

Learn LaTeX

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About

This is a *sample* book written in **Markdown**. You can use anything that Pandoc's Markdown supports; for example, a math equation $a^2 + b^2 = c^2$.

```
\begin{equation}
y = mx + c
\end{equation}
```

Which will produce something like this:

$$y = mx + c \tag{1}$$

0.1 What is this book about?

- LaTeX is very flexible: many ways to do the same thing. I will show you how I would go about it, but YMMV and you may have an equally valid or better way to do the same things. If so, great!

0.2 Who is it for?

0.3 What to expect?

- Lots of practice, examples and exercises

0.4 Usage

Each **bookdown** chapter is an .Rmd file, and each .Rmd file can contain one (and only one) chapter. A chapter *must* start with a first-level heading: **# A good chapter**, and can contain one (and only one) first-level heading.

Use second-level and higher headings within chapters like: **## A short section** or **### An even shorter section**.

The `index.Rmd` file is required, and is also your first book chapter. It will be the homepage when you render the book.

0.5 Render book

You can render the HTML version of this example book without changing anything:

1. Find the **Build** pane in the RStudio IDE, and
2. Click on **Build Book**, then select your output format, or select “All formats” if you’d like to use multiple formats from the same book source files.

Or build the book from the R console:

```
bookdown::render_book()
```

To render this example to PDF as a `bookdown::pdf_book`, you’ll need to install XeLaTeX. You are recommended to install TinyTeX (which includes XeLaTeX): <https://yihui.org/tinytex/>.

0.6 Preview book

As you work, you may start a local server to live preview this HTML book. This preview will update as you edit the book when you save individual `.Rmd` files. You can start the server in a work session by using the RStudio add-in “Preview book”, or from the R console:

```
bookdown::serve_book()
```

Part I

Part I

Chapter 1

Getting started

1.1 What is LaTeX?

1.2 Why LaTeX?

- Maths
- Big documents
- WYWIWYG not WYSIWYG
- Plain text plays well with version control
- Been around for a long time and stable
- Programmatic:
 - much more control than markdown
 - can define your own macros to take some of the faff out of it
- Journals and Books

what to prepare yourself for

- some very pretty output
- some very ugly error messages
- a steep but rewarding learning curve
- lots of googling

Effectively learning a programming language, but where the output is a pretty document.

1.3 Getting LaTeX ready

- Online vs Offline
- Recommend using Overleaf, at least until you get started
- Worry about installing locally when you want to write on a train or a plane.

- [Link to installation instructions](#)
- IDE vs vim vs commandline

1.4 Where to look for help?

- The Not so short introduction to LaTeX2e
- Google (and friends)
- Books

1.5 A Note on Directory Structure

- Good to know where things are on your computer
- Don't work in Downloads or some other ridiculous location
- Either have a single directory (maybe Documents/writing) to store all of your tex documents in one place
- If using Overleaf this is effectively what you are doing, but the documents are all stored on the cloud rather than on your computer.
- On a related note - just like you should have backups of word documents incase you spill your pint of squash on your laptop, you should keep your LaTeX files in the cloud or with backups.
- The other approach, if you are writing on an exciting project, is to have all files to do with that project in Documents/.../exciting-project/writing
- This is because in the process of going from plain text to a beautiful pdf, LaTeX will make some intermediate files (which you can delete safely) that contain advanced diagnostic information when things go wrong. You can set things up so that LaTeX will tidy up after itself, but I wouldn't recommend it. Just ignore the extra files until you ever need them.

Chapter 2

Hello World! LaTeX Text

2.1 Structure of a LaTeX Document

2.2 Hello world

2.3 A Basic Preamble

2.4 Structure

- bold
- italic
- underline
- monospace
- cross through
- Paragraph breaks
- Sections
- Subsections
- lists:
 - numbered
 - unnumbered
 - sublists
 - subsublists
- footnotes

2.5 Lorem Ipsum

A longer example text. Give as .txt and ask to format as seen in example pdf.

2.6 Labelling and Referencing

- labelling sections and subsections
- suggested naming structure ch-intro sec-intro-labelling
- Move sections around and numbers fix themselves (on double compiling)
- Adding hyperlinks with the hyperref package

2.7 Citations

- the .bib file & its structure
 - recommend authorYYYYkeyword
 - recommend keeping alphabetical order within bib file
 - sorting by topic seems like a good idea when you start but there are always awkward in-between papers
- How to get bib references from google scholar
- Can also get them from other citation managers such as Mendeley and Evernote
- Can also create an entry manually yourself
- Can edit entries manually yourself
- This is important so that you can fix the dodgy references (Coles example)
- Citing Websites
- Citing ArXiv preprints
- Citing other materials
- what to add to the preamble and the end of the document
- Where to go for extra help - the Overleaf help page is very good on this.

2.8 Tips for writing longer documents

- Can skip on first reading
- multiple tex files
 - file for preamble
 - file for main text structure
 - separate file for each section/chapter
 - include and input

Cross-references make it easier for your readers to find and link to elements in your book.

2.9 Chapters and sub-chapters

There are two steps to cross-reference any heading:

1. Label the heading: `# Hello world {#nice-label}`.
 - Leave the label off if you like the automated heading generated based on your heading title: for example, `# Hello world = # Hello world {#hello-world}`.
 - To label an un-numbered heading, use: `# Hello world {-#nice-label}` or `{# Hello world .unnumbered}`.
2. Next, reference the labeled heading anywhere in the text using `\@ref(nice-label)`; for example, please see Chapter `??`.
 - If you prefer text as the link instead of a numbered reference use: any text you want can go here.

2.10 Captioned figures and tables

Figures and tables *with captions* can also be cross-referenced from elsewhere in your book using `\@ref(fig:chunk-label)` and `\@ref(tab:chunk-label)`, respectively.

See Figure 2.1.

```
par(mar = c(4, 4, .1, .1))
plot(pressure, type = 'b', pch = 19)
```

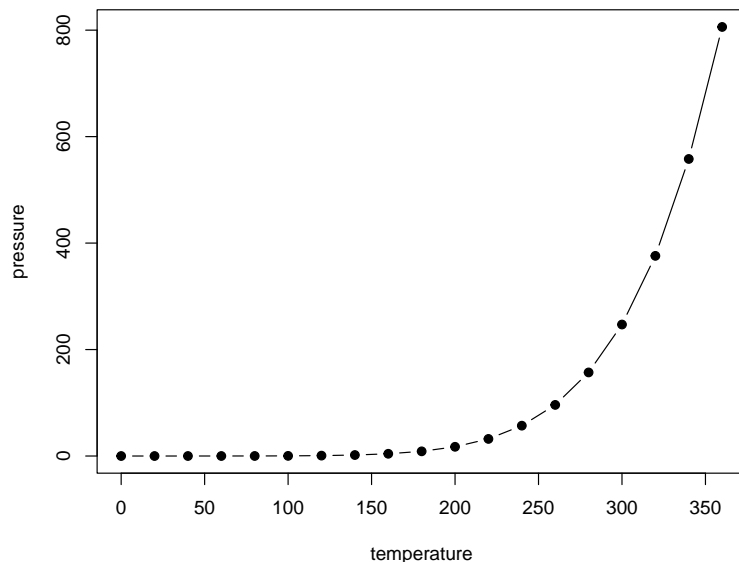


Figure 2.1: Here is a nice figure!

Table 2.1: Here is a nice table!

temperature	pressure
0	0.0002
20	0.0012
40	0.0060
60	0.0300
80	0.0900
100	0.2700
120	0.7500
140	1.8500
160	4.2000
180	8.8000

Don't miss Table 2.1.

```
knitr::kable(  
  head(pressure, 10), caption = 'Here is a nice table!',  
  booktabs = TRUE  
)
```

Chapter 3

Beautiful Math in LaTeX

3.1 Introduction

- This is what we are really here for and where things start to get really fun!
- several ways of writing math, all of which come into some sort of math environment.
- first is inline math, that is used for when you are talking about a mathematical object or expression in the middle of a sentence. The math text should be “wrapped” in dollar signs.
- For displayed math there are several options: wrap in double dollar signs, wrap with `\[` and `\]` or explicitly use an equation environment.
- Displayed equations by default get numbered and you can label and reference them in the same way as sections and subsections earlier. Remember, it might take two compilations to get these references to appear.
- Only equations that you mention in the text should get numbers. To typeset a displayed equation without a number you can add `\nonumber` to any of the above options or you can use the `equation*` environment instead.

3.2 Some oddments

`\times` is `\$times$`.

You can add parts to organize one or more book chapters together. Parts can be inserted at the top of an `.Rmd` file, before the first-level chapter heading in that same file.

Add a numbered part: `# (PART) Act one {-}` (followed by `# A chapter`)

Add an unnumbered part: `# (PART*) Act one {-}` (followed by `# A chapter`)

Add an appendix as a special kind of un-numbered part: `# (APPENDIX) Other stuff {-}` (followed by `# A chapter`). Chapters in an appendix are prepended with letters instead of numbers.

Chapter 4

Figures, Tables and Diagrams

4.1 Figures

- floating environments [htbp!]
- figure environments
- includegraphics
- labels and captions
- subfigures
- referencing subfigures
- Graphics types
- Exporting from R (and Python?)
- Draft mode

4.2 Tables

- tabular and table environments
- labels and captions as for figures
- multirow and multicolumn
- Large horizontal tables
- coloured cells

- rotated text for column headings
- Link to table generator

4.3 Diagrams

- picture and tikz picture
- DAG example

4.4 Code Listings

- verb and verbatim
- lstlistings

4.5 Algorithms

- list environment
- algorithm2e

4.6 Blocks

- Note, Caution, Important, Tip, Warning

Chapter 5

Structure

5.1 Document types

- article
- report
- book

5.2 Formatting

5.2.1 Paper and Font size

5.2.2 Margins

5.2.3 Columns

5.2.4 Title Page

5.3 Conditional Evaluation

Part II

Part II - Presentations

Chapter 6

Beamer Presentations

6.1 The `beamer` document class

6.2 Presentation Specific Commands

- `\pause`
- `\alert`
- `block` and `exampleblock`
- aspect ratio of slides

6.3 Adding white space

- adding space between bullet points
- vertical and horizontal whitespace
- easy to lose a lot of time here, add all content first then sort spacing

6.4 Multi-column Slides

- `columns`
- example left image slide
- example right image slide

6.5 Animations

- From GIF
- From pdf
 - with buttons
 - without buttons

6.6 Video

- From the internet
- Local

6.7 Links to slide templates

- Include basic beamer template
- Overleaf

Part III

Part III - Posters

Chapter 7

Beamer Posters

- Effectively one big Beamer slide
 - combination of columns and blocks
 - tip: include number in block titles so that reading order is obvious
 - Figures and Tables should still be referenced in text
- Style files for pretification
- Setting paper size and orientation
- Changing colour theme
- Making your own colour theme
- Header and Footer
- Other templates