

# PreTeXt Workshop at AHG

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Our goal in this workshop is to start authoring a short book using PreTeXt syntax. Then we will process the source material into a PDF printable version and an interactive online version, without any subsequent editing or elaborate technical manipulations.

## 1 CoCalc Startup

[CoCalc](#)<sup>1</sup> is an online environment hosting open-source software useful for mathematics and science. I have paid for a one-week course subscription and I have enrolled you in our course using the email you signed up with. You can upgrade later to a longer subscription if you find it useful (as I do). Or you can continue to access your files and use the service for free.

A CoCalc **project** is basically a full computer, available through your web browser (Chrome is best, and then Firefox), running Ubuntu Linux. We will work in a **text editor** and a **terminal** (aka console, or command-line). These might be new to you, especially the latter. Everything we do on CoCalc is easily replicated on any Linux computer or on a Mac. Windows is feasible, but sometimes takes a few more steps to set up. We will use CoCalc for this workshop so we all follow the same directions and have a common set-up.

Please try to follow these directions *exactly* since it is hard to give individual attention when you try to customize the initial experience!

Do the following to get started with CoCalc:

1. Point your web browser (Chrome, or perhaps Firefox) to `cocalc.com`.
2. **Do not** create a new account, you will already have one as part of my enrolling you. Instead, click to “Sign in.”

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<sup>1</sup>`cocalc.com`



CoCalc

Collaborative Calculation  
and Data Science

An instance of CoCalc

### Explore what people have shared using CoCalc!

Share what you create in CoCalc or paste a URL to a GitHub repository or Gist:

[View GitHub Repository or Gist](#)

Path	Description
------	-------------

[PythonDataScienceHandbook](#) Python Data Science Handbo



3. Sign in with the email address you have provided us.

[Sign In](#) Password Reset



## Sign In to CoCalc

Sign in using your email address or a single sign-on provider.

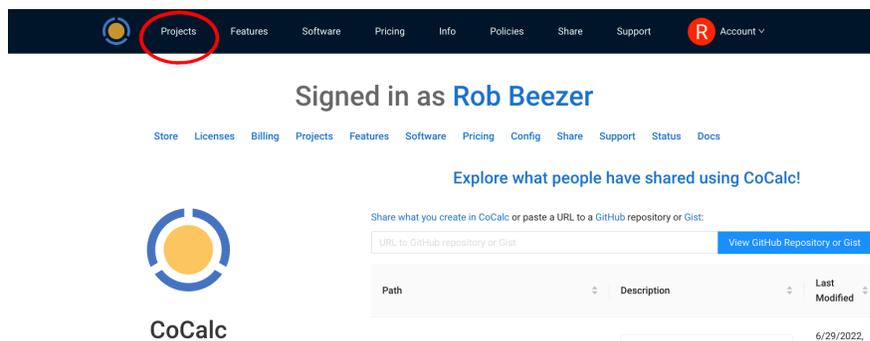


[Institutional Single Sign-On](#)

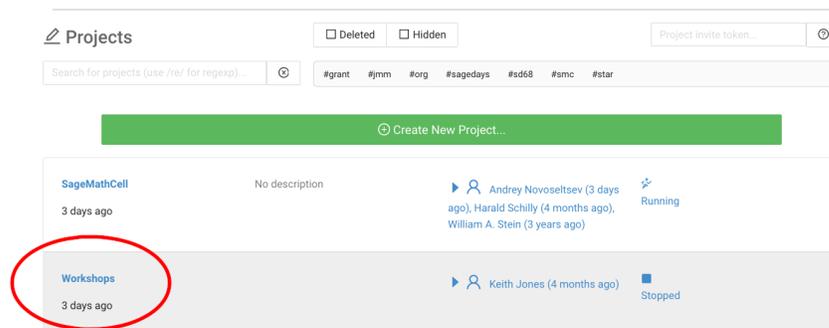
Password

Complete the details for your account, such as your real name and choose a password.

4. Click the Projects link/button in the upper-left.



5. You will see that you have one **project**, with a name like **PreTeXt Workshop**.



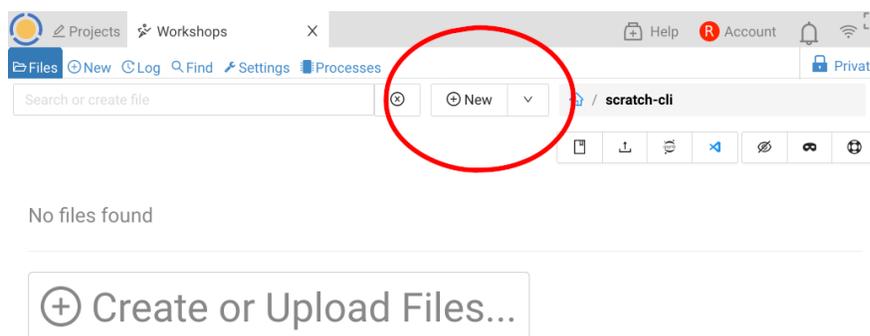
Click on your new project's title to use it.

6. OK, now you are in an online computer where we can start authoring and producing a textbook.

## 2 Creating a Terminal in CoCalc

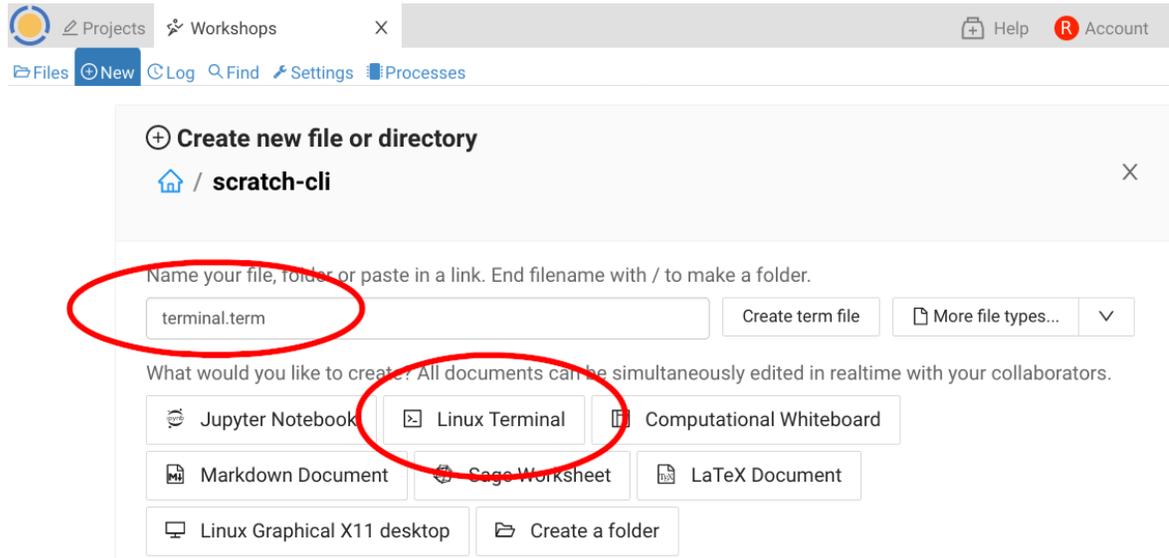
We will use a **terminal**, or **command-line**, to set-up PreTeXt and to process our book into useful output formats.

1. Just above your source file, click on the **+New** button.



2. Create a file whose name is *exactly*

terminal.term

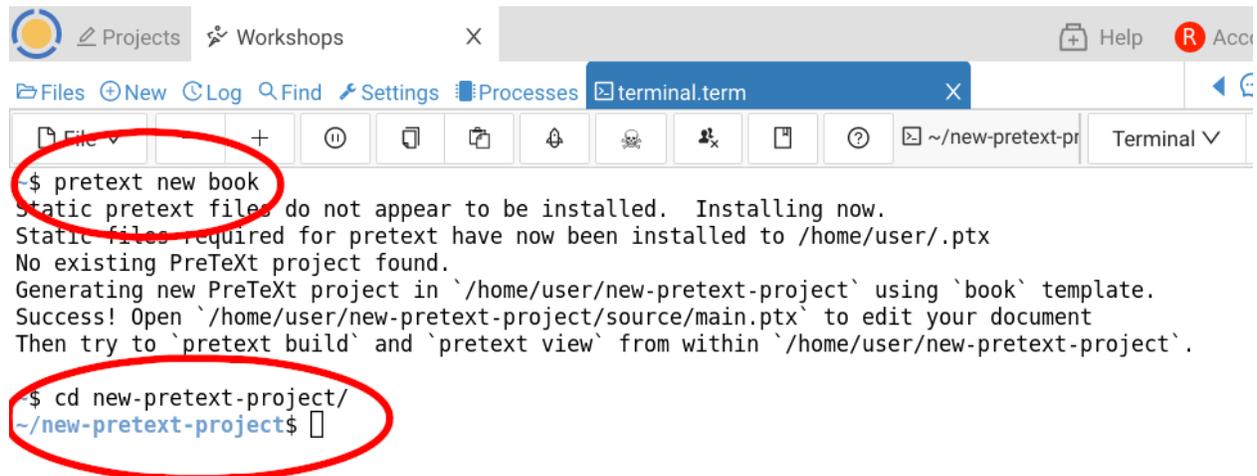


You will see a new tab in your project for your terminal. We will next use the terminal to get our book started

### 3 Creating a New Book Project

PreTeXt is already installed in CoCalc. Installation procedures are described in the PreTeXt documentation, the *PreTeXt Guide*. So we can get started by creating a new book project. This creates a small book that we can edit into the longer book we want to write.

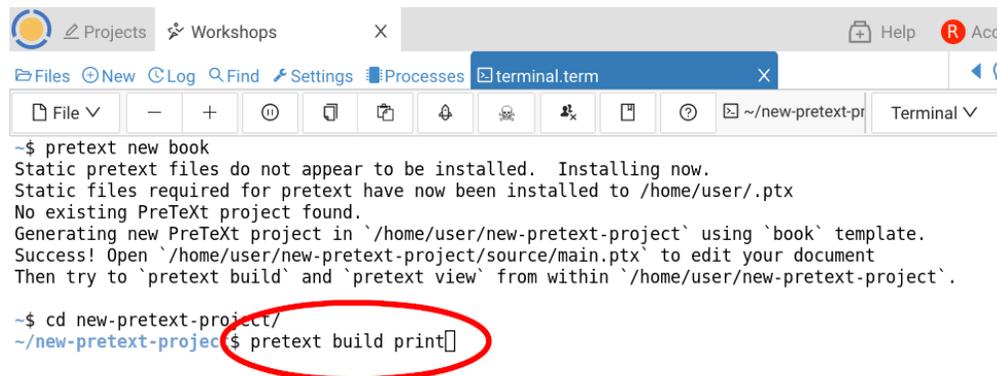
1. In the terminal type: `pretext new book`
2. As suggested type: `cd new-pretext-project`



## 4 Processing to a Print Book (PDF)

Two commands will manufacture a PDF version of our book, and let us view it easily.

1. In the terminal type: `pretext build print`
2. As suggested type: `pretext view print`
3. In the last step, you may need to click on the link to actually view the PDF.



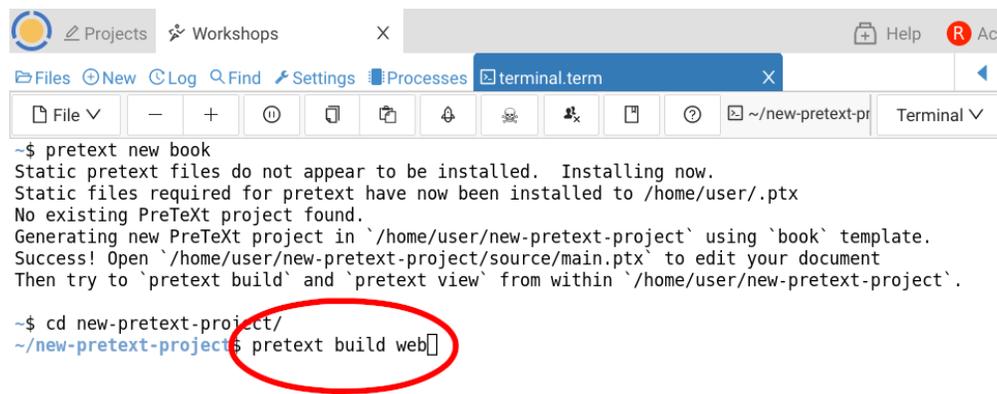
```
~$ pretext new book
Static pretext files do not appear to be installed. Installing now.
Static files required for pretext have now been installed to /home/user/.ptx
No existing PreTeXt project found.
Generating new PreTeXt project in `/home/user/new-pretext-project` using `book` template.
Success! Open `/home/user/new-pretext-project/source/main.ptx` to edit your document
Then try to `pretext build` and `pretext view` from within `/home/user/new-pretext-project`.

~$ cd new-pretext-project/
~/new-pretext-project$ pretext build print
```

## 5 Processing to an Online Book (HTML)

Two commands will manufacture a web-page version of our book, and let us view it easily. Notice how similar they are to what we just did for a print/PDF version.

1. In the terminal type: `pretext build web`
2. As suggested type: `pretext view web`
3. Again, in the last step, you may need to click on the link to actually view the output.
4. You are reminded that you can regain control of your terminal with a combination keystroke of `Ctrl` key plus the `C` key (lowercase).



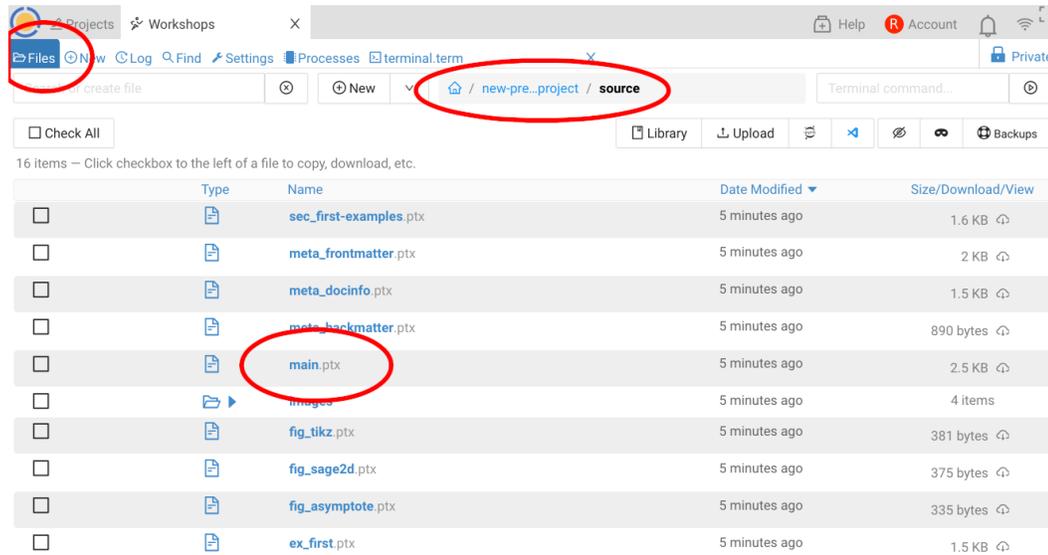
```
~$ pretext new book
Static pretext files do not appear to be installed. Installing now.
Static files required for pretext have now been installed to /home/user/.ptx
No existing PreTeXt project found.
Generating new PreTeXt project in `/home/user/new-pretext-project` using `book` template.
Success! Open `/home/user/new-pretext-project/source/main.ptx` to edit your document
Then try to `pretext build` and `pretext view` from within `/home/user/new-pretext-project`.

~$ cd new-pretext-project/
~/new-pretext-project$ pretext build web
```

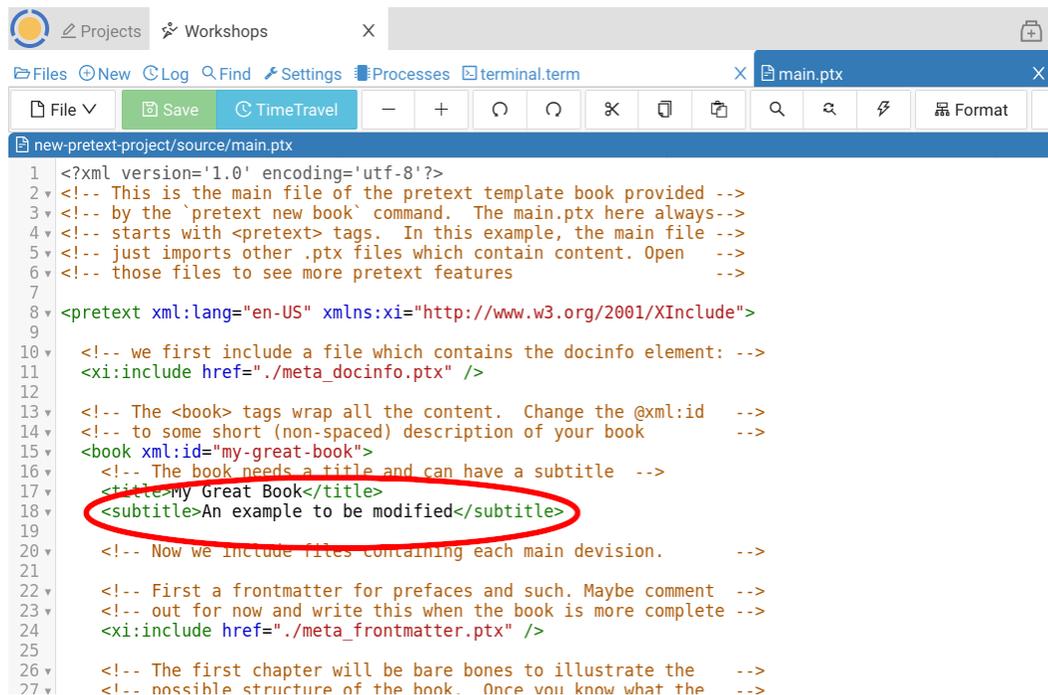
## 6 Editing a Book

We will use the Cocalc interface to locate one of the several files that make up your book.

1. Locate the Files button above, on the far left, and click on it.
2. Navigate through two directories/folders: `new-pretex-project` and `source` where you should see a `main.ptx` file (in addition to about 15 others).
3. Click on `main.ptx` to open it for editing. Locate the `<subtitle>` on about line 18.



4. Edit the subtitle to something about the AHG conference. (We'll make you the author in a minute.) be very careful to not wreck the XML syntax, just edit the content.



5. Save the file with the bright-green **Save** button in the upper-left. (If the button is light-green, CoCalc saved your work automatically for you!)
6. Now, return to your terminal, and make a new print version ([Section 4](#)) and a new online version ([Section 5](#)).

Now, let's get really custom and make ourselves the author of our book. It'll take a little while to learn which file has which parts of the book, but we will guide you today. Open `meta-frontmatter.ptx`. You will see that there is a lot of info about your project. On line 9 you will see that "Me" is the author, but which I mean is *YOU!* You can see that this is the `<personname>` of the `<author>`, who is also affiliated to a `<department>` at an `<institution>`. At a minimum, edit your `<personname>` to be your full name, just like you did for the `<subtitle>`. Save and rebuild both a print and an online version.

Congratulations! You now have about 95% of the skills you need to be a PreTeXt author.

One last experiment, with an even more terse set of instructions. Figure 3.1.3 of your book has a very nice photograph of a very colorful green frog. So nice, that we would like it to be bigger. Open the `ch_features.ptx` file (which is Chapter 3). Near the bottom, find an `<image>` for the frog. Edit its width to be 75% (include the percent sign, just like you found it). Notice the opportunity to provide a textual `<description>` for those who cannot see the image (say, in a conversion to braille). Save and rebuild output. See if you can find the alt-text for the image in the in the web version of your output.

## 7 Big Picture

This is the basic idea behind PreTeXt. Carefully author your thoughts in a very structured and clear source format, and let software translate your words into a variety of very capable and accessible output formats, without expecting you to master a number of technical details. You now have that skill and everything else is just incremental additions.

Note that making an EPUB version, or a braille version, is no more or less work than what you have done in the past few minutes.

Now you can experiment. See some ideas in the next section. Or visit the online version of the [PreTeXt Guide](#)<sup>2</sup>. If you like to learn from examples, checkout out Part III of The Guide, [Basics Reference](#)<sup>3</sup>, which explains the *basics* of creating certain popular components of a document. And/or there is a version of the (messy) sample article which will display the underlying source for various parts, see the [Annotated Sample Article](#)<sup>4</sup>.

## 8 Further Authoring

This is a progressive list of things to try to extend your new book. Re-process at will.

- Add some mathematics. Inside a paragraph, use `<m>` to delimit some simple L<sup>A</sup>T<sub>E</sub>X syntax for math, in lieu of `$`, `$` or `\(`, `\)`.

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<sup>2</sup>[pretextbook.org/doc/guide/html/](http://pretextbook.org/doc/guide/html/)

<sup>3</sup>[pretextbook.org/doc/guide/html/part-basics.html](http://pretextbook.org/doc/guide/html/part-basics.html)

<sup>4</sup>[pretextbook.org/examples/sample-article/annotated](http://pretextbook.org/examples/sample-article/annotated)

- Add a new `<section>` (or several) to a chapter. Be sure to give each a `<title>` (it is required).
- Make a theorem by using the structure shown in [Figure 8.1](#), but use your own content. Notice how some elements describe structure (`<theorem>`, `<statement>`, `<proof>`), while other elements hold content (`<title>`, `<p>`).
- Give your new theorem an identifier, as follows.

```
<theorem xml:id="a-deep-result">
```

Then someplace else in your book, make a cross-reference to your theorem.

```
As we see in <xref ref="a-deep-result"/>, this is...
```

Extensive cross-referencing is an important PreTeXt feature, and is always accomplished in the same way.

- Add an `<exercises>` division to to the end of your chapter, as if it was a new `<section>`. Then author an `<exercise>` with a `<statement>` and a `<solution>`. See the structure shown in [Figure 8.2](#).
- Right after your `<exercises>` division, make a `<solutions>` division.

```
<solutions divisional="solution"/>
```

Normally you might suppress the solution where the exercise first appears, and you would place the solutions into an appendix in the back matter.

- Let’s make your book look more like a book. Before the first (only?) `<chapter>` add the structure shown in [Figure 8.3](#).

Process the L<sup>A</sup>T<sub>E</sub>X version twice to get a Table of Contents.

- Someplace within a paragraph (`<p>`) add

```
<idx>neat stuff</idx>
```

After the end of your last (only?) `<chapter>` add the structure shown in [Figure 8.4](#).

- Within your new `<frontmatter>`, and after `<titlepage>`, add a `<preface>`. Fill it with some `<p>` discussing why and/or how you wrote your book.
- Put an `<appendix>` into your new `<backmatter>`, before the `<index>`.
- Now, really consult the [PreTeXt Guide](#)<sup>5</sup> for more ideas. The “Overview” chapter briefly describes many features, and usually references the “Topics” chapter for a more comprehensive discussion.

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<sup>5</sup>[pretextbook.org/doc/guide/html/](http://pretextbook.org/doc/guide/html/)

```

<theorem>
  <title>Major Result</title>
  <statement>
    <p>
      For a triangle with side lengths <m>a,b,c</m>
      we have <m>c^2=a^2+b^2</m>.
    </p>
  </statement>
  <proof>
    <p>
      Draw some squares using the edges of the triangle.
    </p>
  </proof>
</theorem>

```

**Figure 8.1** PreTeXt Syntax for a Theorem

```

<exercises>
  <exercise>
    <title>Unknown side of a triangle</title>
    <statement>
      <p>
        Find the length of the hypotenuse of triangle
        with sides of length <m>3</m> and <m>4</m>.
      </p>
    </statement>
    <solution>
      <p>
        Substitute into the previous equation
        with <m>a=3</m> and <m>b=4</m> to see
        that <m>c=5</m>.
      </p>
    </solution>
  </exercise>
</exercises>

```

**Figure 8.2** PreTeXt Syntax for an Exercises Division

```

<frontmatter>
  <titlepage>
    <date>September 17, 2019</date>
    <author>
      <personname>Fred Smith</personname>
      <department>Department of Mathematics Education</department>
      <institution>Big State U</institution>
      <email>fred@stateu.edu</email>
    </author>
    <editor>
      <personname>Mary Jones</personname>
      <department>Department of Mathematics Education</department>
      <institution>Huge State U</institution>
      <email>mary@hugeu.edu</email>
    </editor>
  </titlepage>
</frontmatter>

```

**Figure 8.3** PreTeXt Syntax for Front Matter

```

<backmatter>
  <index>
    <title>Index</title>
    <index-list/>
  </index>
</backmatter>

```

**Figure 8.4** PreTeXt Syntax for an Index

## 9 Authoring with PreTeXt

Here is an outline describing how to start a book “from scratch.”

1. Using your terminal, move to to your top-level directory/folder:

```
cd ~
```

2. Again, in your terminal, start a new book just like in [Section 3](#), but now *specify* the directory/folder where it will reside (*mybook*), which will be created for you:

```
pretext new -d mybook
```

3. Adjust all the previous instructions, replacing `new-pretext-project` with `mybook`.
4. Open `mybook/source/main.ptx` for editing via the CoCalc “Files” interface.
5. Remove *all* of the content in this file, since we are going to start over. (`Ctrl+A` and a backspace will do it quickly.)

6. On the very first line type *exactly* the **tag**

```
<pretext>
```

You will see that CoCalc has helpfully added a **closing tag** for you, namely `</pretext>`. Add some blank lines between the two tags to give yourself room to work.

Congratulations—you now have a valid XML document, but it is not yet a valid PreTeXt book. That’s next.

Now we will continue on to create a small textbook. We are going to do the absolute minimum possible first. PreTeXt is big and can do many additional things, which we can explore once we have the basics under control. Be patient and wait a bit to experiment. Type in the following, *exactly, exactly*, to get a feel for the best practices of authoring PreTeXt source. In particular, use two spaces for each level of indentation, and notice the liberal use of new lines, and blank lines. This will make your book easier to maintain, especially when it attracts a following and others volunteer to help you make it better. Notice that the CoCalc editor will try to help you with this—other editors may help in slightly different ways.

```
<pretext>
```

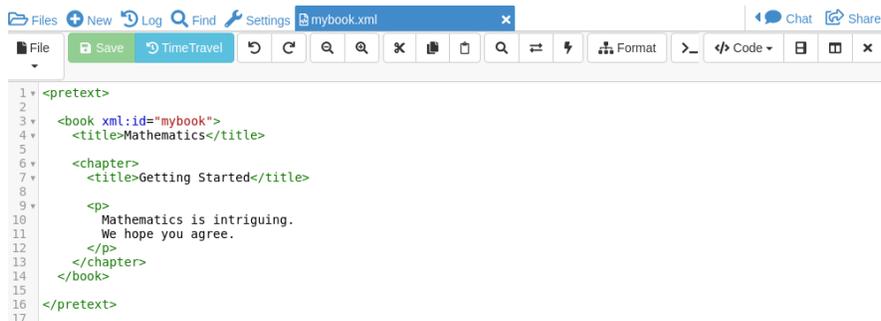
```
<book xml:id="mybook">
  <title>Mathematics</title>

  <chapter>
    <title>Getting Started</title>

    <p>
      Mathematics is intriguing.
      We hope you agree.
    </p>
  </chapter>
</book>
```

```
</pretext>
```

**Figure 9.1** PreTeXt Source for a Simple Book



**Figure 9.2** PreTeXt Source for a Simple Book in CoCalc

Congratulations! You now have now authored a valid PreTeXt book. Make sure the latest edits to your file are saved. Now you can go back to your terminal and you can use `pretxt build web` and `pretext build print` just as before ([Section 5](#), [Section 4](#)). (Make sure your terminal is set to work in the `mybook` directory/folder.)

There is a real chance your editing will have some typos, which can be hard to find at first. These can halt processing entirely, lead to incomplete output, or output that just doesn't quite look right. Building for the web is a bit more forgiving, so do that first. Then see if you can build for print. Be patient—you were successful before with the new book project, so your own book can be just as successful.

Note that the `mybook/source` directory/folder has numerous orphaned files in it. They are fine, your entire book is inside `main.ptx` right now, and they won't do any harm. As you learn the finer points of PreTeXt you will know what to leave in and what to leave out.

## 10 Homework

Some things to do when you get home:

- Make a handout for class.
- Start a set of lecture notes for class.
- Locate the documentation and examples at the [PreTeXt site](#)<sup>6</sup>.
- Obtain, and learn, a good text editor (we like SublimeText).
- Learn how to use a terminal/console/command-line on your system.
- Install PreTeXt on your own computer.
- Join the `pretext-announce` and `pretext-support` Google Groups.
- Wander around the [PreTeXt site](#)<sup>7</sup>.

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<sup>6</sup>[pretextbook.org](http://pretextbook.org)

<sup>7</sup>[pretextbook.org](http://pretextbook.org)