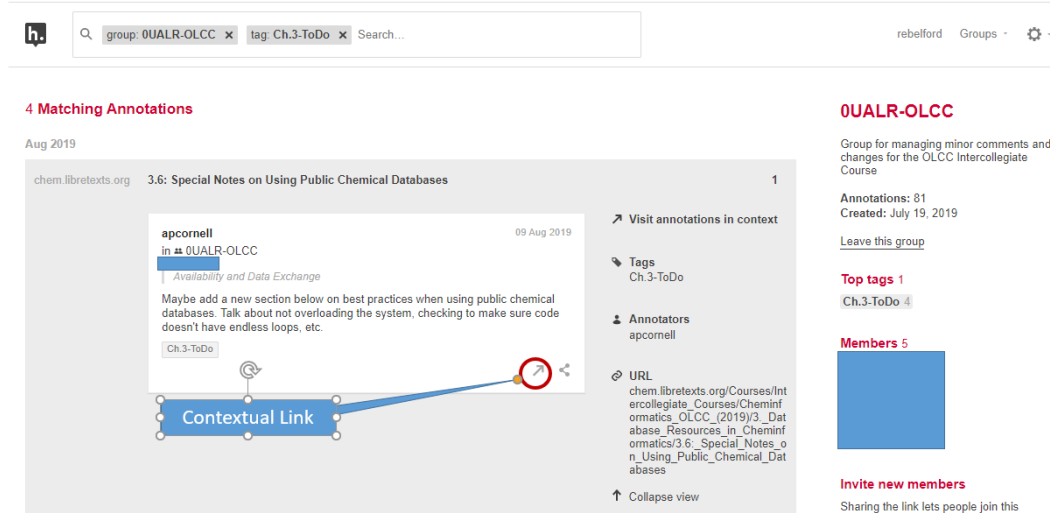


Figure 2.4.3

Annotation and highlights text being displayed. (Copyright; Belford CC0)

Using tags

Tags are a very powerful way of organizing your notes and Hypothes.is has different types of tags. Your class group is a tag, and when you click on your hypotheses.is group activity (figure 2.4.2) you only see items posted to your class (note the first tag in the search filter of figure 2.4.4 is a group tag. If you then click your name you see those you have posted to that group. If you remove the group you see all the annotations you have posted anywhere. If you generate a tag based on a topic or exam, you can then easily find that information. Figure 2.4.4 shows a filter using two tags that resulting in four items in a student's "To Do list" for chapter 3 of a cheminformatics class



4 Matching Annotations

Aug 2019

chem.libretexts.org 3.6: Special Notes on Using Public Chemical Databases 1

apcornell
in 0UALR-OLCC
Availability and Data Exchange
09 Aug 2019

Maybe add a new section below on best practices when using public chemical databases. Talk about not overloading the system, checking to make sure code doesn't have endless loops, etc.

Ch.3-ToDo

Contextual Link

Visit annotations in context

Tags
Ch.3-ToDo

Annotators
apcornell

URL
chem.libretexts.org/Courses/Intercollegiate_Courses/Cheminformatics_OLCC_(2019)/3_Database_Resources_in_Cheminformatics/3.6_Special_Notes_on_Using_Public_Chemical_Databases

Collapse view

0UALR-OLCC

Group for managing minor comments and changes for the OLCC Intercollegiate Course

Annotations: 81
Created: July 19, 2019
Leave this group

Top tags 1
Ch.3-ToDo 4

Members 5

Invite new members
Sharing the link lets people join this group.

Figure 2.4.4 Hypothes.is

search filtered by the group tag 0UALR-OLCC (which was a class group) and a student's tag "Ch.3-ToDo". (Copyright; Belford CC0)

If the student clicks the contextual link hypothes.is will open the webpage that was highlighted, scroll down to the highlighted section and show the annotation in the overlay. This allows students to organize their notes on LibreText and quickly find content. If you get the chrome plugin you can even annotate material outside of LibreText and connect it to your material and notes within LibreText, as long as the material does not require a login to access. It should also be noted that you can not highlight hidden text within LibreText (like the answers to exercises), and if you have a question on the answer to an exercise, you should highlight the question, not the answer.

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2.5: Inserting Dynamic Figures using CalcPlot3D

Overview

CalcPlot3D is a free online visualization tool originally developed to help students learn concepts in multivariable calculus, but now offering visual tools that can be useful in many STEM courses. Using CalcPlot3D, authors of LibreTexts can create and insert dynamic figures of two basic types:

1. Rotatable 3D dynamic plots with no external controls
2. 2D and 3D dynamic plots with scrollbars and some other controls

See examples in Figures 2.5.1 - 2.5.3 below.

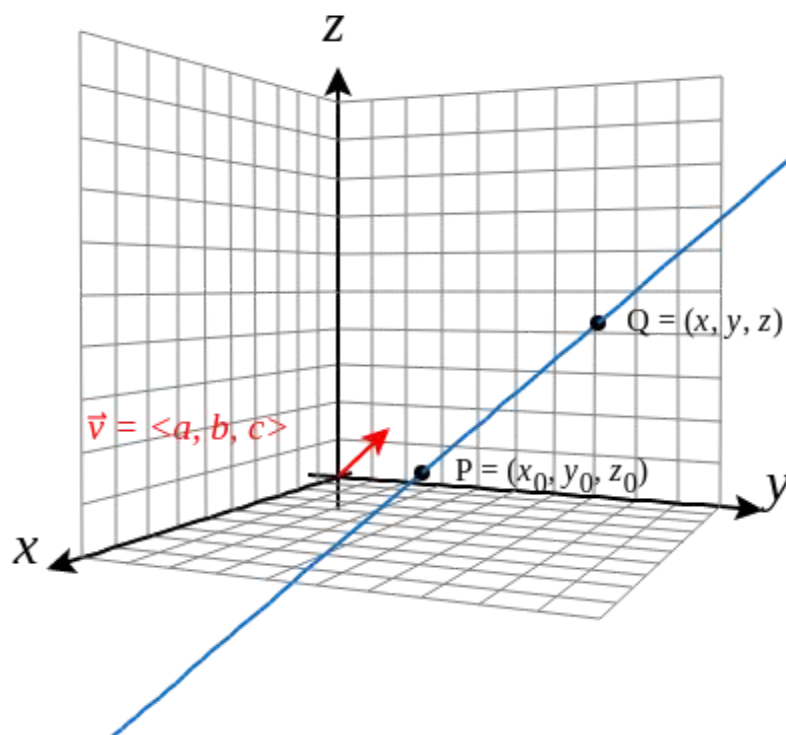


Figure 2.5.1: A three-dimensional line in space (no controls)

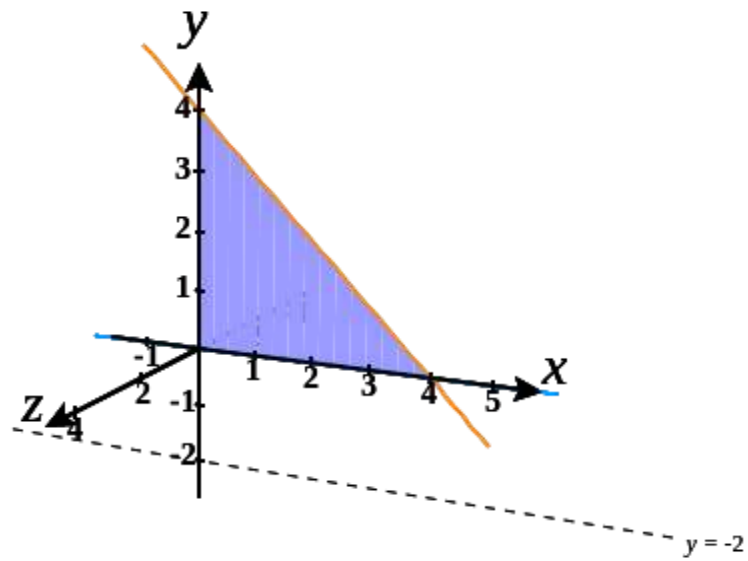


Figure 2.5.2: A demonstration showing the generation of a volume of revolution (includes controls)

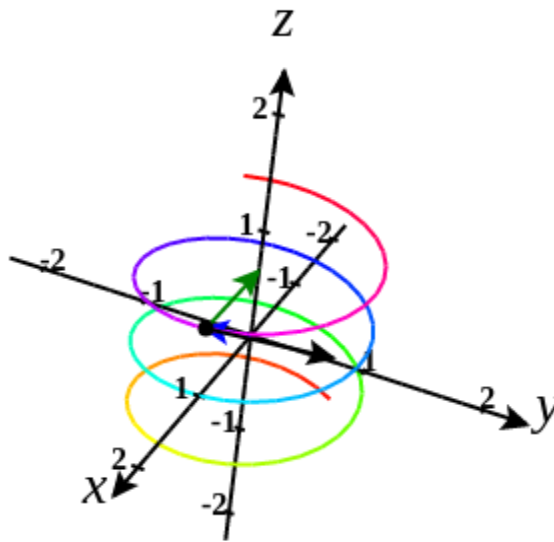


Figure 2.5.3: Animating motion along a helix (includes controls)

As you can see in these examples, both types of dynamic figures can be helpful. Sometimes a rotatable 3D plot is all that is needed. But in other situations, adjusting various parameters with scrollbars, textboxes, and checkboxes can greatly aid student understanding.

Inserting Pre-made CalcPlot3D Dynamic Figures from the Learning Objects Library

This is the easiest way to get started using CalcPlot3D dynamic figures, since it only requires you to browse the Learning Objects library, find a dynamic figure you'd like to use, and then to use the **Content reuse** option on the **Elements** menu to insert it into your LibreTexts page. But this approach does not allow you to adjust the parameters of the interactive figures. You get exactly what's there already. So you may wish to continue to creating your own dynamic figures using CalcPlot3D.

Steps to inserting an existing CalcPlot3D dynamic figure into a LibreTexts page:

1. Browse the [CalcPlot3D Interactives library](#) (this link is for the one on the LibreTexts Math Library) and find a dynamic figure you'd like to use in your custom page.
2. Select **Elements** > **Content reuse** from the edit menu. Then click the + in front of **Home**. You should now see the **Learning Objects** library. Click on the + in front of **Learning Objects** and navigate to find the dynamic figure you found in the

previous step.

You should get an object that looks like the following:

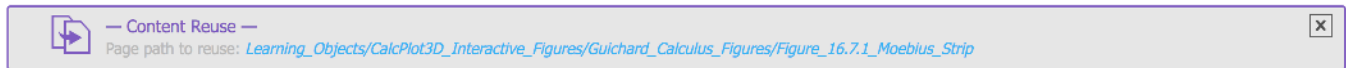
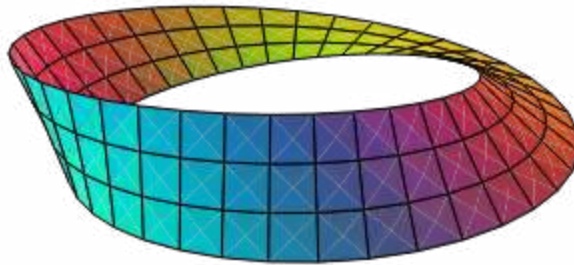


Figure 2.5.4: Content reuse placeholder for a CalcPlot3D dynamic figure when in Edit mode

And renders as:



If you would like to place a CalcPlot3D dynamic figure from the Learning Objects library in a figure, there is a template for that.

Select **Elements** > **Templates** and choose **Template:AddFigureCalcPlot3DReuse** (available on the LibreTexts Math Library). It will generate the following placeholder:

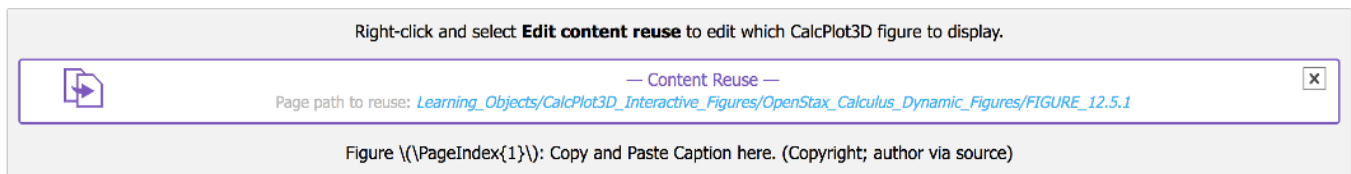


Figure 2.5.5: Template:AddFigureCalcPlot3DReuse placeholder with instructions to edit figure.

You can then follow the instructions at the top of the placeholder to right-click on the content reuse object, select **Edit content reuse**, and adjust the selection to the CalcPlot3D dynamic figure you want to use. Update the figure caption and remove the instructional text at the top of the figure and you'll be all set!

See examples in the [Overview](#) section at the top of this page.

Inserting Pre-made CalcPlot3D Figures from a Different LibreTexts Library

If you decide you'd like to insert a CalcPlot3D dynamic figure from a LibreTexts library other than the one in which you are building your custom text, this can be accomplished using a Cross-Library Reference, the library subject area, and the Page ID number for the CalcPlot3D dynamic figure you have selected.

Say we wish to insert the following figure from the LibreTexts Math Library on a page in another LibreTexts library (say Chemistry or Physics).

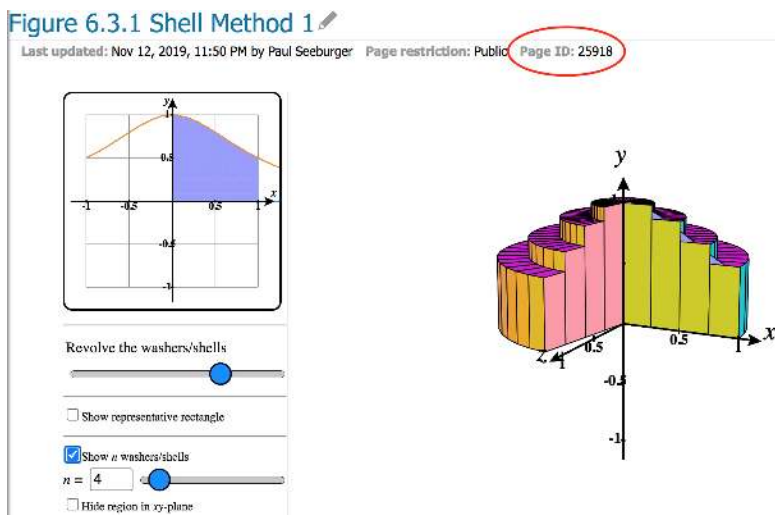


Figure 2.5.6: Static image of a CalcPlot3D dynamic figure from the LibreTexts Math Library, with its Page ID circled in red.

We would need to create a new page, name it, and then save it (before editing it) to set it up with the correct codes. Then we would edit the page again and click on the `</>` HTML button on the right end of the editing toolbar. Enter the following code.

```
<p class="mt-script-comment">Cross Library Transclusion</p>

<pre class="script">
template('CrossTransclude/Web',{ 'Library': 'math', 'PageID': 25918 });</pre>
```

Saving your page should reveal the CalcPlot3D dynamic figure you wanted. This code could also be placed inside a LibreTexts page with other text and figures, or you could set up a collection of figures each in their own page that you could easily place in other pages using the Content Reuse approach described above.

Note

This Cross Library Transclusion code can be used to insert any content from another library into your custom LibreTexts.

Creating your own CalcPlot3D Dynamic Figures using CalcPlot3D (without controls)

In this section, we'll discuss how to generate your own CalcPlot3D dynamic figures using the CalcPlot3D app. As stated above, there are two types, a basic rotatable 3D plot with no controls, and a 2D or 3D plot with controls. Since the first type is easiest to implement, we'll start there and then cover the second variety in the section titled [Creating your own Dynamic Figures using CalcPlot3D \(with controls\)](#) below.

1. Open [CalcPlot3D](#) and work out the figure you wish to include in your LibreTexts page. See the [CalcPlot3D Help Manual](#) for assistance with this.
2. Once you have the 3D plot as you want it to appear in the dynamic figure (including the initial orientation), click on the menu icon ($\equiv$) in the upper-left corner of the app, select **File** and then **Encode View in URL**. See Figure 2.5.7 below.

The page will reload with the new URL that will include a script that specifies the initial view. It should match the view you had set up in step 1.

3. Copy the entire query string following the question mark in the URL to the system clipboard. Ctrl-c (cmd-c on a Mac) will help you do this.
4. Use this query string to paste into the HTML code shown below in either the section titled [Creating Sharable CalcPlot3D Interactives in LibreTexts](#) or the section titled [Using Template:AddFigureCalcPlot3DNew to Insert your New CalcPlot3D Dynamic Figures \(without controls\)](#). Note that the second approach is easier for beginners, but there are some advantages to organizing your CalcPlot3D dynamic figures in a repository folder (see the next section).

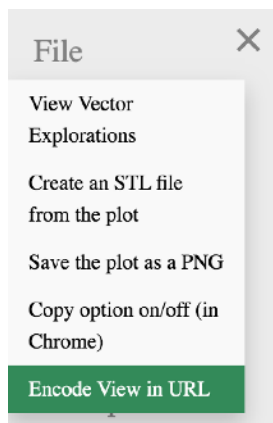


Figure 2.5.7: Use the **Encode View in URL** option on the **File** menu in CalcPlot3D to create the query string you will need here.

Creating Sharable CalcPlot3D Interactive Figures in LibreTexts

There is at least one advantage to creating standalone CalcPlot3D dynamic figure pages in your own repository folder (a "Book" in your Campus Hub or Sandbox). It makes your interactive figures much easier to share with others. All they need to do is follow the instructions above to use content reuse to insert your figures into their pages.

It also allows you to easily update the code for all your figures in one place. And if you happen to want a particular figure in multiple places in your LibreTexts, it's a great way to use transclusion to minimize the code you have to maintain moving forward.

This was the approach used to create the library of CalcPlot3D Interactive Figures in the **Learning Objects** library.

Since the typical user does not have permissions to add new objects there, we will cover how you can create your own repository of CalcPlot3D Interactive Figures. Initially you may practice this process in your Sandbox, but eventually you'll want to move your repository to your Campus Hub, once you have access to it. Note that all links should update when you decide to move this folder. You may wish to make the folder containing these files semi-private using the Permissions menu option on the Options menu for the folder.

The first step in this process is to get a copy of one of the existing CalcPlot3D figures (without controls) into this folder. You have two options to do this for the first time.

1. You can use the Remixer, possibly even using it to create the new "book" which will serve as a repository for your personally created CalcPlot3D dynamic figures, or
2. You can create a new Book in your Sandbox (or Campus Hub), naming it CalcPlot3D Repository (or similar), and then create a new page in this book. Then use **Elements > Content reuse** to import an existing CalcPlot3D figure into that page. Be sure there is nothing else in the page.

Once you have a transcluded copy of a CalcPlot3D figure, you will need to fork the page using the Forker option on the Options menu for the page (or the fork symbol to the right of the page title, if you used the Remixer). This should give you a full copy of a CalcPlot3D dynamic figure of your own to edit.

Once you have used either of these approaches, you should have a linked/transcluded copy of a CalcPlot3D dynamic figure in your repository folder. To create additional CalcPlot3D figures, you can just copy this one, giving it a new name!

From this new forked page, click the **Edit** button on the login bar. Note that the CalcPlot3D figure will still appear in rendered form in Visual edit mode. Click the **</> HTML** button in the upper-right corner of the edit window to change to HTML mode.

Replace the code shown highlighted in blue in Figure 2.5.8 with the query string you formed in Step 3 in the previous section. Note that depending on the figure you chose for this placeholder, the code may be longer or shorter than what is shown in this figure.

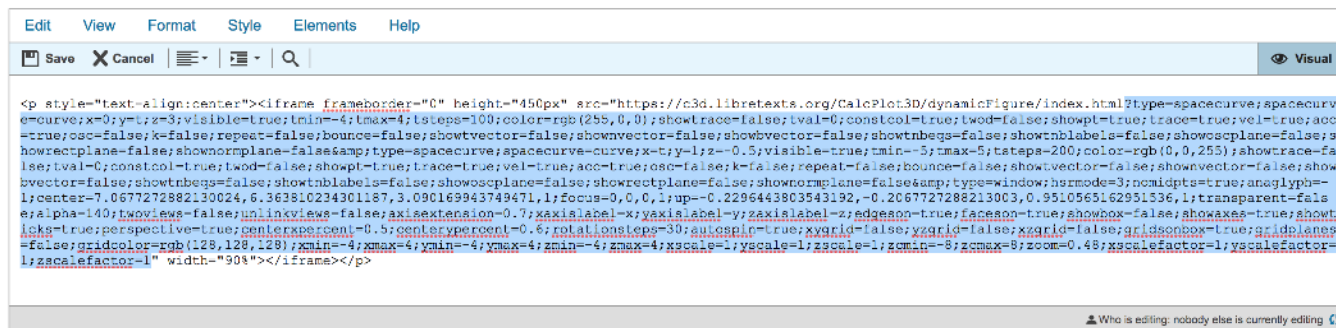


Figure 2.5.8: Highlighted query string code that needs to be replaced when you create a new CalcPlot3D dynamic figure using CalcPlot3D

Clicking of the **Visual** button to toggle back to view the WYSIWYG mode of the editor will actually let you see how the CalcPlot3D figure looks before you save it. If you need to adjust anything in the code, you can switch back to adjust it using the **</> HTML** button again. One of the most common options that you may wish to adjust is the zoom option, located about 4 script commands from the end of the query string. Decreasing the decimal number will make the 3D plot smaller. Increasing it will make the 3D plot larger.

You can actually adjust any of the options in the string, many of which are fairly intuitive. But these could also be adjusted using CalcPlot3D and updating the URL query string.

Note that when you create CalcPlot3D figures with this approach, it is very helpful to add a static image of the figure to the page holding the code for it. This makes the figures much easier to quickly browse in your repository, although it takes an extra step on your part.

Adding a Static Image to your Sharable CalcPlot3D Figure

Once the figure looks as you want it to look, take a screen snip of the figure using a tool like Snip & Sketch on Windows (or Shift-Cmd-4) to create and save an static image to serve as the thumbnail for this figure. Then open the **Page Settings** at the top of the page by clicking anywhere on this gray bar.

If the **Article Type** is not **Book or Unit** or **Chapter**, change it to one of these. This will allow the Thumbnail option to be shown. Once you have changed the **Article Type**, reload the page.

Next hover over the thumbnail image (it may be blank) in the upper-left corner and click on the pencil you should see there. This should allow you to load your saved thumbnail image and you will be all set!

Inserting your own CalcPlot3D Dynamic Figures in LibreTexts Pages

Next we will want to insert our new dynamic figure into a LibreTexts page. There are two basic ways to do this. We can either use **Content reuse** or the template, **Template:AddFigureCalcPlot3DReuse** to insert the new sharable CalcPlot3D Interactive figure we created above or we can use the template, **Template:AddFigureCalcPlot3DNew**, to hard-code the script for our new CalcPlot3D dynamic figure into the page.

Using Content Reuse or Template:AddFigureCalcPlot3DReuse to Insert your Sharable CalcPlot3D Dynamic Figures

If you have chosen to create sharable interactive elements for your CalcPlot3D figures, you can use **Elements > Content reuse** or the template, **Template:AddFigureCalcPlot3DReuse** to add them into your LibreTexts page, depending on whether you want them in a figure object or not. See the section above titled, [Inserting Pre-made CalcPlot3D Dynamic Figures from the Learning](#)

[Objects Library](#) for instructions for how to do this. The only difference here is where you will look for the CalcPlot3D dynamic figure you wish to reuse. Rather than looking in the Learning Objects library, you'll look in your own Interactive Figure repository in your Campus Hub (or Sandbox, if you are practicing).

Using Template:AddFigureCalcPlot3DNew to Insert your New CalcPlot3D Dynamic Figures (without controls)

We can also add a CalcPlot3D dynamic figure using the new template, **Template:AddFigureCalcPlot3DNew**. This template includes the actual HTML code for the CalcPlot3D object so that you can modify the parameters yourself or copy-and-paste the query string from the CalcPlot3D-generated URL into the provided HTML code. Once you have updated the code, you'll also want to remove the instructions given at the top of the figure.

When you insert the template, you will see the following:

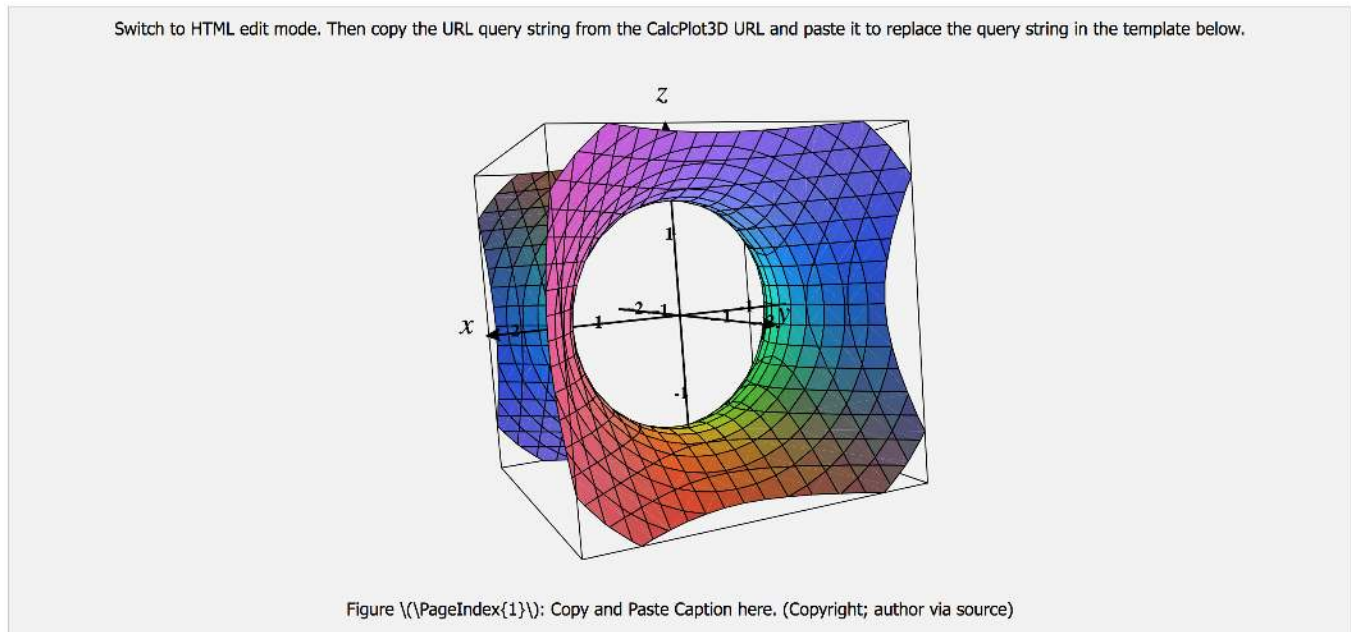


Figure 2.5.9: The appearance of the template **Template:AddFigureCalcPlot3DNew** when it is first inserted

To adjust the actual plot shown, you will switch to HTML edit mode using the button in the upper-right corner of the edit window labeled **</> HTML**. Then you will copy the query string in the URL generated by CalcPlot3D, as described above (everything after the ?) and paste it into the template code, replacing just the query string starting with ? and ending with "zscalefactor=1". See the highlighted portion of the code in Figure 2.5.10below.

```
<figure>
<div style="width:100%">
<p style="text-align:center"><iframe frameborder="0" height="480px" src="https://c3d.libretexts.org/CalcPlot3D/dynamicFigure/index.html?type=implicit;equation-x^2-y^2+z^2=2;cubes=16;visible=true;fixdomain=false;xmin=-2;xmax=2;ymin=-2;ymax=2;zmin=-2;zmax=2;alpha=1;view=0;format=normal;const.col=rgb(255,0,0)&amp;type=window;harmode=3;nomldpts=true;anaglyph=1;center=3.8405533595127737,9.201727028826916,0.7605061339184678,1;focus=0,0,0,1;up=-0.1382725001695583,-0.1369532655300578,0.980879461893141,1;transparent=false;alpha=140;twoviews=false;unlinkviews=false;axisextension=0.7;xaxislabel=x;yaxislabel=y;zaxislabel=z;edgeson=true;faceson=true;showbox=true;showaxes=true;showticks=true;perspective=true;centerpercent=0.5;centerpercent=0.5;rotationsteps=30;autospin=true;xygrid=false;yzgrid=false;zxgrid=false;gridonbox=true;gridplanes=false;gridcolor=rgb(128,128,128);xmin=-2;xmax=2;ymin=-2;ymax=2;zmin=-2;zmax=2;xscale=1;yscale=1;zscale=1;zmin=-4;zmax=4;zcom=0.75;xscalefactor=1;yscalefactor=1;zscalefactor=1" width="90%"></iframe></p>
</div>
<figcaption>Figure {{PageIndex{7}}}: The default CalcPlot3D&nbsp;&plot in this template</figcaption>
</figure>
```

Figure 2.5.10: Replace just the query string shown highlighted in the HTML code above.

One advantage of this method of inserting your CalcPlot3D dynamic figures is that you can see how they look in the Visual mode as you edit the page.

Rendering the default figure (with the instructions line removed):

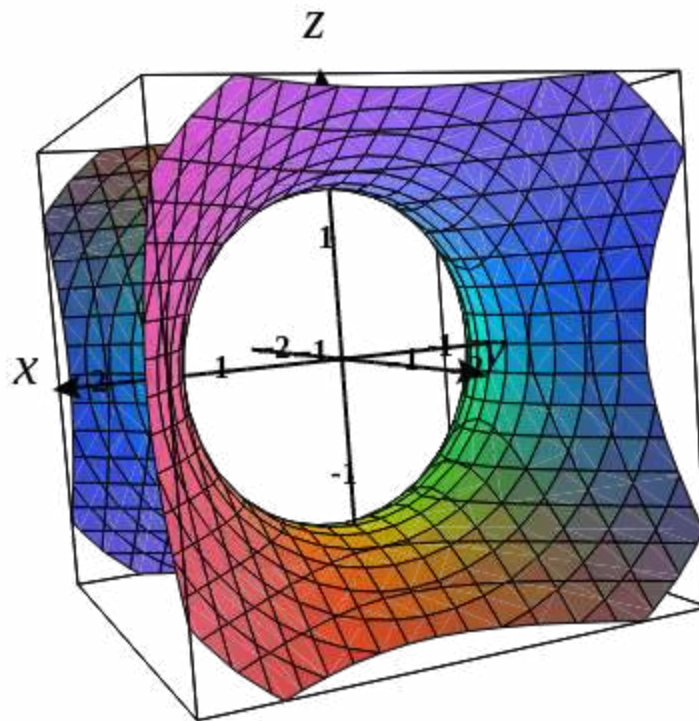


Figure 2.5.11: The default CalcPlot3D plot in this template

Creating your own CalcPlot3D Dynamic Figures using CalcPlot3D (with controls)

Several types of plots in CalcPlot3D can be used to generate dynamic figures that include scrollbars, textboxes or other controls that meaningfully control aspects of the figure.

These are (so far):

1. Any plot that uses parameter sliders
2. Any space (or plane) curve plot can include sliders and an animate button (as shown in Figure 2.5.3 above).
3. Any volume of revolution figure can include a whole set of controls (as shown in Figure 2.5.2 above).
4. The trace plane can be shown along with the rotatable 3D plot when contours are shown in the 3D plot, allowing an input point in the trace plane to be moved around while displaying the corresponding output point on the surface. (See Figure 2.5.12 below.)

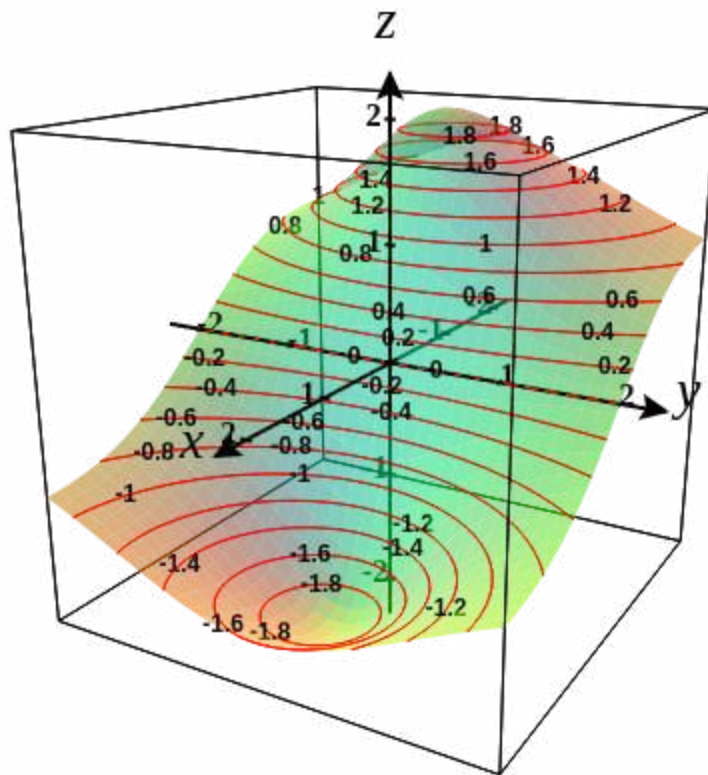


Figure 2.5.12: Example figure showing contour plot and trace plane control.

If you have other situations that you'd like to animate that are not covered here, please send a detailed request of your idea to Paul Seeburger.

Creating the URL Query String in CalcPlot3D for a Dynamic Figure with Controls

To make a CalcPlot3D dynamic figure that includes meaningful controls, it does need to include certain things for this to happen.

If you include parameters and parameter sliders are visible on the control panel when in CalcPlot3D, this plot can be converted into a dynamic figure with controls.

Secondly, as mentioned above, any volume of revolution and any plane curve or space curve can be converted into a dynamic figure with controls.

And finally, if you create a contour plot for a function of two variables and save it to the URL when the main plot window is 3D, but still showing the contours on the surface, then this can be converted into dynamic figure like that shown in Figure 2.5.12 above.

Once you have created your plot in CalcPlot3D, use the process described above in the section titled [Creating your own CalcPlot3D Dynamic Figures using CalcPlot3D \(without controls\)](#). That is, use the **Encode View in URL** option on the **File** menu

to obtain the query string for the CalcPlot3D plot. Copy the query string to the clipboard, as described above and then follow the instructions below.

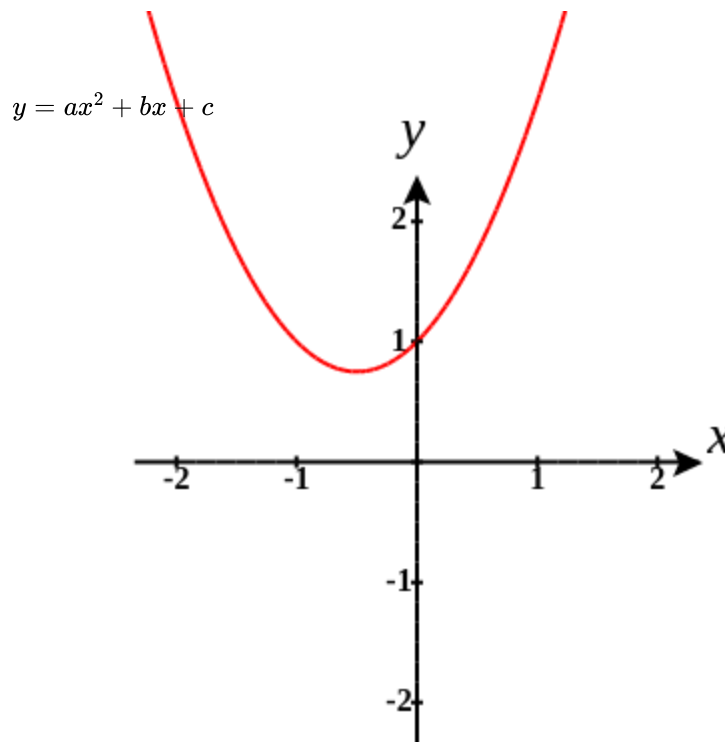


Figure 2.5.13: Example figure showing 2D plot with parameter controls.

Inserting CalcPlot3D Dynamic Figures with Controls in LibreTexts Pages

Creating Sharable CalcPlot3D Dynamic Figures with Controls

First, you will need to either create a copy of a similar CalcPlot3D dynamic figure with controls in your repository folder. If you already have one there, just copy it. If not, copy one from the Learning Objects library, following the steps described in section [Creating Sharable CalcPlot3D Interactive Figures in LibreTexts](#) above.

Second, you should check that the figure does indeed use the correct URL to call CalcPlot3D. If it has controls, it should call the following base URL before the query string:

`https://c3d.libretexts.org/CalcPlot3D/dynamicFigureWCP/index.html`

Note that the only thing that is different here is that the base URL has the characters 'WCP' after 'dynamicFigure' in its path. The WCP represents, "With Control Panel".

Third, you can paste the query string from your CalcPlot3D plot into this new template that you have made.

This means that in order to add a CalcPlot3D dynamic figure **with controls**, you will either need to copy an existing figure with controls or you will need to modify the HTML base URL by adding these three letters (WCP).

There are a number of special commands you may wish to add to the script in the URL query string to adjust what appears and how it is labeled.

Useful Script Commands for CalcPlot3D Dynamic Figures

For CalcPlot3D dynamic figures with controls there are a few options that you may wish to add to the query string by hand. There are even a few commands listed in the last bullet below that can be used for CalcPlot3D dynamic figures with or without controls.

- You can add a `name` attribute and/or a `noanimate` attribute to any sliders. For example, “noanimate=true;name=n_x”. Note that each object, including the sliders, starts with “type=” in the query string. To clarify, these attributes must be set in the definition of the relevant slider object.

See:

```
type=slider;slider=a;value=1;steps=2;pmin=1;pmax=3;repeat=true;bounce=true;waittime
```

The `name` attribute changes the label of the slider to the supplied name, using MathJAX to format the supplied name. This means you can use LaTeX in the name.

The `noanimate` attribute allows you to hide the **Animate** button on the slider control, if you wish.

- For figures showing the trace plane (currently those with contour plots), you can add one or more of the following attributes to the window element at the very end of the query string: “hidexyliders=true; hidetracevalue=true;hidetracepoint=true;”

See:

```
type=window;hsrmode=3;anaglyph=-1;center=-7.447051206708178,-2.790794355991455,3.71
focus=0.5,0.5,0.5,1;up=0.39804763218685024,0.14521777837291014,0.9057979241281567,1
unlinkviews=false;axisextension=0;xaxislabel=%20;yaxislabel=%20;zaxislabel=%20;edge
showaxes=false;showticks=false;perspective=true;centerxpercent=0.5;centerypercent=0
xygrid=false;yzgrid=false;xzgrid=false;gridsonbox=false;gridplanes=true;gridcolor=r
xmin=0;xmax=1;ymin=0;ymax=1;zmin=0;zmax=1;xscale=1;yscale=1;zscale=1;zcm=-4;zcmx
xscalefactor=1;yscalefactor=1;zscalefactor=0.5;
hidexyliders=true;hidetracevalue=true;hidetracepoint=true;
width="90%"></iframe></p>
```

Here the `hidexyliders` tag allows you to hide the *x*- and *y*-sliders that appear below the 2D trace plane by default.

The `hidetracevalue` tag allows you to hide the trace value normally displayed on the 3D plot when moving a trace point around on the 2D trace plane (and 3D surface).

The `hidetracepoint` tag allows you to hide the trace point that may otherwise be shown when you click on the 2D trace plane that appears here.

- For figures that include volumes of revolution, you may wish to add the `hideaxisofrev` command.

See:

```
type=window;hsrmode=0;nomidpts=false;anaglyph=-1;center=5,3,10;focus=0,0,0,1;up=0,2
alpha=140;twoviews=false;unlinkviews=false;axisextension=0.7;xaxislabel=x;yaxislabe
faceson=true;showbox=false;showaxes=true;showticks=true;perspective=true;centerxper
centerypercent=0.42;rotationsteps=30;autospin=true;xygrid=false;yzgrid=false;xzgrid
gridplanes=false;gridcolor=rgb(128,128,128);xmin=-1;xmax=5;ymin=-2;ymax=4;zmin=-4;z
zscale=2;zcm=-8;zcmx=8;zoom=0.37;xscalefactor=1;yscalefactor=1;zscalefactor=1;
```

```
rotatestart=0;rotatedirectionx=1;rotatedirectiony=0;hidexyliders=true;hidetraceval  
hidetracepoint=true;hideaxisofrev=false" width="90%">
```

- Note the other commands shown here can be used in any CalcPlot3D dynamic figure (with or without controls).

The `rotatestart` attribute can have values between 0 and 100 and allows you to set an initial rotation speed. The default speed is 0 which will not cause any initial rotation.

The `rotatedirectionx` and `rotatedirectiony` attributes allows you to specify the initial direction of rotation. Typically these values should be between -1 and 1.

Other commands will likely be created as new features are added to CalcPlot3D to accommodate new types of dynamic figures with controls.

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Adding GeoGebra Explorations to LibreTexts Pages

Adding interactive problems/activities using can make your LibreTexts more interactive and provide immediate feedback to students on their understanding. In addition to interactive problems from H5P, WeBWorK, or MyOpenMath, you can easily also add GeoGebra explorations to your LibreTexts.

Although GeoGebra Explorations are not included as a problem type in Adapt, there are some existing GeoGebra explorations in the LibreTexts Math Library (https://math.libretexts.org/Learning_Objects/GeoGebra_Simulations). It is also fairly easy to find existing GeoGebra explorations addressing many topics using a search engine or searching on the GeoGebra website (<https://www.geogebra.org/>). If nothing you find demonstrates the concept(s) you have in mind, it's not too hard to learn to create your own GeoGebra explorations using **GeoGebra Classic** on the web.

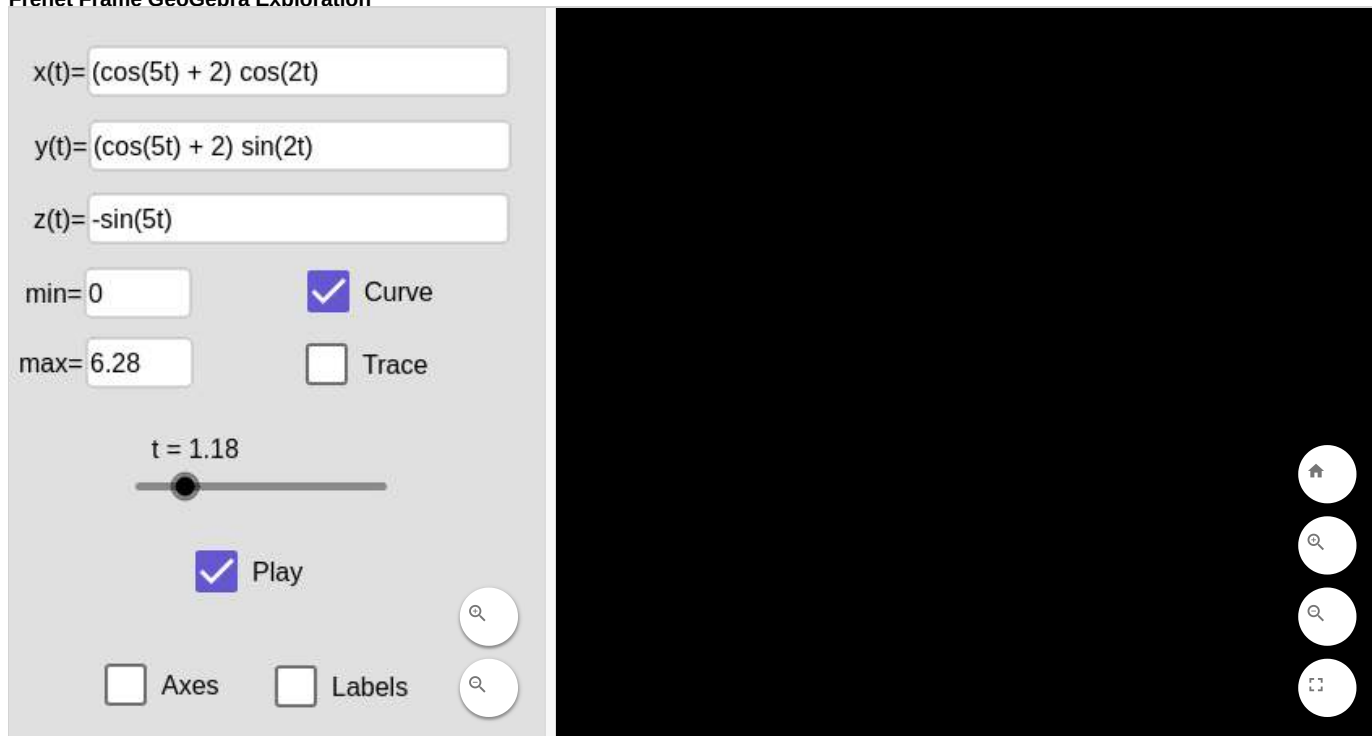
In this tutorial, we will learn how to insert GeoGebra explorations in a Libretexts page. There are several ways to to this. The process you need depends on whether the GeoGebra exploration you want to insert is found in a LibreTexts repository or if you found it (or created it) on the GeoGebra website.

We'll cover how to insert an existing GeoGebra exploration from a LibreTexts repository first and then cover how to insert any GeoGebra exploration you find or create online.

Inserting GeoGebra Explorations from a LibreTexts Repository

The GeoGebra exploration below comes from the collection of GeoGebra explorations in the repository mentioned above on the LibreTexts Math Library.

Frenet Frame GeoGebra Exploration



Visualization created by [Juan Carlos Ponce Campuzano](#).

To add this GeoGebra exploration to this page, you would first need to locate it by name on the repository page described above. Then **Edit** the LibreTexts page where you wish to insert it. Next select the **Elements** option shown along the top bar of the page editing window, and on the Elements menu, select the **Content reuse** option (shown in Figure 1).

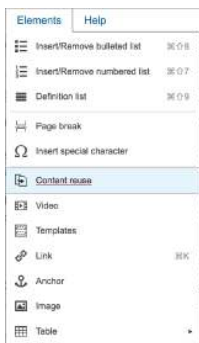


Figure 1: Elements menu, showing **Content reuse** option

Selecting the Content reuse option allows us to add content from anywhere else in the library. You will see the following window (shown in Figure 2).

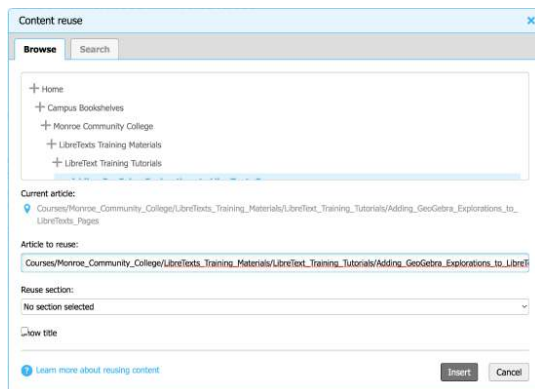


Figure 2: The **Content reuse** dialog

To navigate to the Learning Objects folder, click on the plus symbol in front of the word Home. The list of folders should now appear like Figure 3 below.

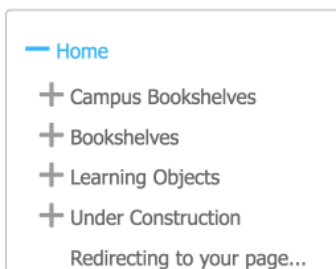


Figure 3: List of folders shown when we click the plus symbol in front of Home

Now click on the plus symbol in front of Learning Objects should display a list similar to that shown below in Figure 4.

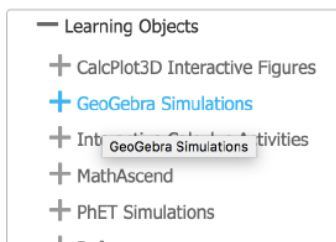


Figure 4: A list of available Learning Objects

Clicking the plus sign in front of GeoGebra Simulations should reveal a list of the current GeoGebra explorations in this repository. Scrolling down to locate the Frenet Frame exploration, it should look similar to what is shown in Figure 5.

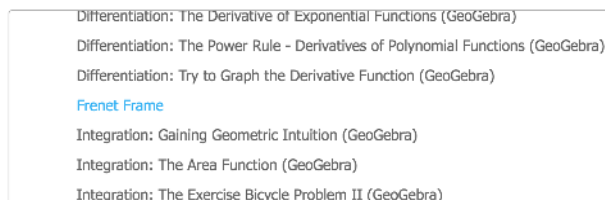


Figure 5: A list of available GeoGebra explorations

Selecting the Frenet Frame exploration causes the Content reuse dialog to appear as shown below in Figure 6.

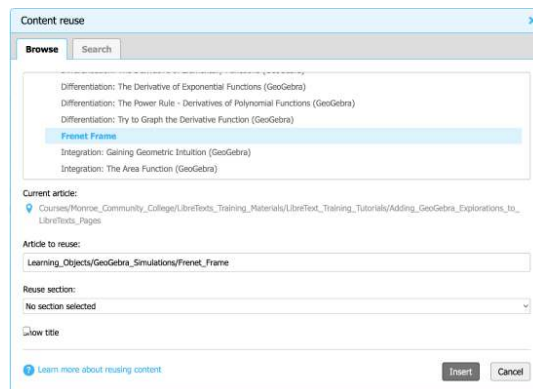


Figure 6: The Frenet Frame exploration has been selected

Note the address of the Frenet Frame exploration within the LibreTexts Math Library is shown under **Article to reuse**. If you select the checkbox labeled **Show title**, the title of the exploration will be automatically displayed just above the exploration on your page. If this checkbox is left unselected, this title will not appear.

Finally, once you are ready to insert the exploration into your page, click the **Insert** button in the lower-right corner of the dialog. A content reuse placeholder like the following will appear in the page editing window. To see your inserted GeoGebra exploration in action, save the page.

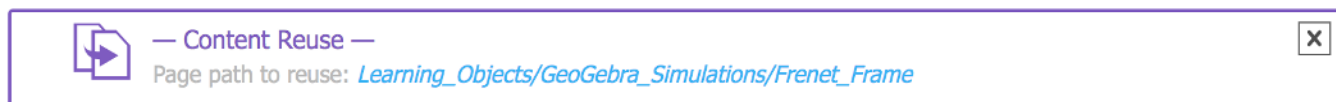


Figure 7: Placeholder for the content reuse of the Frenet Frame GeoGebra exploration

Inserting GeoGebra Explorations from a Different LibreTexts Library

If you decide you'd like to insert a GeoGebra exploration from a LibreTexts library other than the one in which you are building your custom text, this can be accomplished using a Cross-Library Reference, the library subject area, and the Page ID number for the GeoGebra exploration you have selected.

Say we wish to insert the following GeoGebra exploration from the LibreTexts Math Library on a page in another LibreTexts library (say Chemistry or Physics).

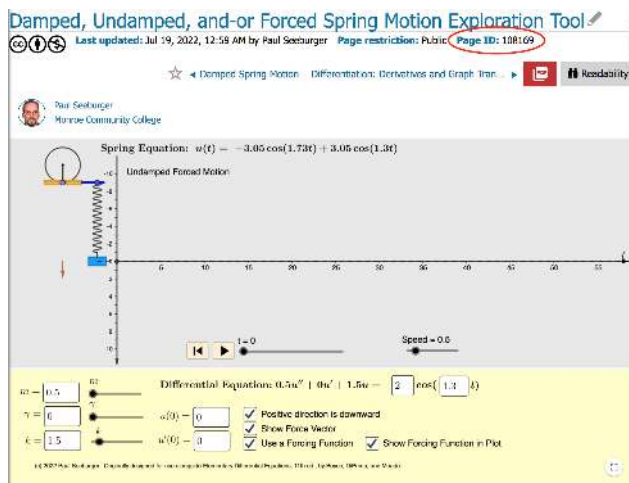


Figure 8: Static image of a GeoGebra exploration from the LibreTexts Math Library, with its Page ID circled in red.

We would need to create a new page, name it, and then save it (before editing it) to set it up with the correct codes. Then we would edit the page again and click on the `</>` HTML button on the right end of the editing toolbar. Enter the following code.

```
<p class="mt-script-comment">Cross Library Transclusion</p>

<pre class="script">
template('CrossTransclude/Web',{ 'Library': 'math', 'PageID': 108169 });</pre>
```

Saving your page should reveal the GeoGebra exploration you wanted. This code could also be placed inside a LibreTexts page with other text and figures, or you could set up a collection of explorations each in their own page that you could easily place in other pages using the Content Reuse approach described above.

Note

This Cross Library Transclusion code can be used to insert any content from another library into your custom LibreTexts.

Inserting GeoGebra Explorations from the GeoGebra Website

First go to the GeoGebra website (<https://www.geogebra.org/>) and locate an exploration that you would like to insert into LibreTexts. If you've created one of your own, feel free to use that! You'll just need the URL of this exploration when we are ready to indicate which exploration we want to insert below.

There are a lot of more advanced programming features that can be used in this process. But for most purposes, we will not need to get this complicated to insert an interactive GeoGebra exploration in a LibreText, so I will not get into these more advanced techniques here.

Note: Exploring Advanced Features

If you are curious to learn more about how some of the GeoGebra explorations in the repository are set up, you copy the GeoGebra exploration from the repository to your sandbox (either using the remixer or creating a new page and then using content reuse) and then fork the page. This will allow you to explore the code needed to accomplish using buttons and text output displays that are external to a single GeoGebra exploration window or to coordinate two separate GeoGebra applet windows.

Although a GeoGebra exploration likely could be inserted directly into a LibreTexts page with other content, I strongly recommend that you create a new (separate) page for each GeoGebra exploration you wish to insert, in a subdirectory of your campus bookshelf dedicated to GeoGebra explorations (perhaps titled **GeoGebra Explorations**) and then use the content reuse approach shown above to locate and insert these explorations into your page. This approach keeps the code for each GeoGebra exploration clearly separate and allows these explorations to be more easily shared among multiple books once they have been created.

This approach also provides an excellent template to use for creating more GeoGebra exploration pages for your LibreTexts. Once you have one of these created, you can just use the Copy option under the Options menu on the page to create a new GeoGebra exploration page. There will be no need to fork the page. You'll just have to edit the code as shown below.

The first time (to get started), I recommend that you copy one of the following GeoGebra explorations from the repository into a page of your own.

[Accumulation Function Curve Sketching Example 1](#) or [Accumulation Function Exploration Tool](#)

You can use the Remixer to do this or you can create a new page using the New button and use Content reuse (as described above) to insert just this exploration into the page.

Note: Using the New Button to Create a New Page

Note that if you create a new page using the **New** button, you should always name and save the page first, then edit it again to add content or use Content reuse (as we need to do to insert the existing exploration above). This maintains the tags that indicate that this page is a section.

Once you have the copy of the exploration in your page, save it and then fork it, either clicking on the fork symbol just to the right of the title (if it is there), or using the Forker option in the Options menu.

Edit the page and click on the HTML button. You will see code like the following:

```
<meta name="viewport" content="width=device-width,initial-scale=1" /><meta charset="utf-8" /><script src="f
<div id="ggb-element">&nbsp;</div>
<script>*<![CDATA[*]
    var params = {"appName": "classic", "material_id": "vy5cfdug", "width": 1260, "height": 657, "scale": 0.
    var applet = new GGBApplet(params, true);
    window.addEventListener("load", function() {
        applet.inject('ggb-element');
    });
/*]]>*/</script>
```

If you used the remixer or content reuse to create the page and then forked the page, you will likely also see some comment code that you can freely delete, possibly both above and below the code shown above.

Now find a GeoGebra exploration that you want to insert. Its web address (URL) should look something like the following:

<https://www.geogebra.org/m/ykqc5be6>

Note that the material id for this exploration is the sequence of letters and numbers after the base URL: <https://www.geogebra.org/m/>. That is, in this case, the material id is **ykqc5be6**.

Copy just this material id code and paste it in the parentheses following "material_id", replacing the current material id. (In the example code above, this code is "vy5cfdug".)

Save the page and you will see your new exploration appear. You may need to adjust the width and height settings to allow all parts of the exploration to appear, and you can experiment with the other settings shown in the code above on the line beginning with "var params =".

 Note: Giving Credit to the Author of the GeoGebra Exploration

Be sure to clearly indicate who authored the GeoGebra exploration that you have imported, if it is not already displayed. It is best to include it just below the exploration on its own page.

Now that you have your new GeoGebra exploration in its own LibreTexts page on your campus bookshelf, you can use the content reuse approach described in the first part of this tutorial to insert this GeoGebra exploration into a regular LibreText textbook page. To do this, you will need to navigate to your campus bookshelf using the Content reuse dialog.

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Adding H5P Problems to LibreTexts

Adding interactive problems/activities using H5P, WeBWorK, MyOpenMath or straight from the LibreStudio (H5P), Query, or Adapt can make your LibreTexts more interactive and provide immediate feedback to students on their understanding. Note that Adapt is a full online homework system that will allow you to grade student work, either completed in the Adapt interface or right in your LibreTexts. But this tutorial is focused on how to use these problems in a formative, non-graded way.

In this tutorial, we will cover how to add formative (concept check) H5P activities to your pages. First we'll cover how you can review the available H5P elements in the LibreStudio library, although there are not many math problems there yet. Then, although it is beyond the scope of this tutorial, we will briefly discuss how you can locate and import H5P activities you find elsewhere or even create your own H5P elements to add to the library!

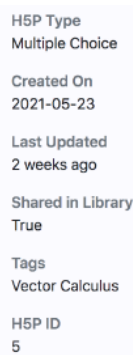
Note that there are not yet any math H5P activities/problems in Query, although this is one place you'll find available WeBWorK problems. In fact, since we have LibreStudio, we will not need to use Query for H5P activities.

Also note that this page is an expanded version of [Section 5.7 in the Construction Guide](#) that is focused on the LibreTexts Math library.

Browsing H5P Activities in LibreStudio

You can browse existing H5P content on LibreStudio and insert selected H5P activities into your LibreTexts pages without logging in.

Go to: <https://studio.libretexts.org>. You can use the filters shown on the left to narrow the search. If you select Mathematics, you will find at least two problems. Clicking on the title of a problem, you will see a column of attributes. In order to insert an H5P activity into a LibreTexts page, we will need the H5P ID number shown at the bottom of this list. See the figure below.



H5P Type
Multiple Choice
Created On
2021-05-23
Last Updated
2 weeks ago
Shared in Library
True
Tags
Vector Calculus
H5P ID
5

Figure 1: The attributes of an H5P activity in LibreStudio

Inserting an H5P Activity into a LibreTexts Page

The H5P template lets authors embed the H5P activity into a page (page > elements > template).



Figure 2: Selecting the template: Template:QueryH5P

Once the template is added to the page, all you have to do is change the ID number of the activity here to the one you located in the previous step (in the place of 5 in below template).

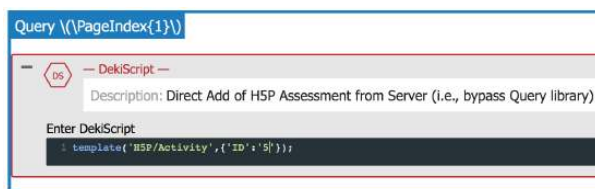


Figure 3: Adjusting the ID number to correspond to the problem you desire.

Logging in to LibreStudio

In order to import or create new H5P activities on LibreStudio, you will need to log in using a user account. If you do not yet have an account, you can register for one here: <https://studio.libretexts.org/user/register> using this LibreStudio registration code: **"LibreFest2021"**

We are in the process of tying all components of the LibreVerse together into one central authentication, but for now individual accounts are needed.

Importing H5P Activities into LibreStudio

Many H5P activities have been created for math on other H5P servers around the world. A Google search for H5P and Math will bring up a number of places to search. If you find an H5P activity you'd like to use or modify, most have a **Reuse** link to download it to your computer. You can then import the activity into LibreStudio by clicking on the **New H5P** button and then selecting the **Upload** option instead of **Create Content**. See Figures 4 and 5 below.



Figure 4: Click on the New H5P button to the left of the Author Menu.

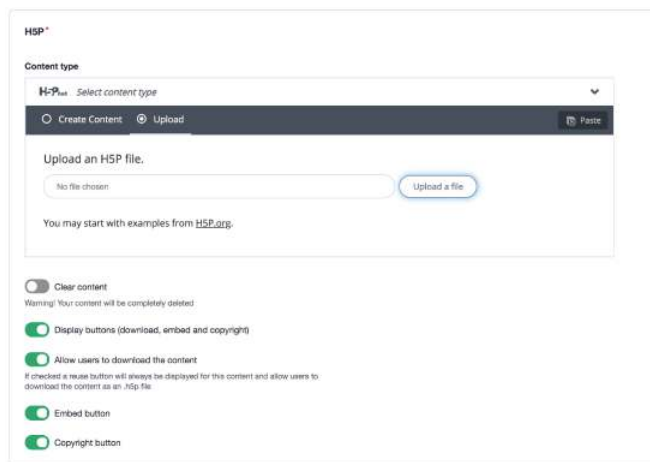


Figure 5: Clicking on the Upload option will display this dialog.

You can then use the **Upload a file** button to upload the H5P activity you saved to your computer from another location on the web. Note that you have a few options for what action items and information the H5P activity will display. If you import activities created by others, please be sure to give the authors proper credit.

Once you've imported an activity, you can either insert it into your LibreText as described above or you can modify it before doing so.

To modify an H5P activity you have either created or imported, use the Author menu to go to your Author Dashboard. Then locate the H5P activity you'd like to modify and click on the **Edit this resource** button near the right side of the activity object.

Creating New H5P Activities in LibreStudio

In the likely event you cannot find a problem that does exactly what you have in mind, you can create your own H5P activities right in LibreStudio!

See the H5P project site (<https://h5p.org/>) for full instructions on this process, and look at example problems there, in LibreStudio, and elsewhere to get ideas.

You will use the New H5P button in Figure \(\PageIndex{4}\) above and then follow the instructions on the H5P site to create a new activity using the Create Content option, as shown in Figure \(\PageIndex{6}\).

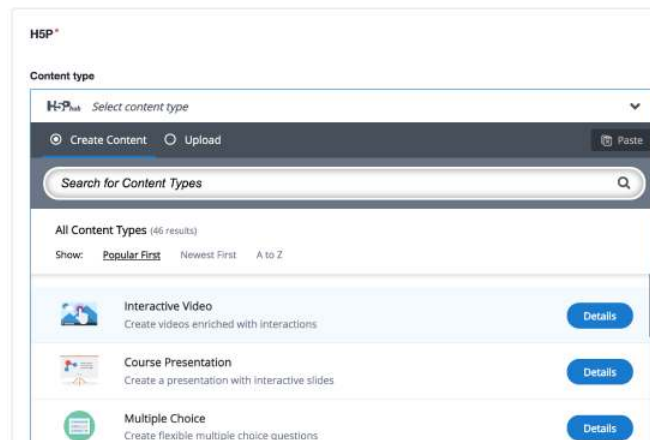


Figure 6: Use this dialog to create a new H5P activity.

Example H5P Activities

1. A Divergence problem from Calculus 3 (by Paul Seeburger).
2. A group of algebra problems presented as one H5P activity (by Bob Belford).

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Adding WeBWorK Problems to LibreTexts

Adding WeBWorK problems to check for student understanding at appropriate places in your LibreTexts can keep students engaged and help them work out the details of definitions, concepts, and theorems.

Although Adapt can allow you to incorporate graded "summative" problems (WeBWorK, H5P, MyOpenMath, etc.) into your LibreTexts, this tutorial will focus on various ways to insert WeBWorK problems into LibreText pages for formative feedback, i.e., to help students check and refine their understanding.

Browsing Available WeBWorK Problems

Two methods to browse available WeBWorK problems are:

1. Use the Library Browser in any WeBWorK course on a WeBWorK server
2. Use the LibreTexts Query Library to locate WeBWorK problems

Library Browser: Once logged into a WeBWorK course with appropriate permissions, you can use the Library Browser link to search the contents of this library for appropriate problems to insert in your LibreTexts. Here you will need the OPL address to insert a WeBWorK problem into a LibreTexts page. We'll discuss this more below.

If you do not have access to a WeBWorK server, it is possible that you could use the LibreTexts WeBWorK server to explore the OPL in this way. If you are interested in this possibility, please request access.

You may find this page about the WeBWorK OPL (Open Problem Library) helpful: https://webwork.maa.org/wiki/Open_Problem_Library

Browsing Query: First, you will need to access the LibreTexts [Query WeBWorK library page](#). Then you can use the topical folder names to dig through the contents of the OPL (Open Problem Library) that are housed in Query. Note that what you'll need to insert a WeBWorK problem from Query is its **page ID**. We'll discuss this more below. Also note that you do NOT need to be logged in to Query to browse problems.

One other thing to consider is that browsing Query may allow you to find other types of problems as well (not just WeBWorK). And these can be inserted into LibreTexts pages using the same method as we show for a WeBWorK problem below.

Inserting Formative WeBWorK Problems into a LibreTexts Page

Even when used formatively, there are currently three methods to insert WeBWorK problems into your LibreTexts pages. Each method has its advantages and the method you choose may depend to some degree on how much experience you have with WeBWorK.

Inserting a WeBWorK Problem Using its OPL (Open Problem Library) Address

This method is great for those who have access to WeBWorK and either know which problems they wish to use from their own assignments or can use the Library Browser in WeBWorK to locate appropriate problems and obtain their OPL address.

Say we found a problem in the OPL with the following address that we want to insert.

Library/Michigan/Chap7Sec1/Q77.pg

Select Elements > Templates > Template:QueryWebWork

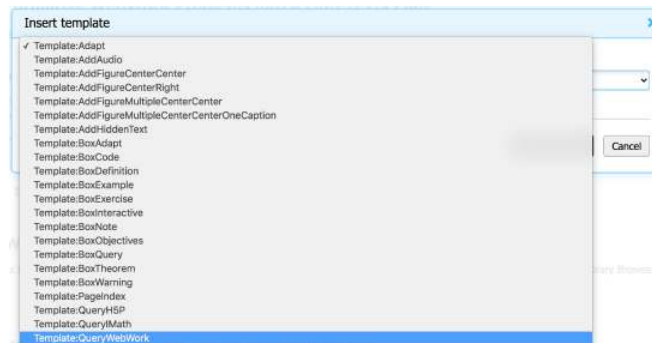


Figure 1: Selecting the WeBWorK template to use with an OPL address.

Once the template is added to the page, all you have to do is change the address of the problem to the one you located in the previous step. Note that you will need to click on the + sign on the DekiScript object to open the attributes for the template. See Figures 2 and 3 below.

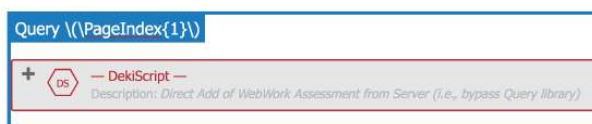


Figure 2: New QueryWebWork template

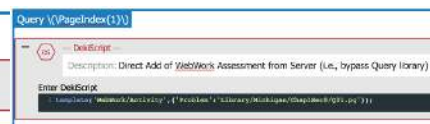


Figure 3: QueryWebWork template opened

Replacing the default OPL address in the code with the OPL WeBWorK problem address we found above gives us:

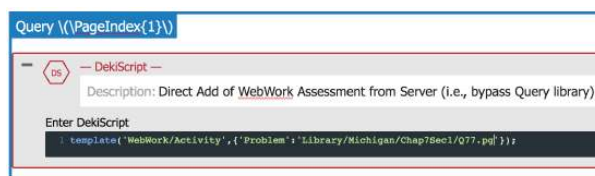


Figure 4: QueryWebWork template with new OPL problem address

Once the page is saved, this will render the problem as:

Note that this problem is labeled as a Query even though it did not come from the Query database. This is intentional, as these types of interactive questions are being called Queries in LibreTexts.

Inserting a WeBWorK Problem Using its Query ID

This method may be easier for anyone who is not as familiar with WeBWorK and/or who does not have access to a WeBWorK course and the OPL Library Browser. It uses the page ID for the corresponding problem in the LibreTexts Query problem database.

As mentioned above, another advantage of this approach is that it can be used to insert problems of any type that you find in the Query problem database. Just find the page ID and insert it in the template as we show below and the problem will render in your LibreTexts page.

Now from the Query database, let's say we found the following problem:

BDH-1-7-01.pg

Last updated: Mar 2, 2020 Page ID: 21088

◀ Bifurcations | BDH-1-7-03.pg ▶ PDF Readability Cite this page Donate

Determine the bifurcation value(s) for the one-parameter family

$$\frac{dy}{dt} = y^2 + k.$$

$k =$ [help \(numbers\)](#)

Determine which differential equation corresponds to each phase line. You should be able to state briefly how you know your choices are correct.

? ▾ 1. k equal to the bifurcation value

? ▾ 2. k smaller than the bifurcation value

? ▾ 3. k larger than the bifurcation value

Preview My Answers Submit Answers

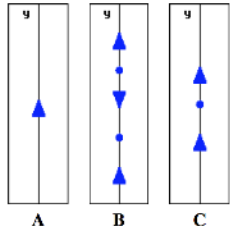


Figure 5: WeBWorK problem in Query

Note the **Page ID: 21088** just below the problem title. We will need this number to identify this problem in the template.

Now select Elements > Templates > Template:BoxQuery

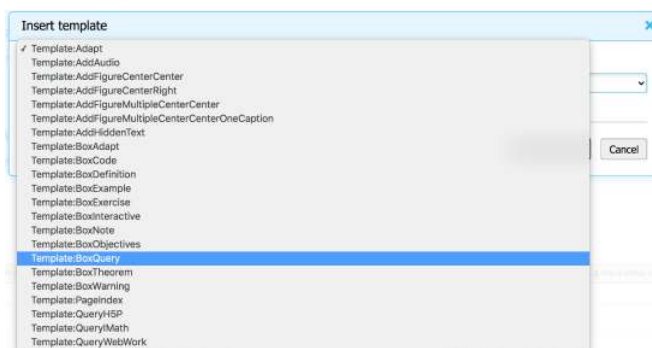


Figure 6: Selecting the BoxQuery template to use with a Page ID.

Once the template is added to the page, all you have to do is change the Page ID of the problem to the one you located in the previous step. Note that you will need to click on the + sign on the DekiScript object to open the attributes for the template. See Figures 7 and 8 below.



Figure 7: BoxQuery template



Figure 8: BoxQuery template opened

Replacing the default Page ID in the code with the Page ID for the WeBWorK problem we found in the Query database (21088) above gives us:

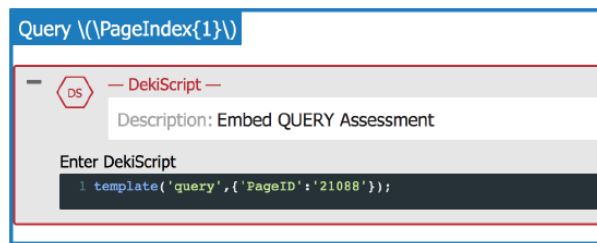


Figure 9: BoxQuery template with new Page ID

Once the page is saved, this will render the problem as:

Note that we can update the PageIndex appropriately as we insert new Query problems.

Inserting a WeBWorK Problem from Your own WeBWorK Server

This method is ideal for inserting your own created or customized problems in a LibreTexts page. It is currently still the least polished in its presentation, although this should soon be standardized to look like the other two methods above, using a new Template. This page will be updated once this is accomplished.

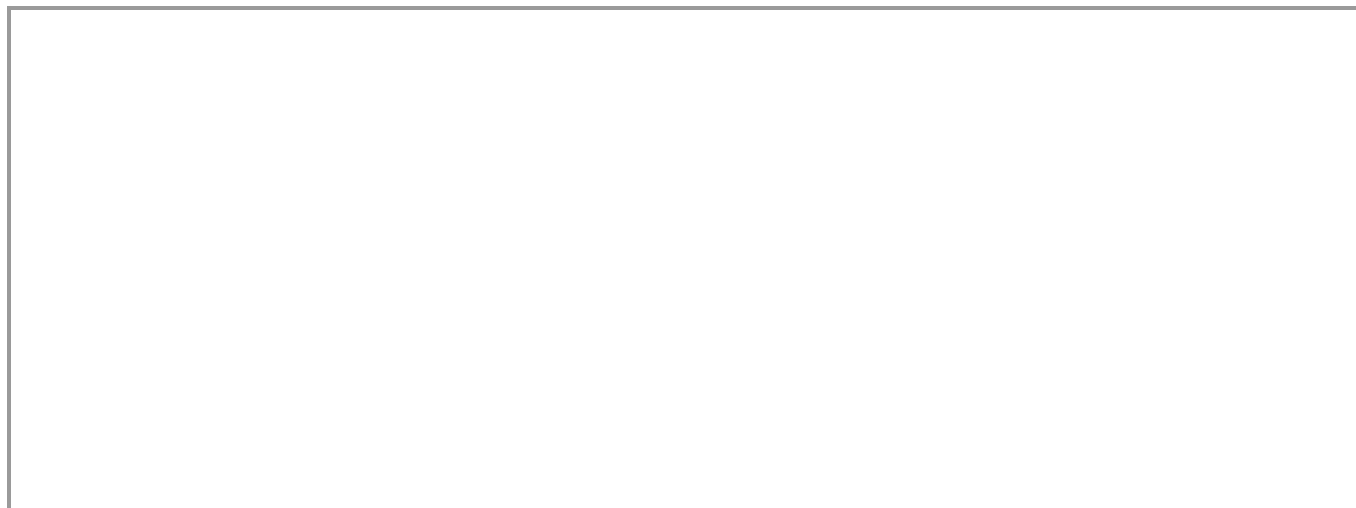
At this point, there is not a template for this method. We will be editing the HTML version of the page directly.

While editing the LibreTexts page that you wish to add a WeBWorK problem to, click the **</> HTML** button in the upper-right corner. This button toggles the editing mode between WYSIWYG and HTML. We can accomplish most editing tasks in LibreTexts without worrying about the HTML, but for this WeBWorK problem option, we need it.

You can copy-and-paste the following code to modify it appropriately to create your linked WeBWorK problem. The base WeBWorK server URL has been formatted to show it is code, but the rest of it should copy-and-paste correctly.

```
<div><iframe                                frameborder="1"                                height="250"                                src="
https://demo.webwork.rochester.edu/webwork2/html2xml ?
&answersSubmitted=0&
&sourceFilePath=Problems/CalcIII/DivCurl/ur_vc_12_9.pg&
&problemSeed=123567&
&courseID=seeburger_course&
&userID=daemon&
&course_password=daemon&
&showSummary=1&
&displayMode=MathJax&
&problemIdentifierPrefix=102&
&language=en&
&outputformat=sticky" width="100%"></iframe></div>
```

This code will generate the following WeBWorK problem, served up from an external WeBWorK server. Although it is not really a custom problem, it could be.



Note that you can specify your desired WeBWorK server and the path to the problem inside the course you set up for serving these problems. The courseID is the course name, and you need to create a user named “daemon” with password “daemon” and permission set to “login_proctor” in that course. Alternatively, you could use "anonymous" instead of "daemon". Just be consistent.

The path can be a Library problem too, although we recommend you use the QueryWebWork template described above unless you wish to use custom problems.

You can use the Library Browser in the WeBWorK course you use to locate any problem available there, even in your local customized problem sets.

Putting these WeBWorK Problems in a Query Box

If you wish it to look more like the other problems, we can use the BoxQuery template for that, although there may soon be a custom template for this feature as well with appropriate parameters.

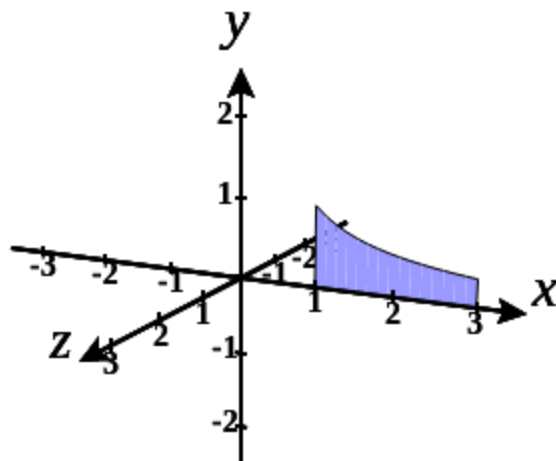
To get the problem inside of a Query Box, I added the BoxQuery template, then switched to HTML mode and replaced the code:

```
<p class="mt-script-comment">Embed QUERY Assessment</p></br>
<pre class="script"></br>
template('query',{ 'PageID': '35292' });</pre>
```

with the HTML code for the desired WeBWorK problem.

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CalcPlot3D Dynamic Figure



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Creating Dynamic Figures with CalcPlot3D

Overview

CalcPlot3D is a free online visualization tool originally developed to help students learn concepts in multivariable calculus, but now offering visual tools that can be useful in many STEM courses. Using CalcPlot3D, authors of LibreTexts can create and insert dynamic figures of two basic types:

1. Rotatable 3D dynamic plots with no external controls
2. 2D and 3D dynamic plots with scrollbars and some other controls

See examples in Figures 1 - 3 below.

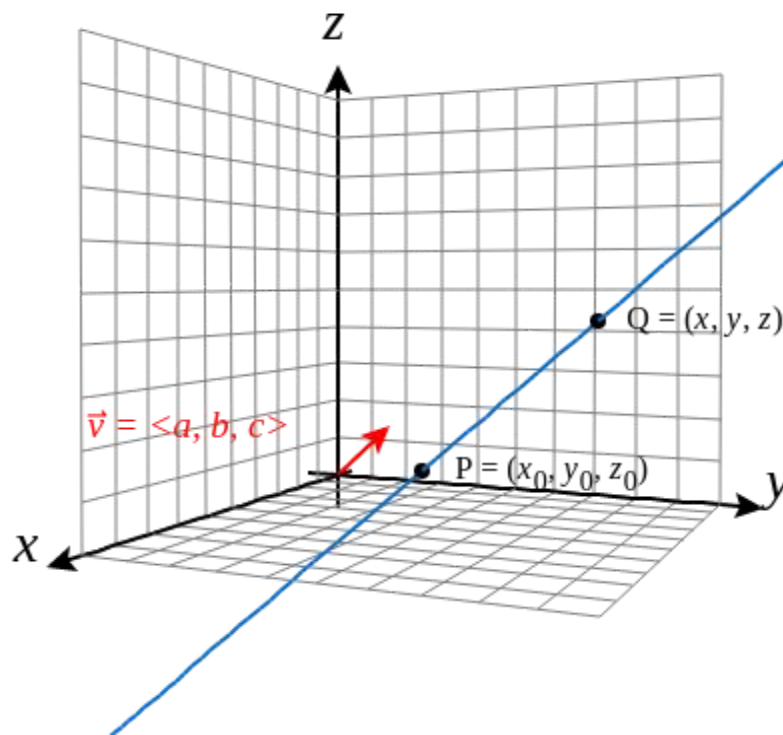


Figure 1: A three-dimensional line in space (no controls)

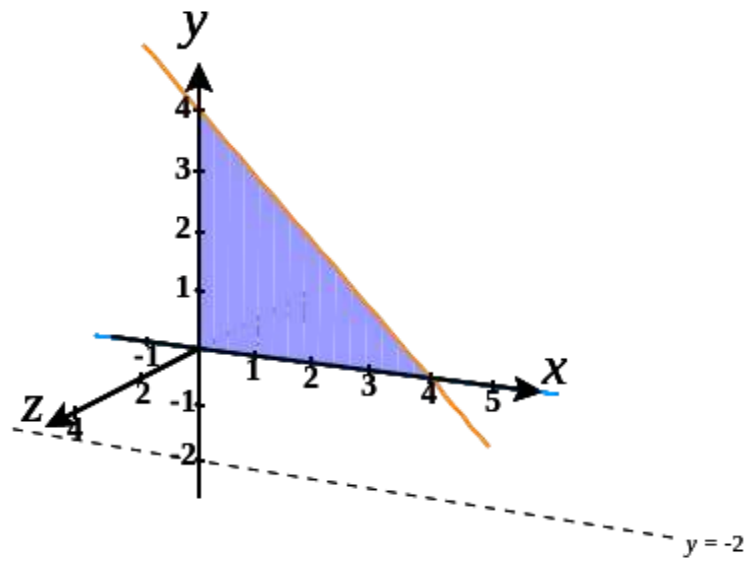


Figure 2: A demonstration showing the generation of a volume of revolution (includes controls)

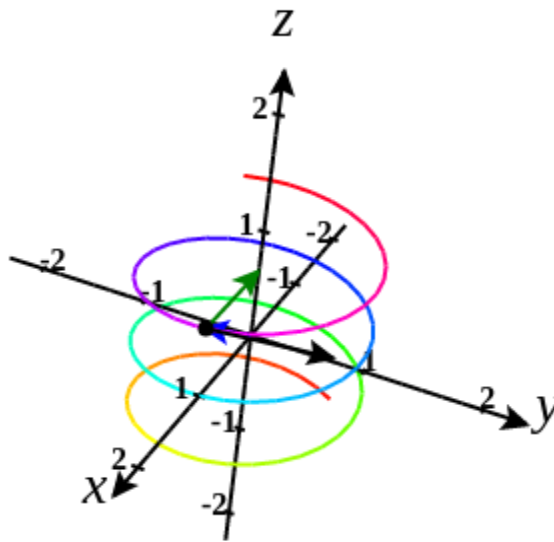


Figure 3: Animating motion along a helix (includes controls)

As you can see in these examples, both types of dynamic figures can be helpful. Sometimes a rotatable 3D plot is all that is needed. But in other situations, adjusting various parameters with scrollbars, textboxes, and checkboxes can greatly aid student understanding.

Inserting Pre-made CalcPlot3D Dynamic Figures from the Learning Objects Library

This is the easiest way to get started using CalcPlot3D dynamic figures, since it only requires you to browse the Learning Objects library, find a dynamic figure you'd like to use, and then to use the **Content reuse** option on the **Elements** menu to insert it into your LibreTexts page. But this approach does not allow you to adjust the parameters of the interactive figures. You get exactly what's there already. So you may wish to continue to creating your own dynamic figures using CalcPlot3D.

Steps to inserting an existing CalcPlot3D dynamic figure into a LibreTexts page:

1. Browse the [CalcPlot3D Interactives library](#) (this link is for the one on the LibreTexts Math Library) and find a dynamic figure you'd like to use in your custom page.
2. Select **Elements** > **Content reuse** from the edit menu. Then click the + in front of **Home**. You should now see the **Learning Objects** library. Click on the + in front of **Learning Objects** and navigate to find the dynamic figure you found in the

previous step.

You should get an object that looks like the following:

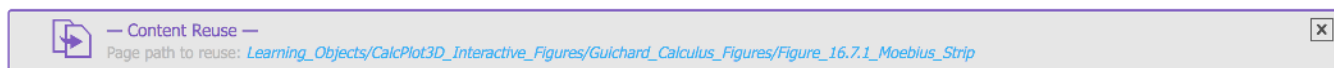
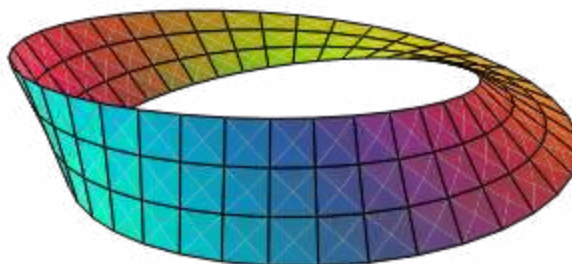


Figure 4: Content reuse placeholder for a CalcPlot3D dynamic figure when in Edit mode

And renders as:



If you would like to place a CalcPlot3D dynamic figure from the Learning Objects library in a figure, there is a template for that.

Select **Elements** > **Templates** and choose **Template:AddFigureCalcPlot3DReuse** (available on the LibreTexts Math Library). It will generate the following placeholder:

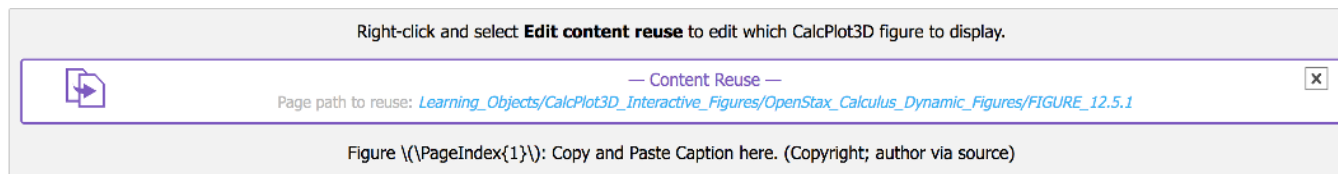


Figure 5: Template:AddFigureCalcPlot3DReuse placeholder with instructions to edit figure.

You can then follow the instructions at the top of the placeholder to right-click on the content reuse object, select **Edit content reuse**, and adjust the selection to the CalcPlot3D dynamic figure you want to use. Update the figure caption and remove the instructional text at the top of the figure and you'll be all set!

See examples in the [Overview](#) section at the top of this page.

Inserting Pre-made CalcPlot3D Figures from a Different LibreTexts Library

If you decide you'd like to insert a CalcPlot3D dynamic figure from a LibreTexts library other than the one in which you are building your custom text, this can be accomplished using a Cross-Library Reference, the library subject area, and the Page ID number for the CalcPlot3D dynamic figure you have selected.

Say we wish to insert the following figure from the LibreTexts Math Library on a page in another LibreTexts library (say Chemistry or Physics).

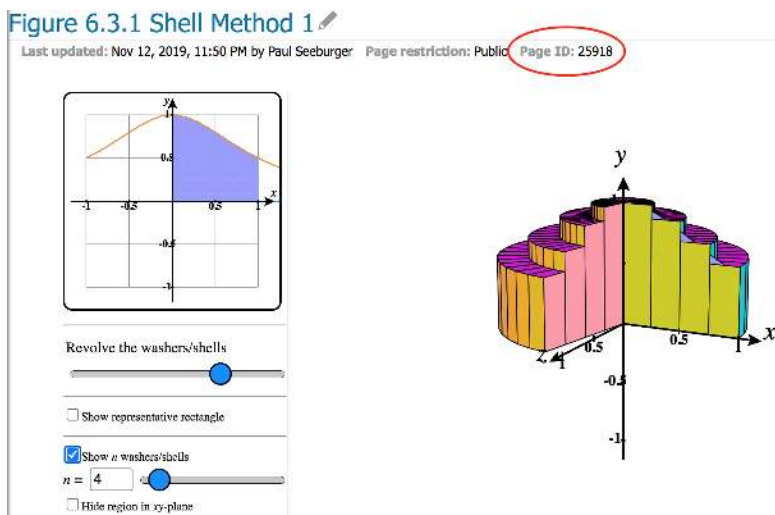


Figure 6: Static image of a CalcPlot3D dynamic figure from the LibreTexts Math Library, with its Page ID circled in red.

We would need to create a new page, name it, and then save it (before editing it) to set it up with the correct codes. Then we would edit the page again and click on the `</>` HTML button on the right end of the editing toolbar. Enter the following code.

```
<p class="mt-script-comment">Cross Library Transclusion</p>

<pre class="script">
template('CrossTransclude/Web',{ 'Library': 'math', 'PageID': 25918 });</pre>
```

Saving your page should reveal the CalcPlot3D dynamic figure you wanted. This code could also be placed inside a LibreTexts page with other text and figures, or you could set up a collection of figures each in their own page that you could easily place in other pages using the Content Reuse approach described above.

Note

This Cross Library Transclusion code can be used to insert any content from another library into your custom LibreTexts.

Creating your own CalcPlot3D Dynamic Figures using CalcPlot3D (without controls)

In this section, we'll discuss how to generate your own CalcPlot3D dynamic figures using the CalcPlot3D app. As stated above, there are two types, a basic rotatable 3D plot with no controls, and a 2D or 3D plot with controls. Since the first type is easiest to implement, we'll start there and then cover the second variety in the section titled [Creating your own Dynamic Figures using CalcPlot3D \(with controls\)](#) below.

1. Open [CalcPlot3D](#) and work out the figure you wish to include in your LibreTexts page. See the [CalcPlot3D Help Manual](#) for assistance with this.
2. Once you have the 3D plot as you want it to appear in the dynamic figure (including the initial orientation), click on the menu icon ($\equiv$) in the upper-left corner of the app, select **File** and then **Encode View in URL**. See Figure 7 below.

The page will reload with the new URL that will include a script that specifies the initial view. It should match the view you had set up in step 1.

3. Copy the entire query string following the question mark in the URL to the system clipboard. Ctrl-c (cmd-c on a Mac) will help you do this.
4. Use this query string to paste into the HTML code shown below in either the section titled [Creating Sharable CalcPlot3D Interactives in LibreTexts](#) or the section titled [Using Template:AddFigureCalcPlot3DNew to Insert your New CalcPlot3D Dynamic Figures \(without controls\)](#). Note that the second approach is easier for beginners, but there are some advantages to organizing your CalcPlot3D dynamic figures in a repository folder (see the next section).

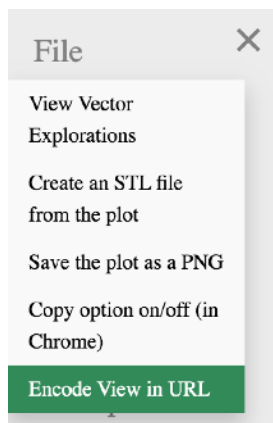


Figure 7: Use the **Encode View in URL** option on the **File** menu in CalcPlot3D to create the query string you will need here.

Creating Sharable CalcPlot3D Interactive Figures in LibreTexts

There is at least one advantage to creating standalone CalcPlot3D dynamic figure pages in your own repository folder (a "Book" in your Campus Hub or Sandbox). It makes your interactive figures much easier to share with others. All they need to do is follow the instructions above to use content reuse to insert your figures into their pages.

It also allows you to easily update the code for all your figures in one place. And if you happen to want a particular figure in multiple places in your LibreTexts, it's a great way to use transclusion to minimize the code you have to maintain moving forward.

This was the approach used to create the library of CalcPlot3D Interactive Figures in the **Learning Objects** library.

Since the typical user does not have permissions to add new objects there, we will cover how you can create your own repository of CalcPlot3D Interactive Figures. Initially you may practice this process in your Sandbox, but eventually you'll want to move your repository to your Campus Hub, once you have access to it. Note that all links should update when you decide to move this folder. You may wish to make the folder containing these files semi-private using the Permissions menu option on the Options menu for the folder.

The first step in this process is to get a copy of one of the existing CalcPlot3D figures (without controls) into this folder. You have two options to do this for the first time.

1. You can use the Remixer, possibly even using it to create the new "book" which will serve as a repository for your personally created CalcPlot3D dynamic figures, or
2. You can create a new Book in your Sandbox (or Campus Hub), naming it CalcPlot3D Repository (or similar), and then create a new page in this book. Then use **Elements > Content reuse** to import an existing CalcPlot3D figure into that page. Be sure there is nothing else in the page.

Once you have a transcluded copy of a CalcPlot3D figure, you will need to fork the page using the Forker option on the Options menu for the page (or the fork symbol to the right of the page title, if you used the Remixer). This should give you a full copy of a CalcPlot3D dynamic figure of your own to edit.

Once you have used either of these approaches, you should have a linked/transcluded copy of a CalcPlot3D dynamic figure in your repository folder. To create additional CalcPlot3D figures, you can just copy this one, giving it a new name!

From this new forked page, click the **Edit** button on the login bar. Note that the CalcPlot3D figure will still appear in rendered form in Visual edit mode. Click the **</> HTML** button in the upper-right corner of the edit window to change to HTML mode.

Replace the code shown highlighted in blue in Figure 8 with the query string you formed in Step 3 in the previous section. Note that depending on the figure you chose for this placeholder, the code may be longer or shorter than what is shown in this figure.

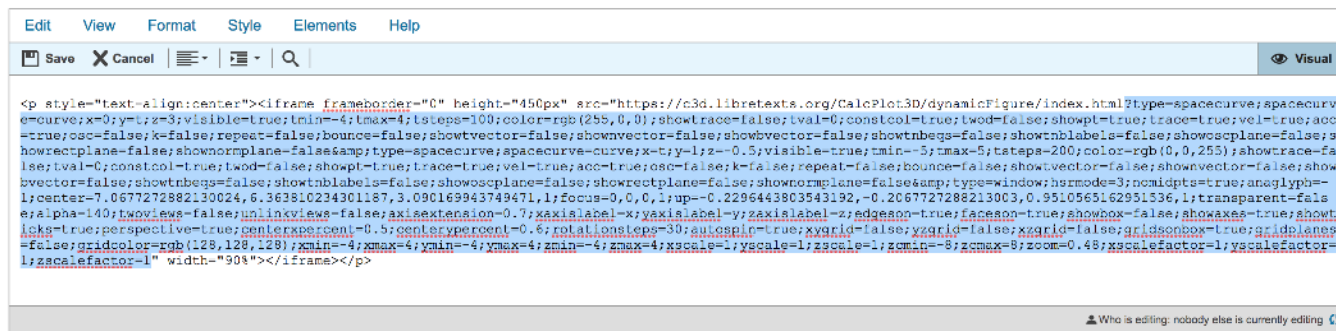


Figure 8: Highlighted query string code that needs to be replaced when you create a new CalcPlot3D dynamic figure using CalcPlot3D

Clicking of the **Visual** button to toggle back to view the WYSIWYG mode of the editor will actually let you see how the CalcPlot3D figure looks before you save it. If you need to adjust anything in the code, you can switch back to adjust it using the **</> HTML** button again. One of the most common options that you may wish to adjust is the zoom option, located about 4 script commands from the end of the query string. Decreasing the decimal number will make the 3D plot smaller. Increasing it will make the 3D plot larger.

You can actually adjust any of the options in the string, many of which are fairly intuitive. But these could also be adjusted using CalcPlot3D and updating the URL query string.

Note that when you create CalcPlot3D figures with this approach, it is very helpful to add a static image of the figure to the page holding the code for it. This makes the figures much easier to quickly browse in your repository, although it takes an extra step on your part.

Adding a Static Image to your Sharable CalcPlot3D Figure

Once the figure looks as you want it to look, take a screen snip of the figure using a tool like Snip & Sketch on Windows (or Shift-Cmd-4) to create and save an static image to serve as the thumbnail for this figure. Then open the **Page Settings** at the top of the page by clicking anywhere on this gray bar.

If the **Article Type** is not **Book or Unit** or **Chapter**, change it to one of these. This will allow the Thumbnail option to be shown. Once you have changed the **Article Type**, reload the page.

Next hover over the thumbnail image (it may be blank) in the upper-left corner and click on the pencil you should see there. This should allow you to load your saved thumbnail image and you will be all set!

Inserting your own CalcPlot3D Dynamic Figures in LibreTexts Pages

Next we will want to insert our new dynamic figure into a LibreTexts page. There are two basic ways to do this. We can either use **Content reuse** or the template, **Template:AddFigureCalcPlot3DReuse** to insert the new sharable CalcPlot3D Interactive figure we created above or we can use the template, **Template:AddFigureCalcPlot3DNew**, to hard-code the script for our new CalcPlot3D dynamic figure into the page.

Using Content Reuse or Template:AddFigureCalcPlot3DReuse to Insert your Sharable CalcPlot3D Dynamic Figures

If you have chosen to create sharable interactive elements for your CalcPlot3D figures, you can use **Elements > Content reuse** or the template, **Template:AddFigureCalcPlot3DReuse** to add them into your LibreTexts page, depending on whether you want them in a figure object or not. See the section above titled, [Inserting Pre-made CalcPlot3D Dynamic Figures from the Learning Objects Library](#) for instructions for how to do this. The only difference here is where you will look for the CalcPlot3D dynamic

figure you wish to reuse. Rather than looking in the Learning Objects library, you'll look in your own Interactive Figure repository in your Campus Hub (or Sandbox, if you are practicing).

Using Template:AddFigureCalcPlot3DNew to Insert your New CalcPlot3D Dynamic Figures (without controls)

We can also add a CalcPlot3D dynamic figure using the new template, **Template:AddFigureCalcPlot3DNew**. This template includes the actual HTML code for the CalcPlot3D object so that you can modify the parameters yourself or copy-and-paste the query string from the CalcPlot3D-generated URL into the provided HTML code. Once you have updated the code, you'll also want to remove the instructions given at the top of the figure.

When you insert the template, you will see the following:

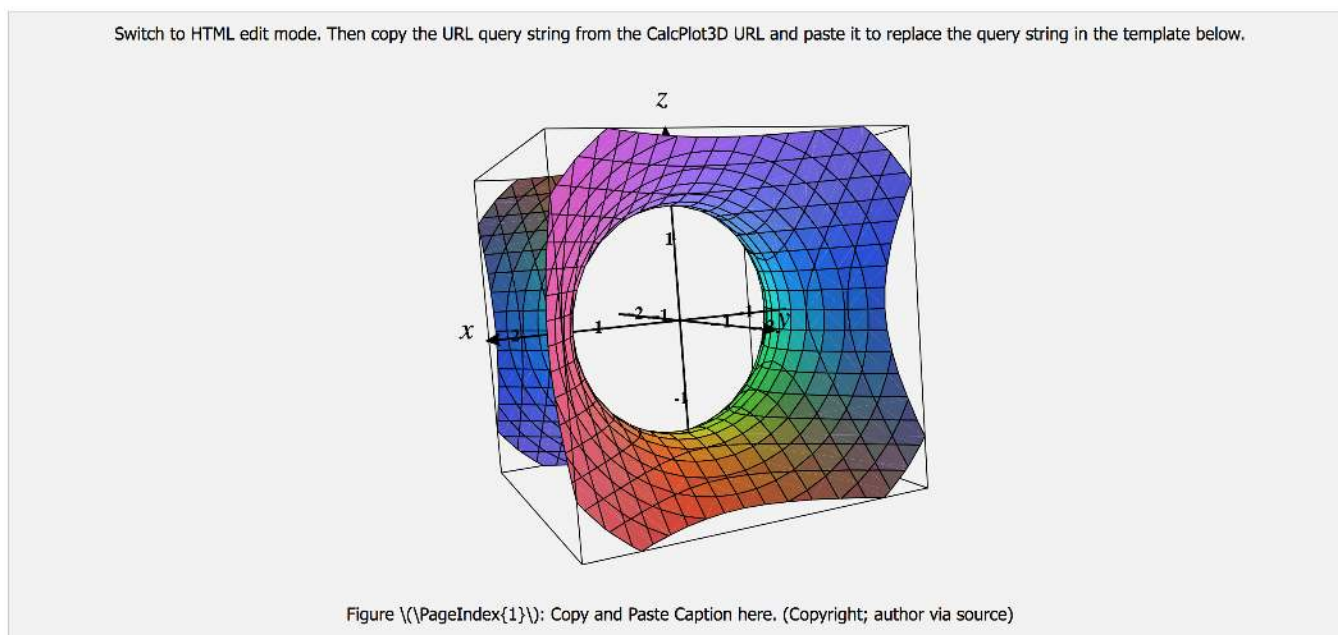


Figure 9: The appearance of the template **Template:AddFigureCalcPlot3DNew** when it is first inserted

To adjust the actual plot shown, you will switch to HTML edit mode using the button in the upper-right corner of the edit window labeled **</> HTML**. Then you will copy the query string in the URL generated by CalcPlot3D, as described above (everything after the ?) and paste it into the template code, replacing just the query string starting with ? and ending with "zscalefactor=1". See the highlighted portion of the code in Figure 10 below.

```
<figure>
<div style="width:100%">
<p style="text-align:center"><iframe frameborder="0" height="480px" src="https://c3d.libretexts.org/CalcPlot3D/dynamicFigure/index.html?type=implicit;equation-x^2-y^2/z^2+2; cubes=1.5;visible=true;fixdomain=false;xmin=-2;xmax=2;ymin=-2;ymax=2;zmin=-2;zmax=2;alpha=1;view=0;format=normal;constcol=rgb(255,0,0)&amp;type=window;nsrmode=3;nomidpts=true;anaglyph=1;center=3.8405533595127737,9.201727028826916,0.7605061339184678,1;focus=0,0,0,1;up=-0.1382725001695583,-0.1369532655300578,0.980879461893141,1;transparent=false;alpha=140;twoviews=false;unlinkviews=false;axisextension=0.7;xaxislabel=x;yaxislabel=y;zaxislabel=z;edgeson=true;faceson=true;showbox=true;showaxes=true;showticks=true;perspective=true;centerxpercent=0.5;centerypercent=0.5;rotationsteps=30;autospin=true;xygrid=false;yzgrid=false;zxgrid=false;gridsonbox=true;gridplanes=false;gridcolor=rgb(128,128,128);xmin=-2;xmax=2;ymin=-2;ymax=2;zmin=-2;zmax=2;xscale=1;yscale=1;zscale=1;zmin=-4;zmax=4;zsom=0.75;xscalefactor=1;yscalefactor=1;zscalefactor=1" width="90%"></iframe></p>
</div>
<figcaption>Figure \{\PageIndex{7}\}: The default CalcPlot3D&nbsp;&nbsp;&nbsp;plot in this template</figcaption>
</figure>
```

Figure 10: Replace just the query string shown highlighted in the HTML code above.

One advantage of this method of inserting your CalcPlot3D dynamic figures is that you can see how they look in the Visual mode as you edit the page.

Rendering the default figure (with the instructions line removed):

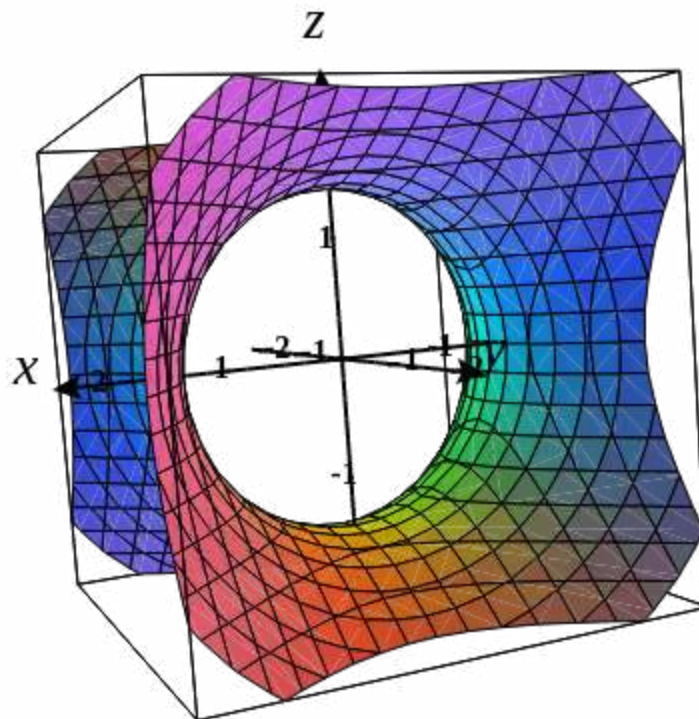


Figure 11: The default CalcPlot3D plot in this template

Creating your own CalcPlot3D Dynamic Figures using CalcPlot3D (with controls)

Several types of plots in CalcPlot3D can be used to generate dynamic figures that include scrollbars, textboxes or other controls that meaningfully control aspects of the figure.

These are (so far):

1. Any plot that uses parameter sliders
2. Any space (or plane) curve plot can include sliders and an animate button (as shown in Figure 3 above).
3. Any volume of revolution figure can include a whole set of controls (as shown in Figure 2 above).
4. The trace plane can be shown along with the rotatable 3D plot when contours are shown in the 3D plot, allowing an input point in the trace plane to be moved around while displaying the corresponding output point on the surface. (See Figure 12 below.)

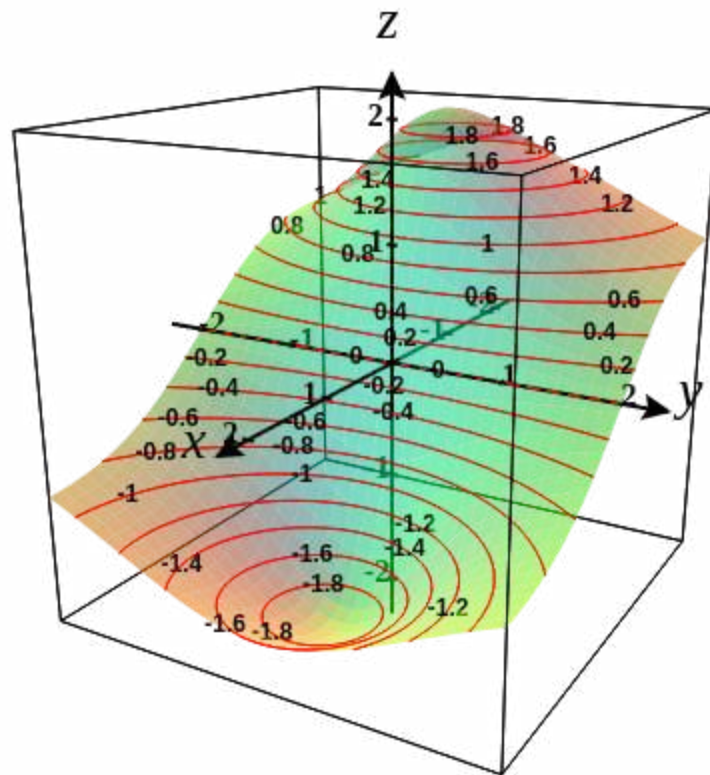


Figure 12: Example figure showing contour plot and trace plane control.

If you have other situations that you'd like to animate that are not covered here, please send a detailed request of your idea to Paul Seeburger.

Creating the URL Query String in CalcPlot3D for a Dynamic Figure with Controls

To make a CalcPlot3D dynamic figure that includes meaningful controls, it does need to include certain things for this to happen.

If you include parameters and parameter sliders are visible on the control panel when in CalcPlot3D, this plot can be converted into a dynamic figure with controls.

Secondly, as mentioned above, any volume of revolution and any plane curve or space curve can be converted into a dynamic figure with controls.

And finally, if you create a contour plot for a function of two variables and save it to the URL when the main plot window is 3D, but still showing the contours on the surface, then this can be converted into dynamic figure like that shown in Figure 12 above.

Once you have created your plot in CalcPlot3D, use the process described above in the section titled [Creating your own CalcPlot3D Dynamic Figures using CalcPlot3D \(without controls\)](#). That is, use the **Encode View in URL** option on the **File** menu

to obtain the query string for the CalcPlot3D plot. Copy the query string to the clipboard, as described above and then follow the instructions below.

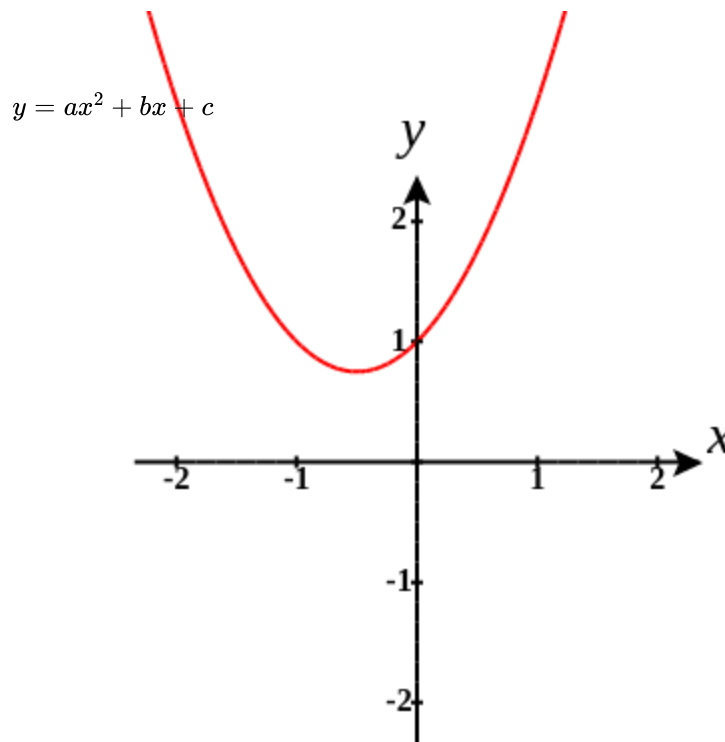


Figure 13: Example figure showing 2D plot with parameter controls.

Inserting CalcPlot3D Dynamic Figures with Controls in LibreTexts Pages

Creating Sharable CalcPlot3D Dynamic Figures with Controls

First, you will need to either create a copy of a similar CalcPlot3D dynamic figure with controls in your repository folder. If you already have one there, just copy it. If not, copy one from the Learning Objects library, following the steps described in section [Creating Sharable CalcPlot3D Interactive Figures in LibreTexts](#) above.

Second, you should check that the figure does indeed use the correct URL to call CalcPlot3D. If it has controls, it should call the following base URL before the query string:

`https://c3d.libretexts.org/CalcPlot3D/dynamicFigureWCP/index.html`

Note that the only thing that is different here is that the base URL has the characters 'WCP' after 'dynamicFigure' in its path. The WCP represents, "With Control Panel".

Third, you can paste the query string from your CalcPlot3D plot into this new template that you have made.

This means that in order to add a CalcPlot3D dynamic figure **with controls**, you will either need to copy an existing figure with controls or you will need to modify the HTML base URL by adding these three letters (WCP).

There are a number of special commands you may wish to add to the script in the URL query string to adjust what appears and how it is labeled.

Useful Script Commands for CalcPlot3D Dynamic Figures

For CalcPlot3D dynamic figures with controls there are a few options that you may wish to add to the query string by hand. There are even a few commands listed in the last bullet below that can be used for CalcPlot3D dynamic figures with or without controls.

- You can add a `name` attribute and/or a `noanimate` attribute to any sliders. For example, “noanimate=true;name=n_x”. Note that each object, including the sliders, starts with “type=” in the query string. To clarify, these attributes must be set in the definition of the relevant slider object.

See:

```
type=slider;slider=a;value=1;steps=2;pmin=1;pmax=3;repeat=true;bounce=true;waittime
```

The `name` attribute changes the label of the slider to the supplied name, using MathJAX to format the supplied name. This means you can use LaTeX in the name.

The `noanimate` attribute allows you to hide the **Animate** button on the slider control, if you wish.

- For figures showing the trace plane (currently those with contour plots), you can add one or more of the following attributes to the window element at the very end of the query string: “hidexyliders=true; hidetracevalue=true;hidetracepoint=true;”

See:

```
type=window;hsrmode=3;anaglyph=-1;center=-7.447051206708178,-2.790794355991455,3.71
focus=0.5,0.5,0.5,1;up=0.39804763218685024,0.14521777837291014,0.9057979241281567,1
unlinkviews=false;axisextension=0;xaxislabel=%20;yaxislabel=%20;zaxislabel=%20;edge
showaxes=false;showticks=false;perspective=true;centerxpercent=0.5;centerypercent=0
xygrid=false;yzgrid=false;xzgrid=false;gridsonbox=false;gridplanes=true;gridcolor=r
xmin=0;xmax=1;ymin=0;ymax=1;zmin=0;zmax=1;xscale=1;yscale=1;zscale=1;zcm=-4;zcmx
xscalefactor=1;yscalefactor=1;zscalefactor=0.5;
hidexyliders=true;hidetracevalue=true;hidetracepoint=true;
width="90%"></iframe></p>
```

Here the `hidexyliders` tag allows you to hide the *x*- and *y*-sliders that appear below the 2D trace plane by default.

The `hidetracevalue` tag allows you to hide the trace value normally displayed on the 3D plot when moving a trace point around on the 2D trace plane (and 3D surface).

The `hidetracepoint` tag allows you to hide the trace point that may otherwise be shown when you click on the 2D trace plane that appears here.

- For figures that include volumes of revolution, you may wish to add the `hideaxisofrev` command.

See:

```
type=window;hsrmode=0;nomidpts=false;anaglyph=-1;center=5,3,10;focus=0,0,0,1;up=0,2
alpha=140;twoviews=false;unlinkviews=false;axisextension=0.7;xaxislabel=x;yaxislabe
faceson=true;showbox=false;showaxes=true;showticks=true;perspective=true;centerxper
centerypercent=0.42;rotationsteps=30;autospin=true;xygrid=false;yzgrid=false;xzgrid
gridplanes=false;gridcolor=rgb(128,128,128);xmin=-1;xmax=5;ymin=-2;ymax=4;zmin=-4;z
zscale=2;zcm=-8;zcmx=8;zoom=0.37;xscalefactor=1;yscalefactor=1;zscalefactor=1;
```

```
rotatestart=0;rotatedirectionx=1;rotatedirectiony=0;hidexyliders=true;hidetraceval  
hidetracepoint=true;hideaxisofrev=false" width="90%">
```

- Note the other commands shown here can be used in any CalcPlot3D dynamic figure (with or without controls).

The `rotatestart` attribute can have values between 0 and 100 and allows you to set an initial rotation speed. The default speed is 0 which will not cause any initial rotation.

The `rotatedirectionx` and `rotatedirectiony` attributes allows you to specify the initial direction of rotation. Typically these values should be between -1 and 1.

Other commands will likely be created as new features are added to CalcPlot3D to accommodate new types of dynamic figures with controls.

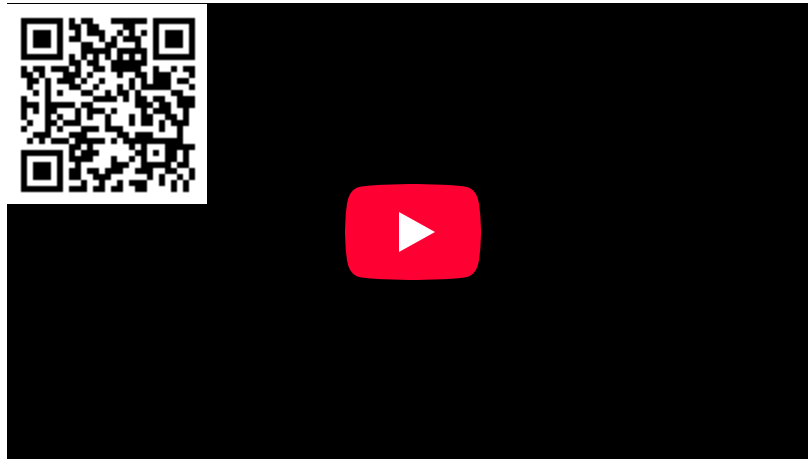
This page titled [Creating Dynamic Figures with CalcPlot3D](#) is shared under a [CC BY-SA](#) license and was authored, remixed, and/or curated by [Paul Seeburger](#).

Hypothesis Annotation

Due to COVID19 this course is being run online and using a variety of web tools. This section provides instructions on many of the tools used in this class. For example, if you properly set up email notifications you will get an email with the course Zoom link 10 minutes before class. If you properly set up Zoom you can run two monitors, one that you are working on, and the other that shows the instructors desktop.

Email Notifications

This class will use Zoom and you need to be logged in by 8:40 AM. We will use the same Zoom link for lecture and lab and it will be emailed to you. I suggest you set up an email notification through your Google Calendar and the following video shows you how to do that for the duration of the class (with the email containing the link being sent 10 minutes before class).



Hypothes.is Web Annotations

This class will use the Hypothes.is web annotation service that is integrated into LibreText. You need to go to <https://web.hypothes.is/> and create an account. Please start your username with your last name so you can easily be identified for grading purposes. You should follow it with an underscore and then anything you want, so my username could be belford_123. You will then need to join the class group, which is a private group. You will be sent an email invitation or contact your instructor, and you should only make annotations in the group.

The following YouTube gives a quick demonstration on the use of the Hypothes.is Web Annotation service.



Making Annotations

To make an annotation you simply highlight the text you want to annotate, choose "Annotate" and write in the overlay. Note, the first time you open up a page it will post to "Public" and you need to change that to your class group. Once you have started posting to the class group that will be the default option, but initially the default is public.



Figure 1: To annotate you simply

highlight text and write in the overlay. (Copyright; Belford, cc.0)

If you tag your annotation you can easily find it by going to your homepage in hypothes.is and then filtering by tags. So you may want to make tags like "exam 1", or "nomenclature". If you then filter with your hypothes.is user name and exam 1, you see those items you tagged. If you just do exam 1, you filter for everything the class tagged exam 1. You can then click the contextual link by the annotation, and hypothes.is will open that page, navigate to the highlighted text and display the annotation. (Note: In LibreText the highlights are hidden by default, and you need to click the "eye" with the slash over it (figure 2

Using the Hypothes.is Overlay to read discussions

By default the hypothes.is overlay is closed and you do not see the annotations.

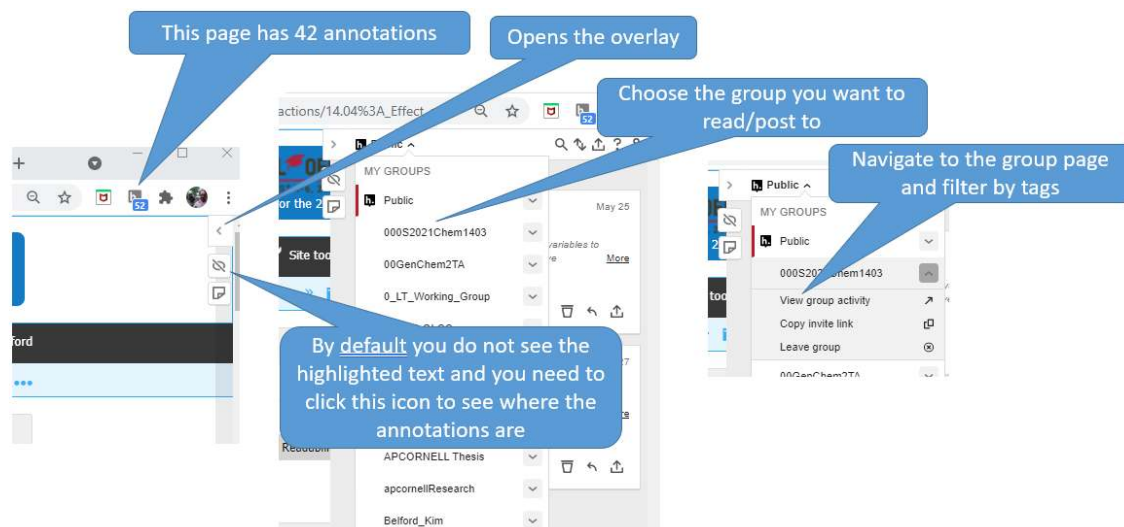
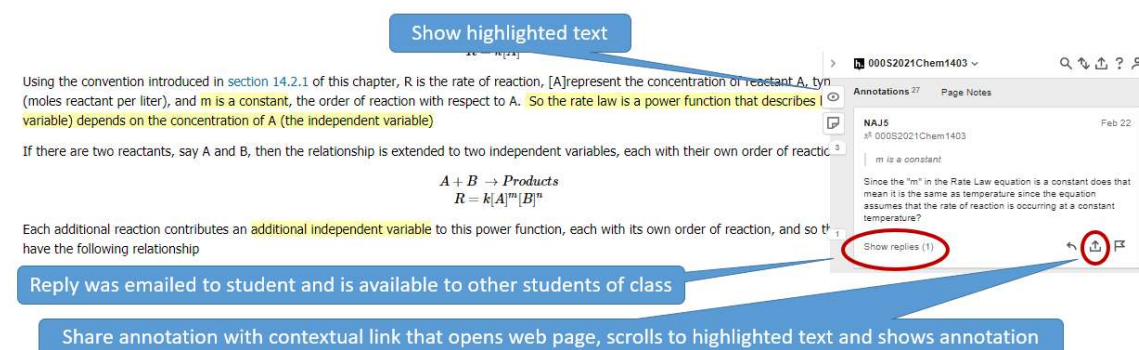


Figure 2: By

default the overlay is closed and annotations are hidden. This image shows how to pick a group and view group activity (Copyright; Belford CC0)

Figure 2 shows how to pick a group and view group activity.



Using the convention introduced in section 14.2.1 of this chapter, R is the rate of reaction, $[A]$ represent the concentration of reactant A , typ (moles reactant per liter), and m is a constant, the order of reaction with respect to A . So the rate law is a power function that describes I (variable) depends on the concentration of A (the independent variable)

If there are two reactants, say A and B , then the relationship is extended to two independent variables, each with their own order of reaction

$$A + B \rightarrow \text{Products}$$

$$R = k[A]^m[B]^n$$

Each additional reaction contributes an additional independent variable to this power function, each with its own order of reaction, and so the relationship have the following relationship

Reply was emailed to student and is available to other students of class

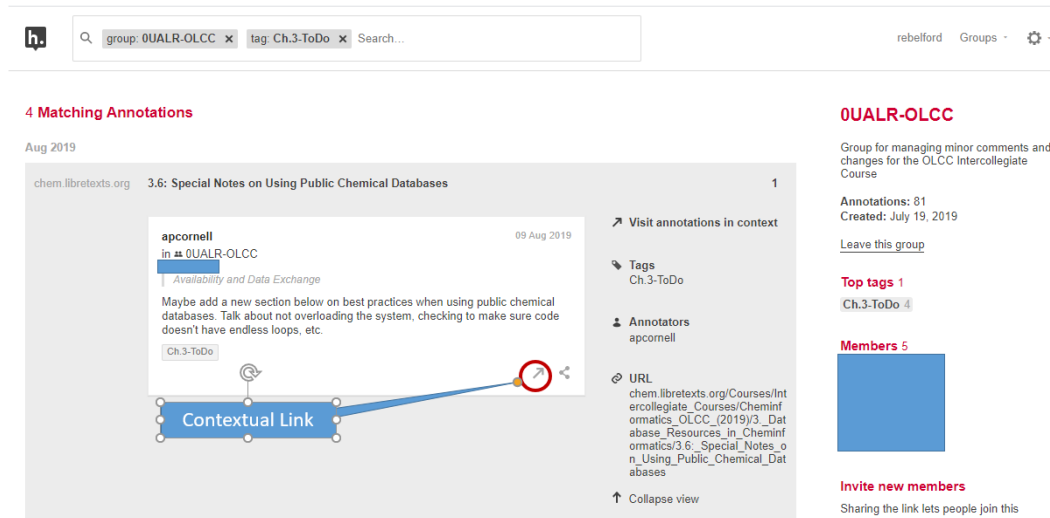
Share annotation with contextual link that opens web page, scrolls to highlighted text and shows annotation

Figure 3:

Annotation and highlights text being displayed. (Copyright; Belford CC0)

Using tags

Tags are a very powerful way of organizing your notes and Hypothes.is has different types of tags. Your class group is a tag, and when you click on your hypothes.is group activity (figure 2) you only see items posted to your class (note the first tag in the search filter of figure 4 is a group tag. If you then click your name you see those you have posted to that group. If you remove the group you see all the annotations you have posted anywhere. If you generate a tag based on a topic or exam, you can then easily find that information. Figure 4 shows a filter using two tags that resulting in four items in a student's "To Do list" for chapter 3 of a cheminformatics class



4 Matching Annotations

Aug 2019

chem.libretexts.org 3.6: Special Notes on Using Public Chemical Databases 1

apcornell in 0UALR-OLCC 09 Aug 2019

Availability and Data Exchange

Maybe add a new section below on best practices when using public chemical databases. Talk about not overloading the system, checking to make sure code doesn't have endless loops, etc.

Ch.3-ToDo

Contextual Link

Visit annotations in context

Tags Ch.3-ToDo

Annotators apcornell

URL chem.libretexts.org/Courses/Intercollegiate_Courses/Cheminformatics_OLCC_(2019)/3_Database_Resources_in_Cheminformatics/3.6_Special_Notes_on_Using_Public_Chemical_Databases

Collapse view

0UALR-OLCC

Group for managing minor comments and changes for the OLCC Intercollegiate Course

Annotations: 81 Created: July 19, 2019

Leave this group

Top tags 1

Ch.3-ToDo 4

Members 5

Invite new members

Sharing the link lets people join this group.

Figure 4: Hypothes.is

search filtered by the group tag 0UALR-OLCC (which was a class group) and a student's tag "Ch.3-ToDo". (Copyright; Belford CC0)

If the student clicks the contextual link hypothes.is will open the webpage that was highlighted, scroll down to the highlighted section and show the annotation in the overlay. This allows students to organize their notes on LibreText and quickly find content. If you get the chrome plugin you can even annotate material outside of LibreText and connect it to your material and notes within LibreText, as long as the material does not require a login to access. It should also be noted that you can not highlight hidden text within LibreText (like the answers to exercises), and if you have a question on the answer to an exercise, you should highlight the question, not the answer.

Accessing Google Classroom

If you open your Google Mail you will see 9 dots by your name which opens the Google Suite. If you scroll to the bottom you will find Google Classroom, and if you open the Drive you will also find a folder called Classroom where you can find your assignments.

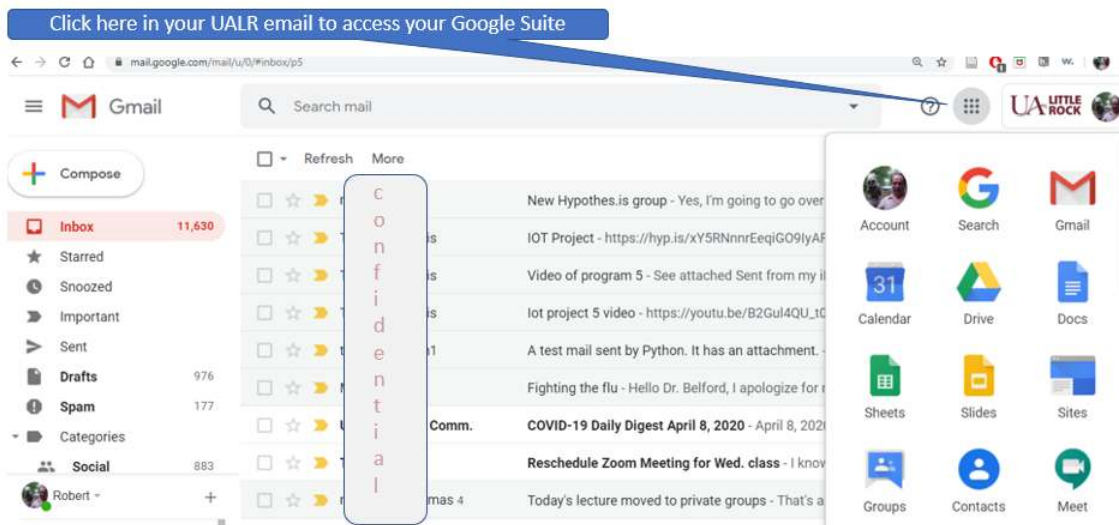


Figure 1: How to

access the Google suite.

Contributors and Attributions

[Robert E. Belford](#) (University of Arkansas Little Rock; Department of Chemistry). The breadth, depth and veracity of this work is the responsibility of Robert E. Belford, rebelford@ualr.edu. You should contact him if you have any concerns. This material has both original contributions, and content built upon prior contributions of the LibreTexts Community and other resources, including but not limited to:

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Remixing a Book to Your Sandbox

This page will cover the basics of how to use the **Remixer** to create a custom textbook in your sandbox.

Note that there are more detailed instructions for this process available here: [Construction Guide - How to Make a LibreTexts Remix](#).

Remixing a Custom Textbook:

Although a textbook on the LibreTexts platform can be created one Chapter and Section at a time, either written from scratch, copied from the source books one section at a time, or using the Content Reuse option to transclude/mirror existing source pages from the Bookshelves, the Remixer offers a much faster way to set up a custom course textbook from the source books on the Bookshelves or even from other customized course books in Campus Bookshelves.

If you choose to create a textbook from existing source pages, your remixed textbook will contain transcluded/mirrored links to the source pages rather than immediately creating distinct copies of them all. These sections can still be renumbered to match your chapter and section organization (and this will be reflected in Figures, Examples, Theorems, etc.), and the pages will update if any typos are fixed in the linked source pages. If you find any typos as you proofread your remixed book, please contact Paul Seeburger or someone else at LibreTexts to fix them for you. Once you become proficient at editing LibreText pages, you may also be given permission to go to the source pages to fix them yourself! To contact us about typos, either use the Leave Feedback button near the bottom of the relevant page (to the right of "Was this article helpful?") or email me or Delmar directly about it. Please be very specific, so we can quickly fix the issue(s).

Once your book is created, if you desire to customize the content of a section yourself, you can “fork” it, creating a distinct copy of the original page that is no longer linked to the source page. Your changes to it will not affect the original page on the Bookshelves and edits to the original will no longer affect your copied version. It is even possible to use the Reuse Content feature to transclude subsections of a page and to insert your own additional custom exposition before and after it. In fact, on any transcluded section, you will always have the option to add your own text or other materials at the top or bottom of the page, while leaving the rest of the section linked to the original source!

Now, before you are ready to Remix a new textbook, you will need to survey the textbooks on the Bookshelves and possibly also those that are in Campus Bookshelves. Once you know which books, chapters, and sections you wish to use to create your new custom course text, it's time to open the Remixer and get started!

Once you are logged into LibreTexts as an author/editor/viewer, you will see the following bar near the top of the page:



Unlike the other options (except Downloads), it does not matter what page you are on for the Remixer. It will take you to the same place. The first time you open the Remixer, it will look like the following:

The Remixer works best on Chrome browsers; if you do not see anything below this text within 15 seconds please switch to Chrome.

The OER Remixer tool allows the rapid assembly of customized Remixes from existing sources on our comprehensive and ever-growing libraries. See the Remixer Tutorial in Chapter 7 of the [Construction Guide](#) for more details for an explanation of the Remixer's interface and videos to a walkthrough videos of how to do basic tasks with the OER Remixer. Your [Remixing Map](#) is stored automatically on your computer as you build, so you do not have to complete your Remix in one setting. If you switch to a different computer, you will want to save the Map.

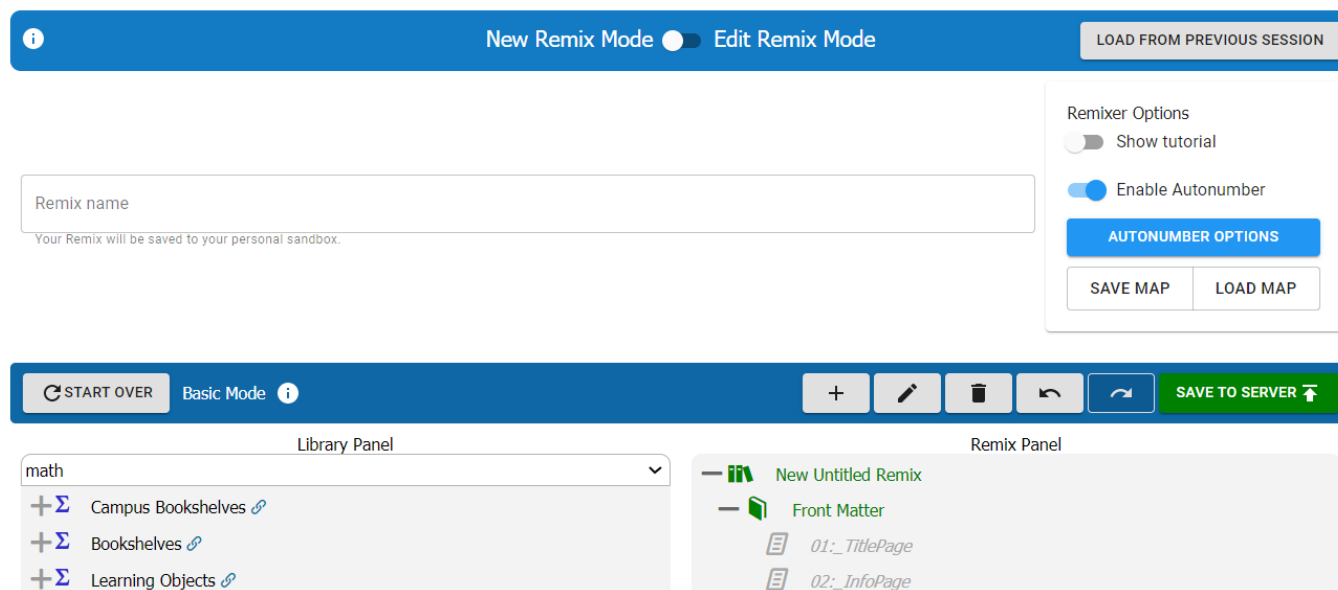


Figure 1: Initial view of the Remixer

Note that after you use the Remixer, it will store a cookie on your computer and will therefore remember what you last used the Remixer to do. If you want to go back to that Remix to continue working on it, click on the Load From Previous Session button in the upper-right corner. The Remixer will then show the last remix you worked on in the state in which you left it.

By default, the Remixer provides five empty untitled chapters. I usually don't want these empty chapters. To clear these quickly or to simply start over, we can click on the **Start Over** button with the circular arrow on the left side of the blue bar above the Library Panel. This will clear any content in the Remix Panel to the lower right. When you start over, you will be asked the number of provided empty Chapters and Sections (pages) in each chapter. I prefer to add empty pages to my custom books directly rather than using the Remixer, so I would usually choose 0 Chapters and 0 Pages per Chapter. You'll still be given Front Matter and Back Matter for your new book.

You can now name your textbook in the top textbox labeled **Remix name**. We recommend making this the course name, although, you can use whatever makes sense for your situation.

By default your Remixes (custom textbooks) will first be published to your Sandbox. Once you are ready for your custom textbook to go live, one of the curators will be glad to help you move it to your campus bookshelf located in Campus Bookshelves and give you editing rights to your book there so you will be able to continue to customize the book as you begin to use it.

As discussed above, by default the Remixer will create linked (transcluded) copies of the source pages when it creates your custom book. Note that this will still create your own "forked" and editable versions of the top level book page and chapter pages (those that show the sections in each chapter). This means you can add additional pages to these whenever you wish. As mentioned before, you can actually also add your own text before or after the transcluded content on any given page while keeping this content linked to the source. Or you can also "fork" the page, giving you a distinct full copy of the content that you can edit and customize to your heart's content. It will no longer update when typos are fixed in the original source pages, and your changes will not affect others using the source pages.

As you get started using the Remixer (or as a refresher later on), you can turn on the Remixer Tutorial by clicking the slider on the right under **Remixer Options** labeled **Show tutorial**. It contains a lot of useful information, some of it similar to what is found

here. There is also a chapter in the LibreTexts **Construction Guide** on Remixes. Although this tutorial covers the basic steps of the process, we recommend that you read that as well. There is a link to this guide on top of the Remix page (and a link to it at the top of this tutorial page too).

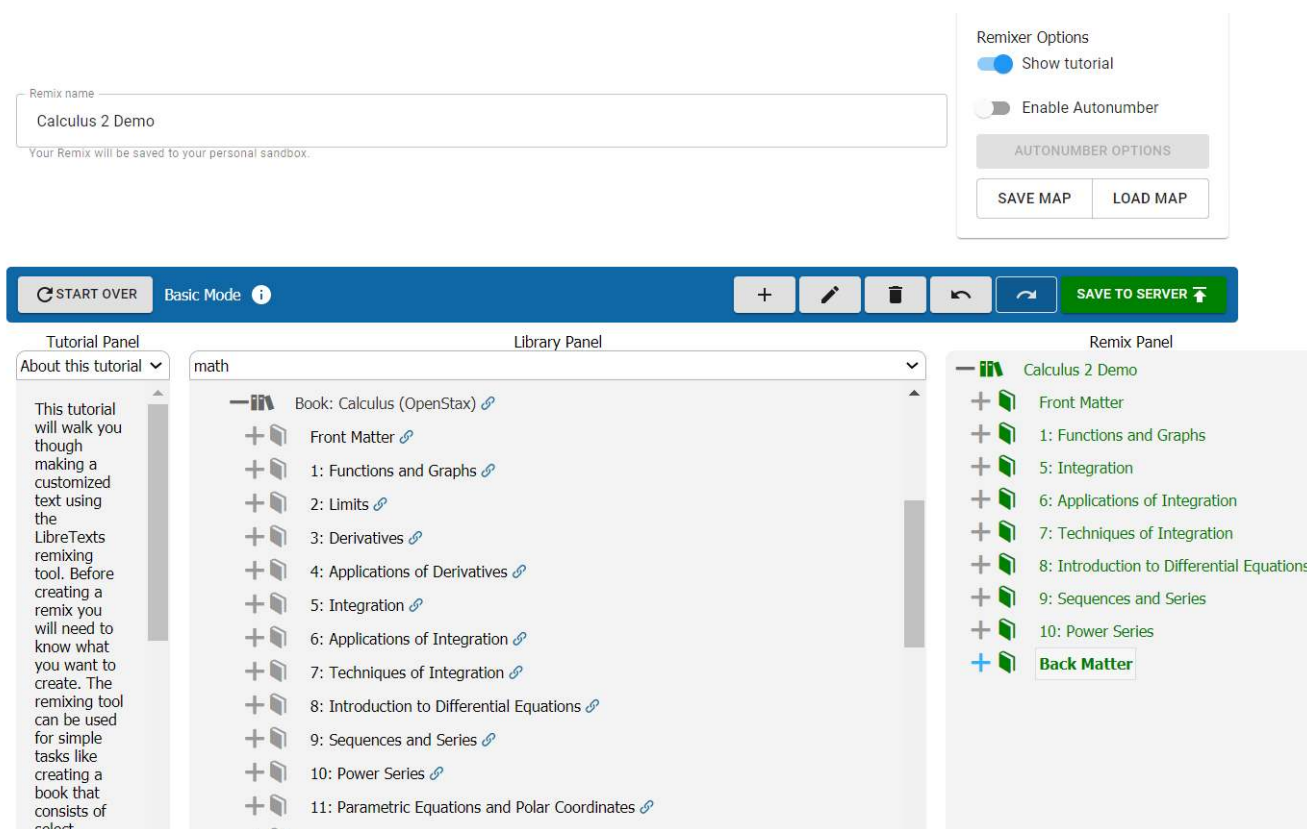
The **Autonumber** feature can be helpful, particularly if you are mixing content from multiple books or not using all the sections in some chapters of the original book. If turned on, it will facilitate the numbering of your chapters and sections to automatically start with Chapter 1 and Section 1.

But occasionally, Autonumber may adjust the numbering in ways that do not match your desires (e.g., if you want to start with Chapter 12). In that case, turn it off and go from there. You can turn it on or off at any time, but when it is on, it will take over and renumber all sections in your Remix.

Now find a book in the Library Panel on the left from which you wish to reuse content. Once you find it, you have several options.

- You can click and drag on the entire book, dragging it just above the top title layer in the Remix Panel on the right. This will allow you to copy the entire book all at once.
- You can click and drag a whole chapter at a time and drop it below the top title level of the Remix Panel, placing it in the order you wish it to appear in the book.
- You can also simply click and drag one section at a time and place it in your remixed book where you wish it to appear.

In the example shown below, a custom book was made for a Calculus 2 class from middle chapters of the OpenStax Calculus text in the Bookshelves. Note that Autonumber needed to be turned off in order to maintain the chapter numbers 5 - 10 rather than automatically converting them to chapters 2 - 7.



The screenshot displays the LibreTexts Remix interface. At the top, there's a 'Remix name' field containing 'Calculus 2 Demo' and a note 'Your Remix will be saved to your personal sandbox.' To the right, the 'Remixer Options' panel shows 'Show tutorial' as a toggle switch and 'Enable Autonumber' as a toggle switch that is currently turned off. Below these are 'SAVE MAP' and 'LOAD MAP' buttons.

The main interface is divided into three panels:

- Tutorial Panel:** Contains a dropdown menu 'About this tutorial' and a text area with instructions on how to use the remixing tool.
- Library Panel:** Displays a list of books and chapters. The selected book is 'Calculus (OpenStax)'. The chapters listed are: Front Matter, 1: Functions and Graphs, 2: Limits, 3: Derivatives, 4: Applications of Derivatives, 5: Integration, 6: Applications of Integration, 7: Techniques of Integration, 8: Introduction to Differential Equations, 9: Sequences and Series, 10: Power Series, and 11: Parametric Equations and Polar Coordinates.
- Remix Panel:** Shows the structure of the custom book. It includes 'Calculus 2 Demo' at the top, followed by 'Front Matter', '1: Functions and Graphs', '5: Integration', '6: Applications of Integration', '7: Techniques of Integration', '8: Introduction to Differential Equations', '9: Sequences and Series', '10: Power Series', and 'Back Matter' at the bottom.

Figure 2: A Calculus 2 Remix with Autonumber off.

If you create any sections you do not want, or if you did not click Start Over to clear the default chapters, you can use the delete button (a trash can icon) to delete them. There are undo and redo buttons, and a pencil icon to allow you rename sections or modify other settings. Many of these are more advanced settings, and it's recommended that you leave them at their default values unless you know what you are doing (or just want to experiment with them to see what they do).

If you already know there are a few Sections that you plan to write yourself, you can add these blank pages now and title them, using the button with the plus sign on it.

But these will be easy to add later as well. You will just go to the Chapter page in which you wish to add a Section and click the **New** button (which is just to the left of the Remixer button) on the author bar, select a Page/Section, enter a title for the page, save it (before editing it) and then click the Edit button again to add your content. (The first save sets some important settings.)



Just before publishing your new textbook, we recommend that you use the **Save Map** button to save your new Remix. This makes it easy to share the Remix with someone else or to load it back in to create another version of the text. Most of the time, we will not need this again, but it allows you to keep a record of your Remix that you could review later, if you desire.

Once you are happy with the Chapters and Sections in your new textbook, it's time to publish it to your Sandbox folder. Click on the green **SAVE TO SERVER** button. You should see something like the following screen:

[OER Remixer](#)

The Remixer works best on Chrome browsers; if you do not see anything below this text within 15 seconds please switch to Chrome.

The OER Remixer tool allows the rapid assembly of customized Remixes from existing sources on our comprehensive and ever-growing libraries. See the Remixer Tutorial in Chapter 7 of the [Construction Guide](#) for more details for an explanation of the Remixer's interface and videos to a walkthrough videos of how to do basic tasks with the OER Remixer. Your [Remixing Map](#) is stored automatically on your computer as you build, so you do not have to complete your Remix in one setting. If you switch to a different computer, you will want to save the Map.

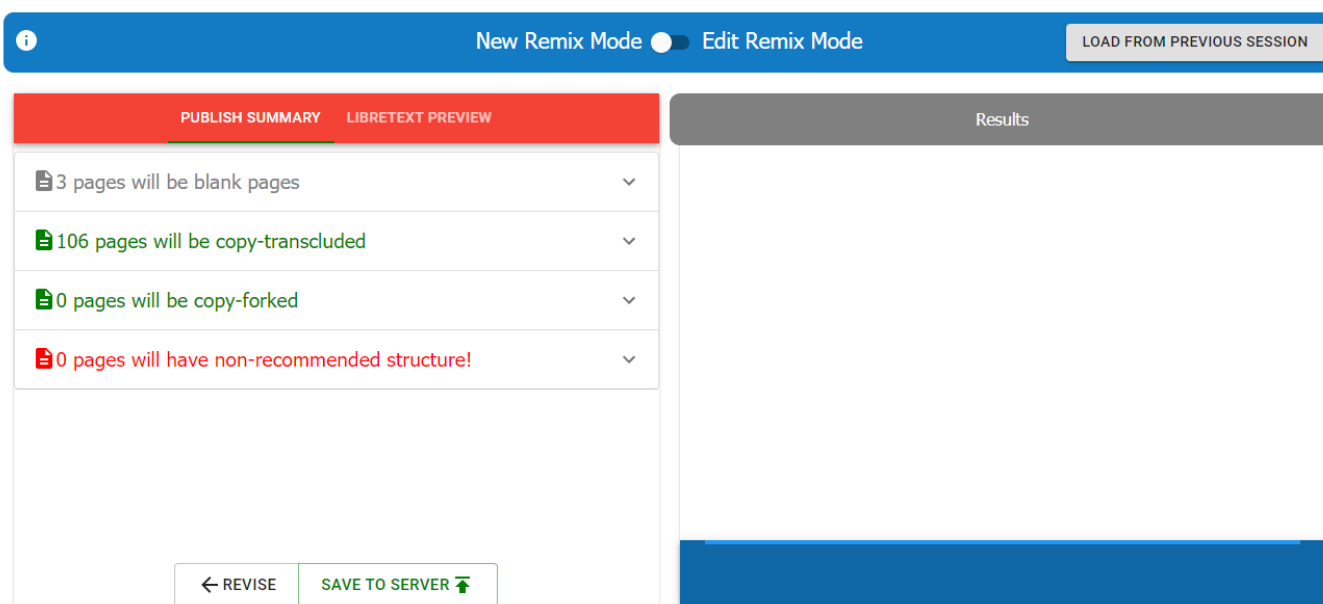


Figure 3: Summary view of the Remix before final publishing step.

The left panel displays a summary of the pages being created.

Now click the **SAVE TO SERVER** button again and you will see the progress being made on creating your new textbook, one section/page at a time. The results should look something like this:

The Remixer works best on Chrome browsers; if you do not see anything below this text within 15 seconds please switch to Chrome.

The OER Remixer tool allows the rapid assembly of customized Remixes from existing sources on our comprehensive and ever-growing libraries. See the Remixer Tutorial in Chapter 7 of the [Construction Guide](#) for more details for an explanation of the Remixer's interface and videos to a walkthrough videos of how to do basic tasks with the OER Remixer. Your [Remixing Map](#) is stored automatically on your computer as you build, so you do not have to complete your Remix in one setting. If you switch to a different computer, you will want to save the Map.

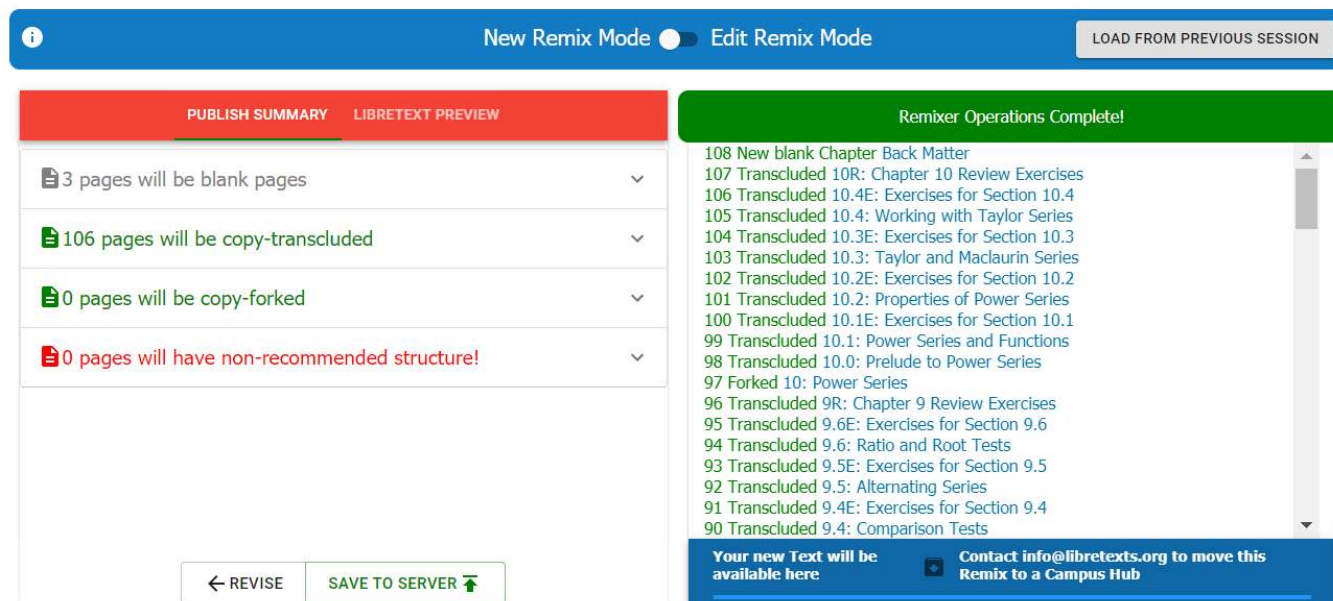


Figure 4: Published Remix showing a log of completed steps and links to view the text, etc.

Note in Figure 4 above that the Chapter pages are labeled as “Forked”. As mentioned above, this means that these pages are completely yours to edit freely. The other pages, marked “Transcluded”, can actually also be edited (adding text above and below the transcluded text), but they currently contain Content Reuse elements that you can adjust as you decide to customize them more fully. You’ll be able to “fork” these transcluded pages to fully edit them when and if you choose to do so.

Note the text on right side of the blue bar in the lower right corner of the window, “Contact info@libretexts.org to move this Remix to a Campus Hub.” As mentioned before, once you are ready for your textbook to go “live”, you can have it published to your Campus folder in the Campus Bookshelves. If one does not yet exist for your institution, one will be created for you. Note that the book does NOT need to be completed before you place it in your Campus Hub. You will likely be continuing to customize it each semester you use it.

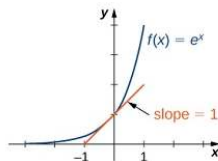
Now click the white text on the left side of the blue rectangle, “Your new Text will be available here”. This should open your new textbook in your Sandbox! And now you can begin to customize it. See image below for this textbook.

Moving your Remix to the Campus Hub

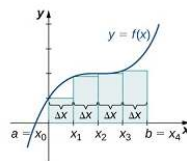
As user with an Instructor account, contact info@libretexts.org once you are ready to move this Remix to a Campus Hub.



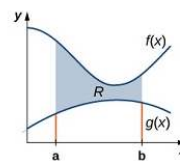
Front Matter



1: Functions and Graphs



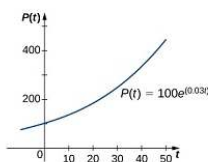
5: Integration



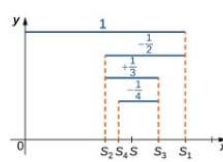
6: Applications of Integration



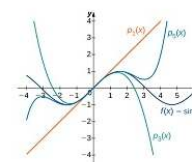
7: Techniques of Integration



8: Introduction to Differential Equations



9: Sequences and Series



10: Power Series

Figure 5: Image of the published Calculus 2 Demo Remix textbook

Note that a message is also displayed on the remix's title page reminding you how you can request for it to be moved to your Campus Hub.

Re-Remixing an Existing Textbook to Adjust its Contents:

Once you have created a course textbook, there are several options for adjusting its contents. You can, of course, add your own new material or “fork” and customize the existing sections. You can add new transcluded/mirrored content by using the Reuse Content option in a new Section/Page that you can add directly in your Chapter folders.

But it's also possible to use the Remixer to **Re-Remix** the book (or edit the remix), adjusting which sections you include and perhaps adjusting the section numbers and names all in one place. For example, when I created my MCC Intermediate Algebra LibreText, I realized that I needed to add a couple of additional sections to my book from another source book after I had already published it. This was quite easy to do using this feature!

Now let's say we want to remove Section 8.5 from the Calculus 2 book we created above and add an Appendix with Trig identities, etc.

1. First we need to enter the Remixer again. Click on the Remixer button from any page. Now move the selector button from **New Remix Mode** to **Edit Remix Mode**. See Figure 6 below.

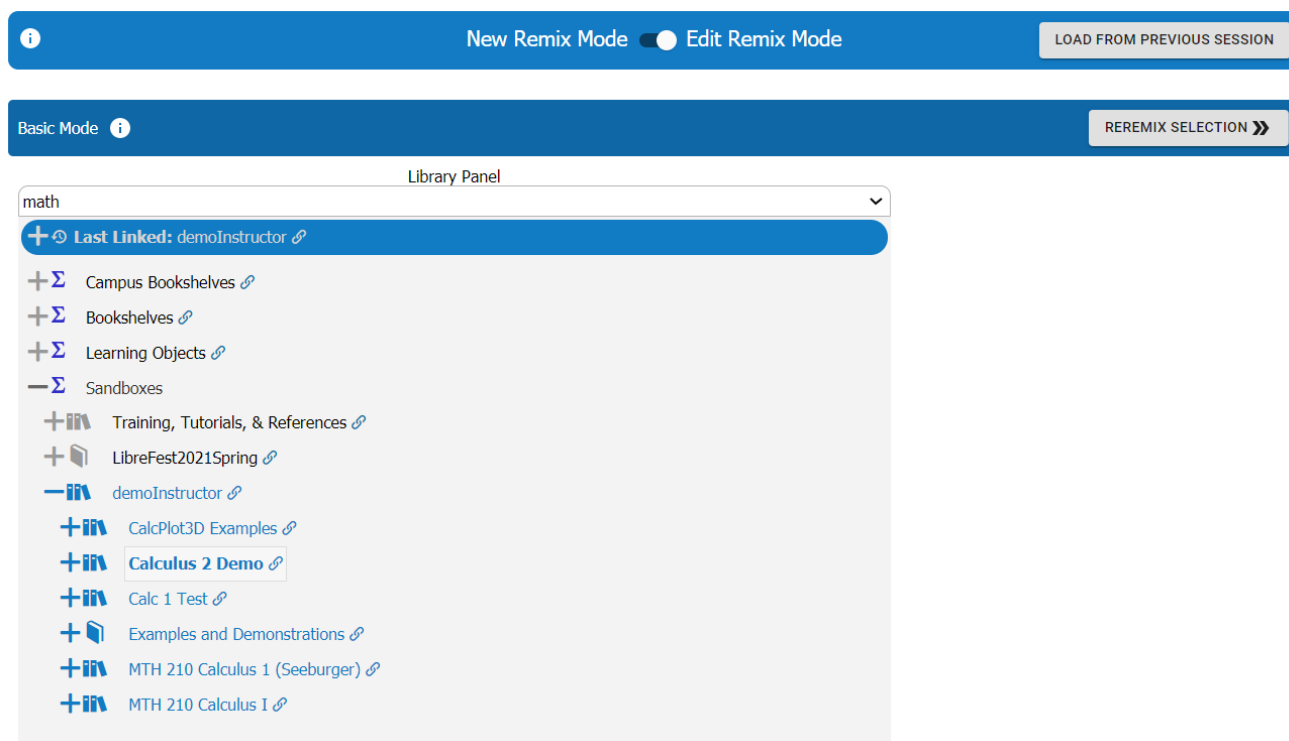


Figure 6: Re-Remixing the Calculus 2 Demo text.

2. The Remix window will change to appear like Figure 6 above.
3. Use the Library Panel on the left side to find the textbook in your Sandbox (or possibly in your college's folder in Campus Bookshelves) for which you wish to adjust the Remix. Click on it to select it and then click on the REREMIX SELECTION >> button to the upper right corner of the Remix control bar.
4. Now you can add and remove sections quickly. You can double-click on any sections you wish to rename (or renumber, if autonumber is off).

Note that deleted sections/pages are shown crossed out in red. Added sections are shown in green (even if renamed).

Sections that have only adjusted numbers or names would be shown in yellow.

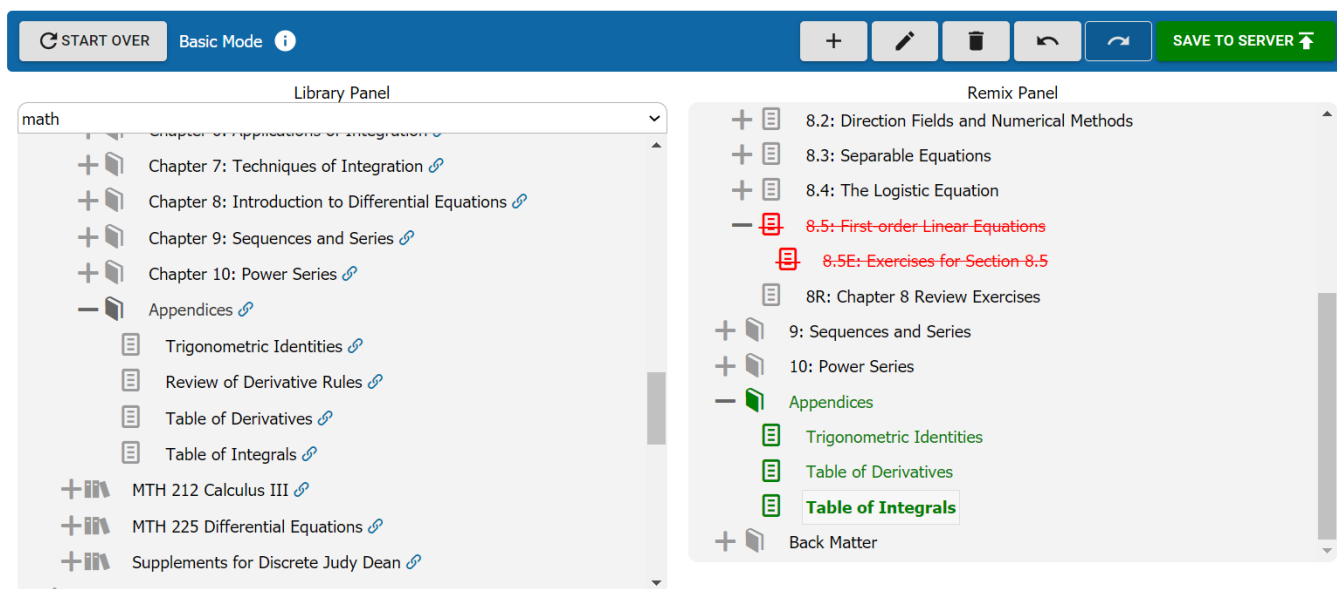


Figure 7: Editing the Calculus 2 Demo text remix by deleting Section 8.5 and adding Appendices

6. Once you are happy with the new version of your remix, click the green **SAVE TO SERVER** button on the right end of the Remixer control bar. A page like the following should appear:

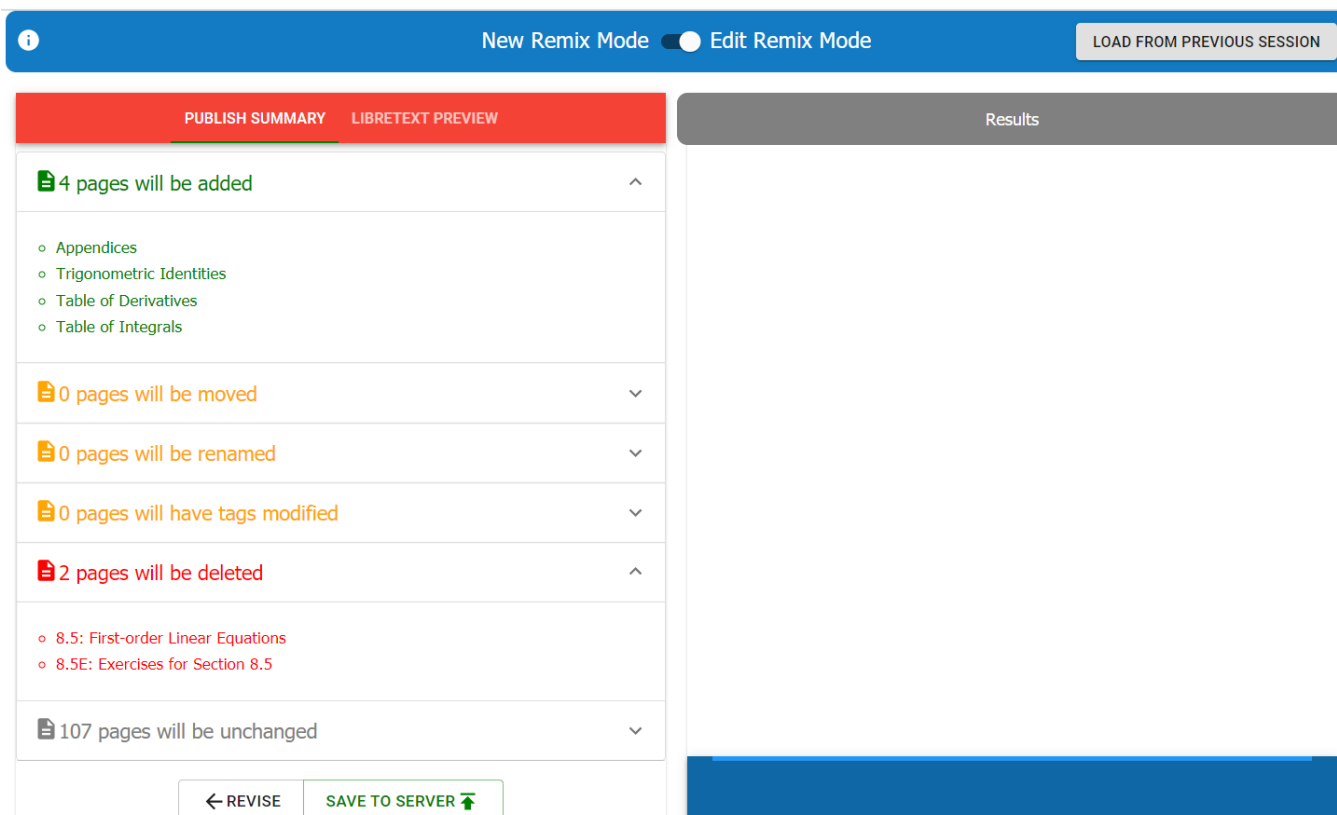


Figure 8: Summary page showing changes just before final publishing of re-remix

Note that a summary of all changes should appear here. We can click the downwards pointing chevrons to see details of the changes. (They change to upwards pointing chevrons to indicate you could then close these details.) See Figure 8 above.

7. Once you are ready to publish your adjusted Remix, click the **SAVE TO SERVER** button again.

Again a summary of the tasks done in adjusting your text should appear in the panel on the right. See below for an example:

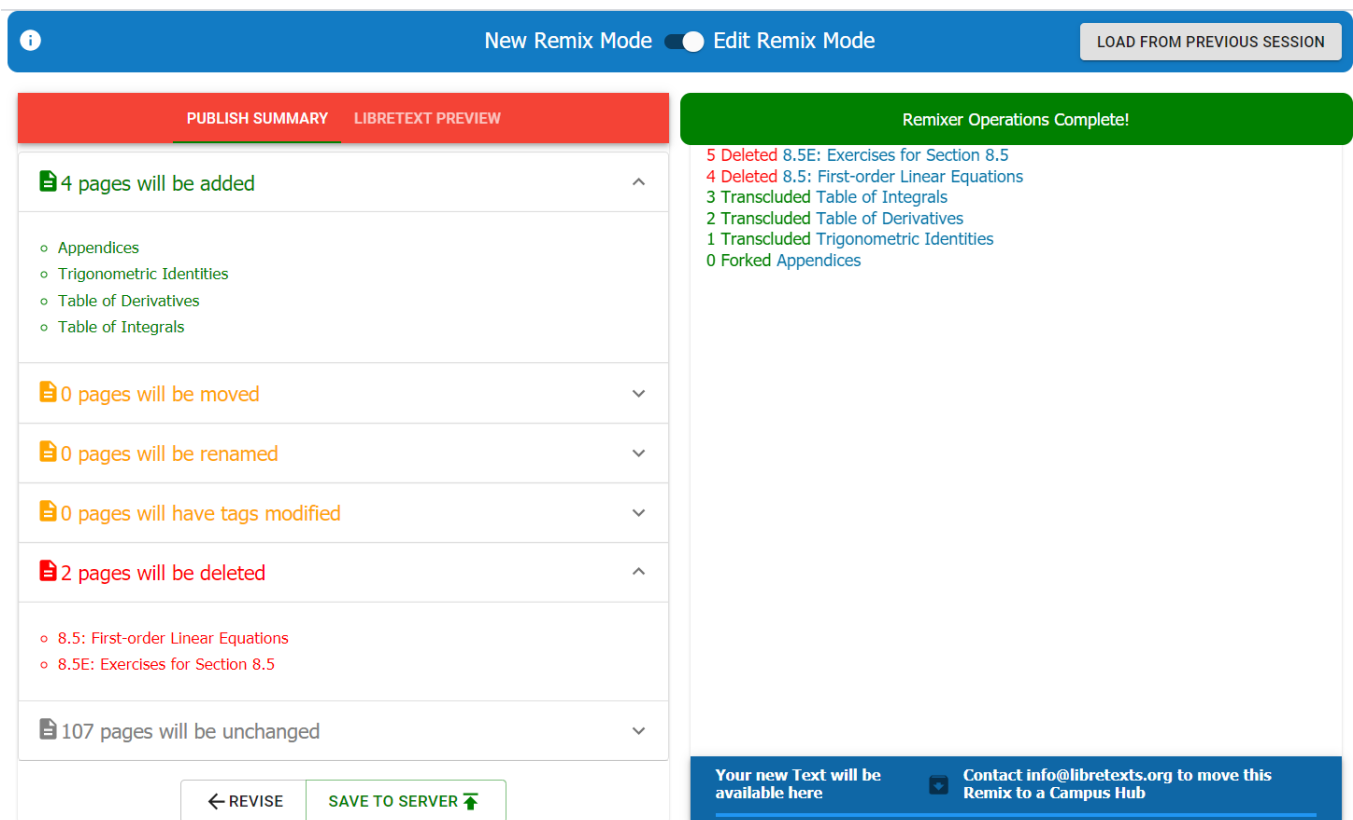


Figure 9: Summary of steps taken in publishing re-remix of Calculus 2 Demo text

9. Now click the blue text in the black rectangle in the lower right corner of the window, “Your new Text will be available here”. This should open your newly revised textbook in its home location (either your Sandbox or your Campus Hub).

Check it over to see that the changes you made look as you expected them to look.

Let us know if you have any questions on this process!

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WeBWork Demo Page

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Glossary

Sample Word 1 | Sample Definition 1