Introduction to LaTeX
Math 221 Fall 2026

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Writing is central to all scholarship, including mathematics. In our modern times that means typing on a computer. On thing that sets mathematics apart from other disciplines is the heavy use of symbolic expressions. For example, consider this identity discovered by Srinivasa Ramanujan,

$$\frac{1}{\pi} = \frac{2\sqrt{2}}{99^2} \sum_{k=0}^{\infty} \frac{(4k)!}{k!^4} \frac{26390k + 1103}{396^{4k}}.$$

Typing all these symbols in a clean, readable way is possible on a standard document editor like Microsoft Word or Google Docs, but the result looks unprofessional. This is where LaTeX[1] comes in: LaTeX is essentially a programming language for writing documents. It allows you to write text and symbolic expressions together with unlimited control over the formatting of your document. LaTeX is the universal standard for writing in math, physics, engineering, computer science, economics, and statistics. If you want to make a professional grade technical document, then you want to write it in LaTeX.

As with any powerful tool, LaTeX has a learning curve. Some of the code will look intimidating and be hard to remember—you may get frustrated trying to get your document formatting to look right. But armed with Google, the new AI chat bots, and your ever-helpful instructor, you will soon be TeXing like a pro!

The only way to really learn how to use LaTeX is to use it, and use it we shall: **all homework assignments in this class must be written in LaTeX and submitted as PDF files**. To help you get on your feet, I will provide you the `.tex` files for the problem sets.

[1] People pronounce this either law-tech or lay-tech.

1 Getting Started

LaTeX code can be written in any text editor. All you need to do is to save the file with `.tex` at the end of the filename and it will become a LaTeX file. However, typically one writes the code in what is called a "LaTeX compiler". These are programs that can read LaTeX code and turn it into a nice looking PDF. There are many LaTeX compilers including ones that you can download (for free) and ones that you can use online (also for free). I prefer to use an online editor/compiler called Overleaf. The benefit of using a service like Overleaf is that you can access it from any computer and all your documents are saved on the cloud. The downside is that you need internet access to use it.

Here are step-by-step instructions for getting started with Overleaf.

1. Open the website (`https://www.overleaf.com`) and then click the **Register** button if you are new to Overleaf (if you already have an account, go ahead and log in.)

2. Once you are in, you should see a page with a heading that says **All Projects**. This is where you will see all of the projects you have worked on. Each project can have multiples `.tex` files. I usually find it convenient to keep all related files in one project. For example, I am using a single project to create all the documents for this course. This is especially useful if you want to copy and paste some LaTeX code between files or use some pictures in more than one file. Click the **New Project** button.

3. A menu should pop up asking you what sort of project you would like to make; these just preload some templates for you. For now, select **Blank Project** and name it **Math 221**.

4. Now you are in the Math 221 project. On the left you will see a list of files and folders in this project. The next window is where you type the LaTeX code, and the right most window is where the compiled document will appear.[2] The project comes with one file that is called `main.tex`. You can rename the file to anything you want. Near the top left, you will see an icon for an **Upload** button (a horizontal rectangle with an arrow pointing up out of it); click it.

5. Download the file `Introduction to LaTeX.tex` from Moodle and upload it to Overleaf. This is the file I wrote to create the PDF file you

[2] This is just the default layout, you can rearrange things if you'd like.

are currently reading. With the file selected, you will see a bunch of stuff written in code part of the file, and a copy of this PDF on the right.

6. Go through the document and read the hidden comments written there. Experiment with making changes to the file. To make the changes appear, just hit the **Recompile** button at the top center of the page. It will take a moment, and then the updated PDF will be displayed. When beginning with LaTeX it is good to recompile often to help you catch any errors. As you get better you can save time by only recompiling occasionally.

7. If you want to download the compiled PDF file or the `.tex` source files, click the **Menu** button in the top left; both options will be shown at the top of the menu.

2 LaTeX Assignment

Please create a new `.tex` file and include the following:

1. Title
2. Your name as the author
3. A paragraph including some formatted text.
4. A display environment with a mathematical identity.
5. A list.
6. A comment in the `.tex` file.

Be creative, have some fun. Please submit both the compiled PDF file and the source `.tex` file on Moodle.