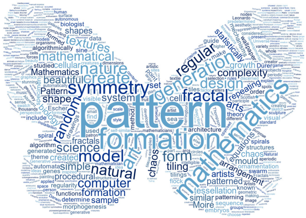
Advanced Mathematical Perspectives 1

Lecture 2: Tools of the Trade: LaTeX



Matthew Roughan
<matthew.roughan@adelaide.edu.au>
www.maths.adelaide.edu.au/matthew.roughan/notes/AMP1/

School of Mathematical Sciences,
University of Adelaide

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Section 1

Tools of the Trade

Mathematicians use various tools.

From time to time, we'll talk about a few of the most common.

These are things that will be useful through your degree and beyond

Section 2

LaTeX

What is LaTeX

- It is a document preparation system developed by mathematicians and computer scientists to fit our needs
- It works by creating a *text* document with added *markup* that starts with *backslashes*
- Examples:
  - To do a heading, we might write

```
\section{This is a section heading}
```

  - To do an equation, we might write

```
\begin{equation}
  E = m c^2
\end{equation}
```

  but there is much, much more it can do

Concept

- It isn't WYSIWYG!
  - many people are daunted by that
- You write a plain "text" file with extra *markup*
  - in LaTeX the markup usually begins with a backslash \
  - *e.g.*, \alpha $= \alpha$
- You "compile" the text into an output file
  - usually these days the output is PDF

Why use LaTeX?

Obvious reasons:

- Free
- Runs on Linux, MacOS, Windows, ...
- Incredibly flexible
- Best (practical) typesetting of mathematics
- Files are open and portable
- Good typesetting

Why use LaTeX? (part ii)

Not so obvious reason:

- WYSIWYG focuses your attention on style
  - *e.g.*, how things look
- LaTeX focuses your attention on content
  - most real writers don't add any of the stylistic features you see in the final product
  - style can be added last

Three parts of a document

content what you want to say

- this seems pretty important?

structure how it is organised, and other special notations

- e.g. emphasis

style how it actually appears in the end:

- layouts (e.g., number of columns)
- colours
- fonts
- positioning (of floats)

One set of content+structure can be displayed with many styles, but only if the content and structure are written in a way that is translatable.

Markup Facilitates Reuse

- One set of content+structure can be displayed with many styles or output formats
  - PDF and WWW output
  - what if I changed the template (style) for your reports at the last minute?
- One style can be used for many reports
  - I can give you a "style" and get you all to do (almost) identical looking reports

Why use LaTeX? (part iii)

You have to!

Your report (for 60% of your total mark) WILL be done in LaTeX

This is not a punishment, it's basic training

- You will most likely need it in AMP 2, and 3
- Honours theses ++ are all done with LaTeX
- Math and CS journals often *only* accept LaTeX

You will find, once you get used to it, it's a great way to write up any math, even assignments

Getting started with LaTeX

Sign up to Overleaf https://www.overleaf.com/ now!!!

Installation on your computer

- Installing LaTeX is not usually trivial
- To get started quickly, we will use a cloud-based LaTeX tool called Overleaf
  - you need to sign up for a *free* account
  - **please do that before you come to the practical**
- Eventually you will want an installation on your local computer
  - Good idea is to install a package that puts all the bits of TeX in one place and integrates them
    - ★ standard package on Linux-based systems is what I mainly use, with emacs as the editor
    - ★ on MacOS many people seem to like TexShop
    - ★ I don't know the best kit on Windows – maybe you can tell me?
    - ★ There are lots of possibilities: for comparisons see `http://en.wikipedia.org/wiki/Comparison_of_TeX_editors`

Latex is not a good search term

We will do a few activities to help you get started with LaTeX

Other resources:

- My fav. book is [KD03], but there are lots of others, some much newer (and maybe better) – I have several I can lend
- The LaTeX guys themselves https://www.latex-project.org/
- https://www.tug.org/interest.html
- LaTeX wiki https://en.wikibooks.org/wiki/LaTeX
- Tony Robert's www.maths.adelaide.edu.au/anthony.roberts/LaTeX/index.html
- Lot's of help on StackExchange

Use of references

- Using references/citations well is incredibly important
  - See the University's plagiarism guidelines
  - See Section 2 of
    http://www.rogerclarke.com/SOS/SCSP-09.html
- LaTeXcomes with a tool for doing references called BibTeX
  - there are variants in the tools, and how to use them, *e.g.*, BiBLaTeX and BibDesk
  - all are great!

Task

- This week we will create our first LaTeX document

Further reading I

 Helmut Kopka and Patrick W. Daly, *Guide to latex*, Addison-Wesley, 2003.