MATH9999 Lecture Notes

Clement Lee

Semester 2, 2023/2024

Contents

Module overview **5**

1 Mathematical Identities **7**
1.1 LaTeX environments 7
1.2 Bookdown environments 7

2 Computational reproducibility **9**

3 Labelling **11**

Module overview

Say something about the module. The `{-}` in the Rmd file is so that this chapter doesn't get numbered.

Chapter 1

Mathematical Identities

This is Chapter 1.

1.1 LaTeX environments

We can use `equation` envrionment as in LaTeX.

$$e^{i\pi} + 1 = 0 \tag{1.1}$$

Equation (1.1) is the Euler's identity.

1.2 Bookdown environments

These start with `::: {. }` and end with `:::`.

Theorem 1.1 (Euler's identity)**.** $e^{i\pi} + 1 = 0$

The proof of Theorem 1.1 is as below:

Proof.

$$\begin{aligned} e^{i\pi} + 1 &= \cos\pi + i\sin\pi + 1 \\ &= -1 + i \times 0 + 1 = 0 \end{aligned}$$

□

The proof is written in the same kind of environments as the theorem.

Chapter 2

Computational reproducibility

Plot the `cars` data set in `R`. What do you observe?

```
plot(cars)
```

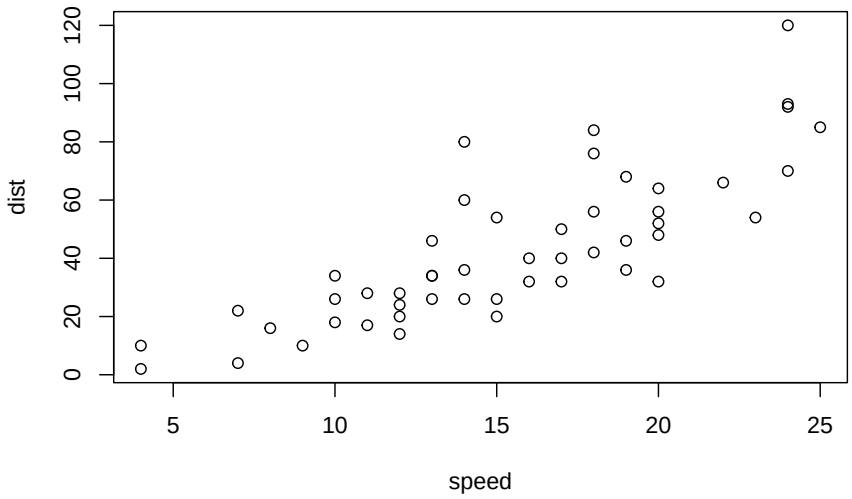

Figure 2.1: Cars dataset

A positive correlation between `speed` and `dist` can be seen in Figure 2.1.

Chapter 3

Labelling

Environment	Where label?	When labelling	When referencing
Chapter/section	After name	`{#chapter-name}`	`\@ref(chapter-name)`
Equation	Before/after equation	`(\#eq:euler)`	`\@ref(eq:euler)`
Theorem	1st line of environment	`::: {.theorem #identity}`	`\@ref(thm:identity)`
Proof	Can't label	N/A	N/A
Figure	1st line of environment	```` ```{r plot-cars} ````	`\@ref(fig:plot-cars)`

It's confusing!

- When labelling: apart from equations, don't add the required prefix; relatedly, don't use colon `:` in the label name or things will break.
- When referencing: apart from chapters/sections, add the required prefix; always use `\@ref()` so that referencing works in both html & pdf.
- In addition to colon `:`, avoid using underscore `_` in labels as things **might** break; the hyphen `-` is the best bet.