

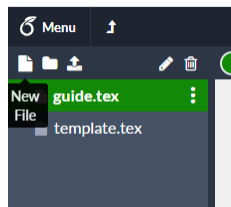
L^AT_EX basics for MATH 294

January 2021

The purpose of this document is to give a super-quick introduction to L^AT_EX, for the purpose of MATH 294. A good reference that I would recommend is https://www.overleaf.com/learn/latex/Learn_LaTeX_in_30_minutes, although not every section of the document will be immediately relevant for our needs. In particular, I would mainly recommend sections 1-7, 9, 10, 11.2, 12.1, and 12.2, but it would certainly be helpful to read the whole thing.

1 Creating a .tex file for a class session

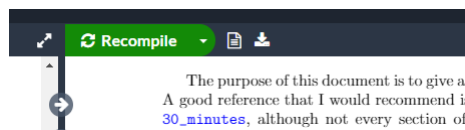
For each class session, each group should create a new .tex file by clicking the "New File" button in the top left corner of the Overleaf window:



This will allow you create a blank document. Name the file “week n -section-group m .tex”, where n is the week, “section” is either 9AM or 12PM, and m is the group number. So if you are creating a document on week 3 in the 9AM section for group 2, the filename should be “week3-9AM-group2.tex”. You should then copy and paste the text from the “template.tex” file into your newly created file. Edit the title of the document to include the week, section, and group number, the authors to include the names of everyone in the group, and the date to match the current date.

2 Basics

LaTeX can look intimidating at first, but it’s not so hard to just get started. Typing normal text anywhere in between the `\begin{document}` and `\end{document}` command will show up in the document as normal text. However, you might notice that the text you type into the document doesn’t immediately show up in the display on Overleaf. To see the changes you made, press the “Recompile” button at the top of the PDF display:



You can also press “Ctrl+Enter” (“Cmd+Enter” on Mac) to recompile the PDF.

2.1 Commands

In general, commands in LaTeX start with a backslash (`\`), and are followed by the name of the command. For example, the command to start a new section (which you can see in this document) is `\section`. Many commands will take in some inputs, which go inside curly braces (`{` and `}`) – so the `\section` command takes in an input, which it will use as the section title, as in this section `\section{Basics}`.

2.2 Formatting

LaTeX is nice in that it will do a lot of the formatting for you, but it's also not as nice in that it takes some learning how to customize things the way you want. I'll list the most useful formatting techniques below:

- **Bold:** to make text **bold**, write the command `\textbf{}` and put the text you want to be bold inside the curly braces. For example, `\textbf{this text is bold}` will show up in your compiled PDF as **this text is bold**.
- **Italics:** to make text *italicized*, write the command `\textit{}` and put the text you want to be bold inside the curly braces. For example, `\textit{this text is italicized}` will show up in your compiled PDF as *this text is italicized*.
- **Underline:** to make text underlined, write the command `\underline{}` and put the text you want to be bold inside the curly braces. For example, `\underline{this text is underlined}` will show up in your compiled PDF as this text is underlined.
- **Math mode:** there are two main ways of displaying math notation using LaTeX. The first is *inline math mode*, which is where the math formatting is in the same line as all your other text. As an example, I can write the equation $x^2 + 2x + 1 = 0$ in the same line. To do this, put dollar signs (\$) around the text you want to turn into math formatting. The equation I just did was written as `\$x^2 + 2x + 1 = 0\$`.

The other main way of displaying math is *display mode*, which is where the math formatting is placed into a separate line from all your other text. As an example, I can write the equation

$$x^2 + 2x + 1 = 0$$

in a separate line. To do this, put a backslash and left square bracket (`\[`) before the text you want in math formatting, and a backslash and right square bracket (`\]`) after the text. The equation I just did was written as

```
\[
x^2 + 2x + 1 = 0
\]
```

You don't have to put the text on a different line than the `\[` and `\]`, but I like to do it just to make the code easier to read.

Display mode can be used to make your writing more easy to read, but also some formatting behaves better with display mode. In particular, tall symbols like the integral symbol usually work better in display mode. As an example, here's an integral in inline mode: $\int_0^1 f(x) dx$, while here's an integral in display mode:

$$\int_0^1 f(x) dx$$

There are many other types of useful math modes, such as the `align` environment. You can look into these separately if you think you might need them.

- **Lists:** You might find that you want to make ordered (numbered) lists, or unordered (bulleted) lists. To make an ordered list, use the `enumerate` environment:

```
\begin{enumerate}
  \item Here's item 1
  \item Here's item 2
\end{enumerate}
```

This will appear as:

1. Here's item 1
2. Here's item 2

To make unordered lists, do the same, except replacing `enumerate` with `itemize`:

```
\begin{itemize}
  \item Here's item 1
  \item Here's item 2
\end{itemize}
```

This will appear as:

- Here's item 1
- Here's item 2

Notice that the unordered list has dashes instead of bullets. That's because we're already inside a list – this is a demonstration of how LaTeX will automatically format nested lists for you.

One other thing to note about how LaTeX does formatting is how it handles new lines and paragraphs. You might notice from examining the source code for this document that pressing Enter once doesn't start a new line or paragraph. To start a new paragraph, you must press Enter twice.

Here, since I pressed Enter twice, I get a new paragraph. Notice that it's indented automatically. If I want to start a new line without starting a new paragraph, I can add `\\` to the end of the the line. As an example, you can see that a new line has started, without starting a new (indented) paragraph.

3 Conclusion

These are just the very very beginnings of LaTeX. It's extremely powerful and very flexible, and can do many more very cool things. There are a lot of things written on the internet about LaTeX, so if you're wondering how to do something, you can probably find it by searching "latex" + whatever you're trying to do. In particular, <https://tex.stackexchange.com/> is a place where you can ask questions about LaTeX and other people will answer, and I can basically guarantee that if you're wondering how to do something, someone has asked it before on StackExchange.