

# Homework 8 - LaTeX

Due Wednesday, November 13th, 2024 at 11:59pm.

October 30, 2024

**LaTeX** is a markup language that is commonly used when complex formatting is required for a project (like a research paper or technical report). Unlike, (what you are probably familiar with) Google Docs and Microsoft Word, LaTeX allows you define the structure of a document with code which you can compile into a PDF!

**Overleaf** is a cloud-based LaTeX editor that allows you to easily collaborate with other people on LaTeX projects. This is the software we will be using in ULAB to work with LaTeX.

## 1 Make an Overleaf Account

First, you will need to make an overleaf account.

1. Go to <https://www.overleaf.com/>.
2. Make an account **with your BERKELEY email address**.
3. Go to the top right corner of your home page and click on **Account**.
4. Take a screenshot of your berkeley email address in the Overleaf account. If you are confused, refer to the lecture slides for an example.
5. Call your screenshot **overleaf**.
6. Upload this screenshot to your **homework8** branch!

## 2 Copy the Report

We have provided you a practice LaTeX report and your job is to recreate it to the best of your ability! Follow the steps provided below.

1. Open overleaf, make a new **blank** project. Call it **Doctor, is this normal?**.
2. At the top of the document (also called the **preamble**) you will see the following:

```
\documentclass{article}
\usepackage{graphicx} % Required for inserting images
```

Essentially, LaTeX is providing you with some standard formatting (but just like importing python libraries into a jupyter notebook) we want a bigger toolbox to work with. So, update your preamble to look like the following:

```
\documentclass{article}
\usepackage{graphicx}
\usepackage[letterpaper, portrait, margin=1in]{geometry}
\usepackage{float}
\usepackage{amsmath}
\usepackage{physics}
\usepackage{hyperref}
\usepackage{parskip}
```

These are just some default packages to get you started! You may want to import more depending on what you are trying to accomplish with a specific project. You won't need any other packages for this project than the ones provided above.

3. Add a subtitle called **ULAB, Division of Sincerely Serious Science** inside of `\title{}` *Hint: You will need to use double backslashes to make a new line and you will want to call `\large` in front of your subtitle.*
4. Don't use my name, use your name.
5. Change the date to today's date with the `\today` command.
6. In the **Introduction** section copy the introduction paragraph we have provided you. In this section, you will notice that we are citing **Figure 1**. To do this you will have to import your image by calling `\begin{figure}`. Make sure to include the proper caption and make the `width=0.8 \linewidth`. Use the `\autoref{}` command to cite the first figure in your paragraph, don't use `\ref{}`.
7. Make another section called **Methods**. Make a subsection called **Preprocessing** and another subsection called **Curve Fitting**. Copy the Preprocessing subsection provided. When you write **Python Imaging Library** and **NumPy** use the function `\texttt{}` to change the formatting of those words.
8. For the Curve Fitting subsection, make an labeled equation with the command `\begin{equation}`. To call  $\mu$  you need to write `\mu` and for  $\sigma$  you need to write `\sigma`. For the  $\cdot$  you need to write `\cdot`. To make in-line math characters, you will need to make in-line equations by calling `$$`. Example: The `$$\sigma` code would produce  $\sigma$  in the compiled version.
9. Make a new section called **Results**. Make a figure for the image `fit.png`. Give it the proper caption, give the figure a width of 13 cm. Use `\autoref`

`{}` again to auto cite Figure 2.

10. For the equation in the results section, to write  $\nu$  you will have to call `\nu`, to write  $\chi$  you will have to call `\chi` and to call  $\sum$  you will have to call `\sum`.
11. Almost done! Now we want to add some citations. Don't make a section called **References** instead call this before the last line `\end{document}`.

```
\bibliographystyle{ieeetr}
\bibliography{ref.bib}
\nocite{*}
```

12. Import the `ref.bib` file to overleaf. You don't need to make this a figure! Call the `\cite{}` with the proper keys to cite the packages. This isn't technically necessary in real research papers, but we are just helping you practice writing a bibliography.

13. Download both the `.pdf` and `.tex` versions of your LaTeX assignment!

Here are some more hints. *Hint: To find out what key you need to use for the bibliography citations, go to `ref.bib` and copy the label next to `ARTICLE`. Hint: To get your figures to orient themselves properly call the `[h]` command next to the `\begin{figure}` comand (i.e. call `\begin{figure}[h]`, this is overriding where LaTeX is choosing to place your images. This is only possible with the `\usepackage{float}` command!*

**Extra Credit:** If you add a table to the report, I will give you some extra credit. It has to be make sense and be properly formatted though.

### 3 Proper Submission

To receive full points on submitting this assignment, make sure you do the following:

1. Make a new branch called `homework8`, make sure it is completely empty of all files that don't pertain to homework 8 itself.
2. Upload your screenshot of your Overleaf account called `overleaf` to your `homework8` branch.
3. Upload your `.pdf` and `.tex` LaTeX documents to your `homework8` branch.
4. Take a screenshot of you adding these files, call it `hw8_add`.
5. Take a screenshot of you committing these files, call it `hw8_commit`.
6. Take a screenshot of you pushing these files, call it `hw8_push`.
7. Upload your remote repository to Gradescope!