Getting Started with LaTeX

And why I don't use Word anymore

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What is LaTeX?

A bit of Background

- Widely regarded as the standard typesetting method for academic journals
  - Far easier to present data, equations
  - Much easier to cite references (i.e. automatic footnotes, hyperlinking etc.)
  - Separates content from the formatting of documents

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  - Separates content from the formatting of documents
- Far more control over many aspects of the document
  - Backend rather than frontend (e.g. Word)
  - Images won't disappear when moved slightly
    - Everything is where you tell it to be

- Files can be as big as needed, don't need to worry about a 30+ page Word doc crashing
- Multi-file documents are very easy to achieve, no post-processing
- It looks pretty

Something to keep in mind throughout this presentation: *every single slide* is done in $\LaTeX$
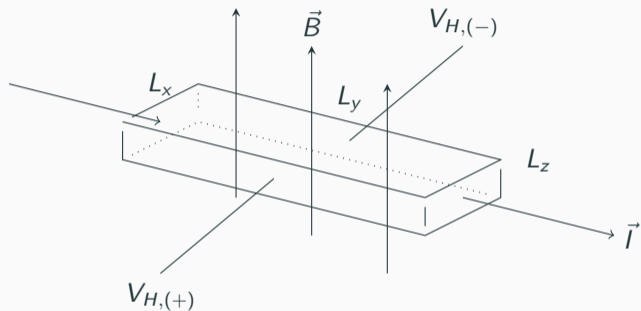
What can I do?

In short: anything you can do with Word + much much more!!

Diagrams from scratch:

Figure 1: Semiconductor sample in B field

GIFS:

Maths

- Inline:
  It is known that $y = x^2 + 2x + 4$ is a parabola.
- Block:
  Here is a Fourier transform:
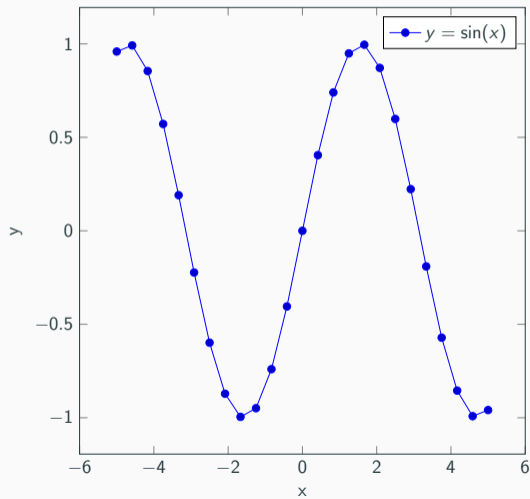 $$\mathcal{F}(\omega) = \int_{-\infty}^{\infty} f(t)e^{i\omega t}\mathrm{d}t$$
- Numbered:

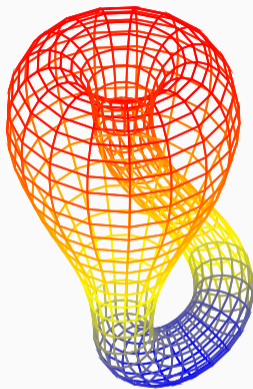$$|+_x\rangle = \frac{1}{\sqrt{2}}|+\rangle + \frac{1}{\sqrt{2}}|-\rangle \tag{1a}$$

$$|-_x\rangle = -\frac{1}{\sqrt{2}}|+\rangle + \frac{1}{\sqrt{2}}|-\rangle \tag{1b}$$

$$|\langle+|+_x\rangle|^2 = 0.5 \tag{1c}$$

Plots
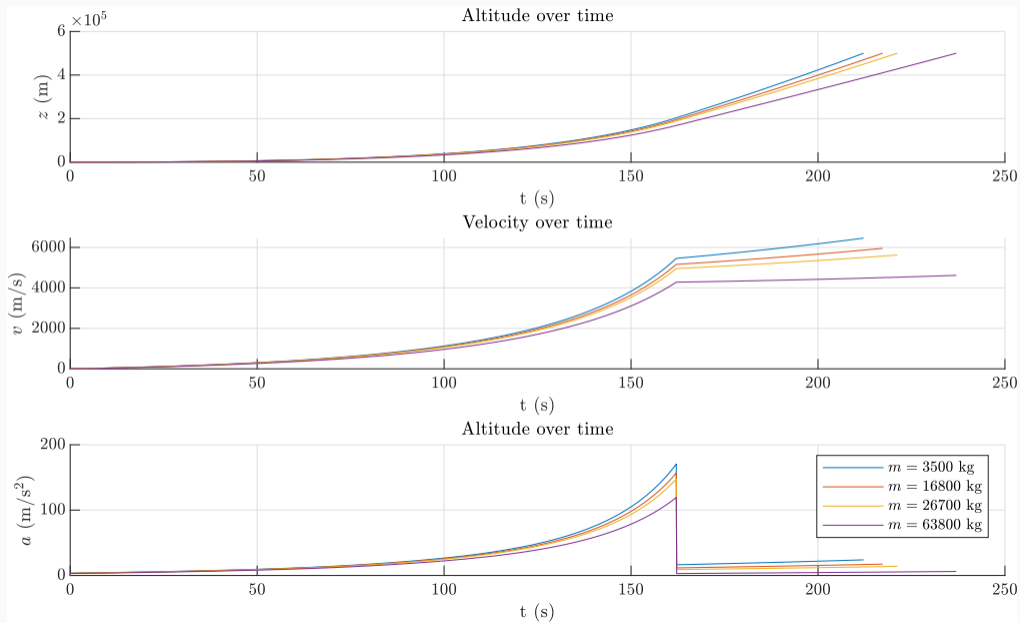
Using gnuplot:

Figure 2: A Klein Bottle plotted via pgfplots/gnuplot

MATLAB Plots:

I'm interested! How do I start learning?

Programs/Compilers

MikTex Standalone LaTeXcompiler and editor. Good for local installations on Windows.

- Very easy to use
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- Not the prettiest
- THE WHITE - IT BURNS

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Overleaf Web based, cloud storage. The Google Docs of LaTeX.

- Very easy to use
- GitHub integration
- Free Pro+ account by registering as a USYD student/staff member
- Multiple author editing
- Some packages might not be recognisable

We'll be using Overleaf
overleaf.com

Starting off a Document

Define document class:

```
\documentclass[12pt]{article}
```

Begin document:

```
\begin{document}

<insert document content here>

\end{document}
```

Well done! You've just told LaTeX to create a new, blank document!
So... is that it?

Not in the slightest!

The Preamble

Everything before \begin{document} is known as the preamble. Let's start customising this.

```latex
\documentclass{article}
\title{My Title}
\author{My Name}
\date{\today}
\begin{document}
\maketitle
...
\end{document}
```

Sections

```latex
\documentclass{article}
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Bonus: try adding \tableofcontents after \maketitle

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E.g. \begin{equation}...\end{equation}

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$$\frac{\mathrm{d}\sin x}{\mathrm{d}\cos x} = -\cot x \tag{2}$$

and `\begin{align*}...\end{align*}`

$$\begin{aligned} F(s) &= \mathcal{L}\{t\} \\ &= \frac{1}{s} \end{aligned}$$

Packages

You'll notice that `align*` doesn't work. The reason is, you haven't added the package necessary yet.

Try including \usepackage{amsmath} in your preamble.

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After you've checked that works - load the graphicx package.

Pictures

```
\begin{figure}[h!]
  \includegraphics{/path/to/figure}
  \caption{}
  \label{}
\end{figure}
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The [h!] component tells LaTeX to put the image exactly where you told it to. A big one-up on Word.

The best way to keep learning

There is thousands of packages for different things! The only way you can learn them is by going through and using them in documents. Stackexchange is your friend.

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- Solve differential equations
- Plot natively in the document
- Presentations (like this one!)

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When I call \Eval{x^2}{2}{3} this gives $x^2\big|_2^3$

Other programs to help create nice looking documents in $\LaTeX$

TikzEdt Semi-graphical tikz editor - very similar to the semiconductor drawing I showed earlier

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Mendeley Bibliography management: yes no more CiteThisForMe!

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