COMP2123 LaTeX Worksheet

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1 How to Write LaTeX

There are many different ways to set up and use LaTeX. You can type using any text editor and then compile using your computer. Or use one of the many WYSIWYG editors.
My personal approach is Overleaf. As well as syncing everything online so you can access from anywhere, you can view the formatted document to the side as you type and can compile at the click of a button.

2 Document Set Up

Your document will always start with a preamble. Here we specify basic set up details as well as any packages we are using (used to add additional functionality).
The first line will always say what document class (style) we are using (in most cases article):
`\documentclass{article}`
To specify a package: `\usepackage{name}`
You can also specify information about the document's metadata (author, title, etc):

- `\title{\LaTeX Workshop}`
- `\author{Madeleine}`
- `\date{\today}`

Now you're ready to create a document! All the actual content of your document should be enclosed between `\begin{document}` and `\end{document}` To include the title (and or table of contents) (this should go after `\begin{document}`)

- `\maketitle`
- `\tableofcontents`

Try It Yourself

Now it's your turn! Try creating the preamble of your first document

Make sure to include the following:

- The `\documentclass` line
- Your name and document title
- Beginning and ending your document
- Displaying your document title, author and date

3 Sections

Your LaTeXdocument is divided up into sections. To create a new section:
`\section{section heading}`
To create a new section use subsection: `\subsection{subsection name}`
To avoid numbering your section add `*`. `\section*{title}`

Try It Yourself

Create your first document section! Call it "testing" and use it contain the rest of the activities.

4 Text Basics

- **Bold** `\textbf{text}`
- Underline `\underline{text}`
- *Italics* `\textit{text}`
- Small Caps `\textsc{text}`
- Text Font Family:
  - Roman Family `\textrm{text}`
  - Sans Serif Family `\textsf{text}`
  - `Typewriter Family` `\texttt{text}` (this is often used for tiny code snippets or example input / output.)

Try It Yourself

Try recreating the following text (including formatting):

The **quick** brown `fox` jumps over the *lazy* DOG

5 Useful Document Format Options

- `\newline` inserts a blank line at the given location
- `\pagebreak` inserts a page break at the given location
- \\ Begins a new line (without a paragraph break)
- `\begin{multicols}{n} ... \end{multicol}` Splits the text into an n number of columns. Need to add the `multicol` package
- Comment `%Comments`(will not appear in compiled document)
- Using the package `anysize` will by default remove the very wide margins that LaTeX normally has. You can further specify exact margin size (etc.) if you like.

Try It Yourself

Experiment with these as your LaTeXdocument grows! Most of these options are up to you!

6 Lists

There are two styles of lists, numbered and dot points. Both contain items beginning with `\item`
Like document these lists exist between a `\begin{}` and `\end{}`

Bullet List:

```
\begin{itemize}
    \item This
    \item Is a
    \item bullet point
    \item list
\end{itemize}
```

- This
- Is a
- bullet point
- list

Numbered List:

```
\begin{enumerate}
    \item This
    \item is a
    \item numbered
    \item list.
\end{enumerate}
```

1. This
2. is a
3. numbered
4. list.

Try It Yourself

Write a list, listing 5 of your favourite songs (unranked).

Write a numbered list ordering your 3 favourite colours.

7 Figures

Figures are used to insert images into your document.
The package `graphicx` must be included, therefore, include the line:
`\usepackage{graphicx}` inside the preamble. The code:

```
\begin{figure}[H]
        \centering
         \includegraphics[width=0.5\textwidth]{harry_potter_meme.jpg}
        \caption{My favourite Harry Potter meme}
\end{figure}
```

Will insert a picture like this:

Figure 1: My favourite Harry Potter meme

Getting images where you want them however, can be very fiddly. My advice is to add the package `float` and then use the command `H` in your figure to position it exactly where you want.
Please note if you're using Overleaf you have to upload your image into your workspace to be able to use it. The same applies elsewise: the path you pass to LaTeX as the filename must be correct.

Try It Yourself

Add any image to your document. Don't forget to add a caption!

As an extension try experimenting with different placement options.

8 Graphs and Diagrams

Graphs and diagrams are tricky. I recommend the package `Tikz`. Many examples and reasonable documentation exist online. (See resources).

9 Basic Math

- There are a few different ways to include mathematical equations in LaTeX . This is simply one approach using what I did when I learnt. I'm sure other tutors in this course will have a different approach to me.
- To use maths inline (like so: $a^2 + b^2 = c^2$) use `\(...\) or $ ... $`

- For displayed maths use: `\[...\] or \begin{equation} ... \end{equation}`
- Some of the more fancy mathematical operations require the `amsmath` package
- To line up equations along one or more points (e.g. = signs)

$$3^2 + 4^2 = 5^2$$
$$9 + 16 = 25$$
$$25 = 25$$

```
\begin{alignat*}{1}
        3^2 + 4^2 &= 5^2 \\
        9 + 16 &= 25 \\
        25 &= 25
\end{alignat*}
```

- Some useful shortcuts:
  - To write a Greek letter: `\lettername` (with a capital for a capital letter): e.g. `$\alpha$` $= \alpha$ `$\Theta$` $= \Theta$
  - Fractions (e.g $\frac{x}{y}$): `\frac{top}{bottom}`
  - Powers (e.g. x^y): `base^{power}`
  - $\leq$ `\leq`
  - $\geq$ `\geq`
  - $\neq$ `\neq`
  - $\approx$ `\approx`
  - $\times$ `\times`
  - $\div$ `\div`
  - $\pm$ `\pm`
  - $\cdot$ `\cdot`
  - $\prime$ `/\prime`
  - ∞ `\infty`

Try It Yourself

Write up your solution to an induction question from tutorial 0. Try and make it look nice!

10 Code

Using the `listings` package is one of the most common ways to include code in your LaTeX document. You can find a thorough explanation at overleaf.com/learn/latex/Code_listing

Try It Yourself

Write up the pseudocode you came up with for Problem 6 of Tutorial 1.

11 Resources

The following are resources that I would recommend.

- Detexify (draw a symbol and it will tell you how to make it in LaTeX): http://detexify.kirelabs.org/classify.html

- Cheat Sheet: https://wch.github.io/latexsheet/
- Installation: https://www.latex-project.org/get/
- Math Symbols: https://www.sharelatex.com/learn/List_of_Greek_letters_and_math_symbols and http://web.ift.uib.no/Teori/KURS/WRK/TeX/symALL.html
- Tables (not covered): https://www.sharelatex.com/learn/Tables
- Figures https://en.wikibooks.org/wiki/LaTeX/Floats,_Figures_and_Captions
- TikZ (diagrams): https://en.wikibooks.org/wiki/LaTeX/PGF/TikZ
- Code Listings : https://www.sharelatex.com/learn/Code_listing