

Week 8

Typesetting in LaTeX

What is LaTeX?

- A typesetting “markup” language and compiler used to make most scientific papers, textbooks, etc. (our tutorials are written in Latex).
- LaTeX streamlines the writing process by handling almost all formatting for you, as well as automatically numbering and cross-referencing all figures, equations, etc.
- LaTeX also makes typing math and greek symbols much easier.

Structure

- Latex Documents are structured in what are called “environments”
- For example, your entire document will be enclosed within the “document” environment, within which you might have sections of “math” environments, or other “bullet list” environments, or ones you define yourself in a separate file.
- There is a bit of a learning curve to it, since formatting and things like bolding are all handled in text, much like in html.

The Preamble

- Before starting the document class itself, you have to specify which packages the compiler will use- this is very similar to importing packages in python.
- Over time these become more familiar and you can specify things for special document types, but in general there's a few you'll load up for a simple document like our tutorials

Doc Class and Packages

`\documentclass[12pt]{article}` ← option for fontsize, choose document type

```
\usepackage[margin=1in]{geometry}
\usepackage{amsmath,amsthm,amssymb}
\usepackage{graphicx}
```

(similar to unix, the format is `\usepackage[option]{argument}`)
compare to `command -option argument`

Title section

- Begin document with `\begin{document}`
- (Dont forget you need an `\end{document}` at the very end
- Then put the title lines and a `\maketitle` command- e.g.,

Example Title

```
\title{Title Here!}
```

```
\author{Imad Pasha\\  
Chris Agostino}
```

```
\maketitle
```

(\\ means new line)



Needed to actually make the title



Sections and Subsections

- To set of major sections (like Introduction, Research Methods, Data, Analysis, and Conclusion), use `\section{Sectionname}`
- Within a section you can create subsections by using `\subsection{subsection name}`
- Keep in mind that unlike in an “outline”, you cant back out of a subsection back to the main section.

Inserting Figures

```
\begin{figure}[htp]  
\centering  
\includegraphics[width=\textwidth]{2dspectrum.png}  
\caption{A Typical Caption will talk about the image}  
\label{2dspec}  
\end{figure}
```


Inserting Equations

```
\begin{equation}
\delta v = \frac{1}{\text{SNR}} \frac{1}{\sqrt{N}} \frac{c}{R},
\end{equation}
```

```
\begin{equation}
s_j = \frac{1}{N-1} \sum_{i=0}^{N-1-j} (x_i y_{i+j}) - \frac{N-j}{N-1} \bar{x} \bar{y}.
\end{equation}
```

or, inline, you can enclose short equations in $\$symbols\$$ to get the math font and greek letters

Learning the Lingo

- Greek letters are fairly straightforward, along with superscripts and subscripts. Further things can be googled (there's a site called tex exchange as well), and there are some other helpful tools
- Detexify <http://detexify.kirelabs.org/classify.html> allows you to draw a symbol and it tells you its latex name
- Overleaf is a site that lets your write latex, live compile it (so no installing anything), and has lots of templates for things like papers, assignments, CV's, etc. (and its cloud storage so you can edit from anywhere).