Day 4
overview/intro LaTeX.

Go to writelatex.com and click on CREATE A NEW PAPER

1.

- let's edit the sample paper together

could change font size [12] [10pt]

```
\documentclass[a4paper]{article}

\usepackage[english]{babel}
\usepackage[utf8]{inputenc}
\usepackage{amsmath}
\usepackage{graphicx}
\usepackage[colorinlistoftodos]{todonotes}

\title{Your Paper}

\author{You}

\date{\today}

\begin{document}
\maketitle
```

packages that are used in compiling.

I don't change much here.
update the title and author

Inserts the Title.

```
\begin{abstract}
Your abstract.
\end{abstract}
```

Try changing words here.
anything between \begin{} \end{} will be formated differently.

```
\section{Introduction}
```

- automatic # of sections.

Your introduction goes here! Some examples of commonly used commands and features are listed below, to help you get started. If you have a question, please use the help menu (``?'') on the top bar to search for help or ask us a question.

↑ notice how we do quotes.

```
\section{Some \LaTeX{} Examples}
\label{sec:examples}
```

— we can label and then reference things.

```
\subsection{How to Leave Comments}

Comments can be added to the margins of the document using the \todo{Here's a comment in the margin!} todo command, as shown in the example on the right. You can also add inline comments:

\todo[inline, color=green!40]{This is an inline comment.}

\subsection{How to Include Figures}

First you have to upload the image file (JPEG, PNG or PDF) from your computer to writeLaTeX using the upload link the project menu. Then use the includegraphics command to include it in your document. Use the figure environment and the caption command to add a number and a caption to your figure. See the code for Figure \ref{fig:frog} in this section for an example.

\begin{figure}
\centering
\includegraphics[width=0.3\textwidth]{frog.jpg}
\caption{\label{fig:frog}This frog was uploaded to writeLaTeX via the project menu.}
\end{figure}

\subsection{How to Make Tables}

Use the table and tabular commands for basic tables --- see Table~\ref{tab:widgets}, for example.
```

change the color.

see how the comment changes.

the .jpg must be uploaded and in same project folder.

label figures too.

You will need to do this a lot!

must define correct # of columns

this is important

puts a line between columns.

r → right alignment.

```
\begin{table}
\centering
\begin{tabular}{|lr}
Item & Quantity \\\hline
Widgets & 42 \\
Gadgets & 13
\end{tabular}
\caption{\label{tab:widgets}An example table.}
\end{table}
```

new column

new row.

TRY \begin{tabular} {|c|&|}

don't confuse L and |

TRY \begin{tabular}{c|c|c|c} and add data# to the table.

```
\subsection{How to Write Mathematics}

\LaTeX{} is great at typesetting mathematics. Let $X_1, X_2, \ldots, X_n$ be a sequence of independent and
identically distributed random variables with $\text{E}[X_i] = \mu$ and $\text{Var}[X_i] = \sigma^2 < \infty$, and let
$$S_n = \frac{X_1 + X_2 + \cdots + X_n}{n}
      = \frac{1}{n}\sum_{i}^{n} X_i$$
denote their mean. Then as $n$ approaches infinity, the random variables $\sqrt{n}(S_n - \mu)$ converge in
distribution to a normal $\mathcal{N}(0, \sigma^2)$.
```

most eqns are easy to guess:
\int \phi \epsilon

```
\subsection{How to Make Sections and Subsections}

Use section and subsection commands to organize your document. \LaTeX{} handles all the formatting and
numbering automatically. Use ref and label commands for cross-references.
```

\partial

try some things.

See List of Symbols.

```
\subsection{How to Make Lists}

You can make lists with automatic numbering \dots

\begin{enumerate}
\item Like this,
\item and like this.
\end{enumerate}
\dots or bullet points \dots
\begin{itemize}
\item Like this,
\item and like this.
\end{itemize}
\dots or with words and descriptions \dots
\begin{description}
\item[Word] Definition
\item[Concept] Explanation
\item[Idea] Text
\end{description}

We hope you find write\LaTeX\ useful, and please let us know if you have any feedback using the help menu
above.

\end{document}
```

\begin{equation}
\end{equation}

Spend the rest of class typing your homework.

Numerical Analysis
Homework 2
Due in Dropbox - Tuesday 1pm.

HW 2a

READ: Elementary Numerical Analysis Pages 33-70. We will not cover all of this in class but it is good to understand all the different ways that error can occur in your calculations.

1. Consider the following FreeMat code:

```
x = 2;
M = 60;

for ii=1:M
      x = sqrt(x);
end

for ii=1:M
     x = x^2;
end

x
```

Explain what this code does. What should the output of this code be? Program and script file in FreeMat that executes this code. What is the output of this code? Does it give the correct answer? Why do you get the results you get?
HAND IN: A paragraph describing what you found by doing this problem.

2. Write a FreeMat program that evaluates the accuracy of Stirling's famous approximation

$$n! \approx n^n e^{-n} \sqrt{2\pi n} \tag{1}$$

Make a table of values that lists, n, the true value $n!$, the approximate value, the absolute error and the relative error. Let $n = 1, 2, 3, 4....., 20$. Does that accuracy of the approximation increase or decrease with increasing n?
HAND IN: The table of values along with a description of what you found. Also, use the "verbatim" command to insert the code that you wrote for this problem.

NO LAB HOMEWORK

HW 2b

Starting this week you should type up your homework using LaTeXand you will submit it through Dropbox. Please do the following:

1. Create an account on writelatex.com.
2. Start a new project by clicking on create a new paper. You should see the template paper.

3. Play around with this new paper by typing new text in the code. See what each of the sections does. This is your first chance to learn how to use LaTeX.

4. Type up your HW 2a using LaTeX.

5. Rename the file Homework1_Lastname.txt. To do this click on "Project" then click the down arrow next to the file main.txt. You should see the option to rename the file.

6. Download your document. Both input and output files. This will download a .zip so make sure you have a program that can unarchive .zip folders. Inside this folder should be all the files needed to compile your paper along with the paper itself as a .pdf.

7. Join the Dropbox folder that I shared with you. Please use the link that I send via email.

8. Create folders: Homework1 and within that folder CodeHW1.

9. Upload Homework1_Lastname.pdf to the Homework1 folder and any code that you wrote for the homework to the CodeHW1 folder.

Thanks Jessica!

Make sure the follow the steps so we can all be organized.

Call or text 847-404-4299.

or email !!