

R

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Chapter 1

Footnotes and citations

1.1 Footnotes

Footnotes are put inside the square brackets after a caret `^[]`. Like this one ¹.

1.2 Citations

Reference items in your bibliography file(s) using `@key`.

For example, we are using the **bookdown** package [Xie, 2023] (check out the last code chunk in `index.Rmd` to see how this citation key was added) in this sample book, which was built on top of R Markdown and **knitr** [Xie, 2015] (this citation was added manually in an external file `book.bib`). Note that the `.bib` files need to be listed in the `index.Rmd` with the YAML `bibliography` key.

The RStudio Visual Markdown Editor can also make it easier to insert citations: <https://rstudio.github.io/visual-markdown-editing/#/citations>

¹This is a footnote.

1 R

All chapters start with a first-level heading followed by your chapter title, like the line above. There should be only one first-level heading (#) per .Rmd file.

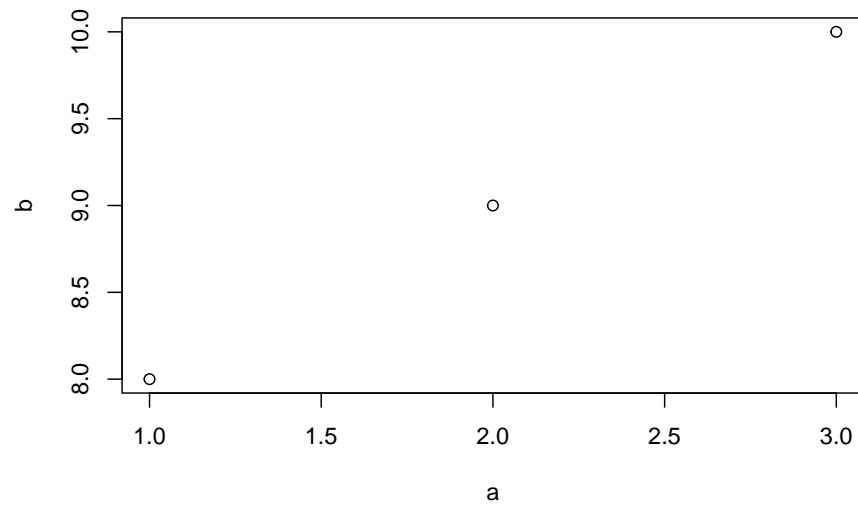
1.1

All chapter sections start with a second-level (##) or higher heading followed by your section title, like the sections above and below here. You can have as many as you want within a chapter.

1.1.1 R

Chapters and sections are numbered by default. To un-number a heading, add a {.unnumbered} or the shorter {-} at the end of the heading, like in this section.

```
a<- c(1,2,3)
b <- c(8,9,10)
plot(a,b)
```



1.1.2 Rstudio

1.1.3 R

1.2

1.3

2

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

2.1

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.

2.2

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 1.1.

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

Don't miss Table 1.1.

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

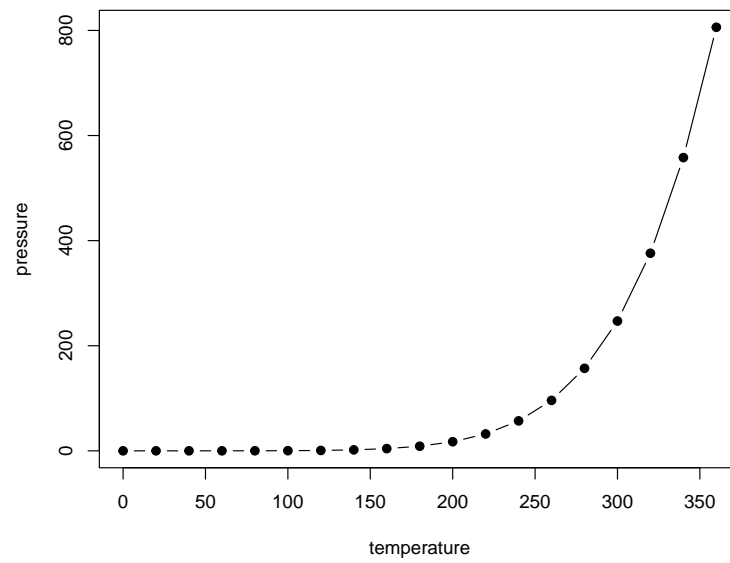


Figure 1.1: Here is a nice figure!

Table 1.1: 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

2.3

3 R

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.

3.1 R

```
load("C:/Users/liren/Desktop/R / / / /data_rdata/data_rdata/Data_Set_1.rdata")#
head(data_set_1) # 6
```

```
## Threshold
## 1      1.0
## 2      1.0
## 3      1.1
## 4      1.4
## 5      1.4
## 6      1.4
```

```
str(data_set_1) #
```

```
## 'data.frame': 470 obs. of 1 variable:
## $ Threshold: num 1 1 1.1 1.4 1.4 1.4 1.5 1.7 1.9 2 ...
## - attr(*, "var.labels")= chr "Mechanical threshold (sheep)"
```

```
table(data_set_1) #
```

```
## Threshold
## 1 1.1 1.4 1.5 1.7 1.9 2 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9
```

```
##      2      1      3      1      1      1      1      8      3      4      4      4      5      5      7      3
##      3 3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 4 4.1 4.2 4.3 4.4 4.5
##      4 10 12 5 9 14 10 9 10 5 7 19 17 14 8 15
## 4.6 4.7 4.8 4.9 5 5.1 5.2 5.3 5.4 5.5 5.6 5.7 5.8 5.9 6 6.1
## 14 14 18 11 8 9 9 5 8 5 6 6 5 8 4 3
## 6.2 6.3 6.4 6.5 6.6 6.7 6.8 6.9 7 7.1 7.2 7.4 7.5 7.6 7.7 7.8
##      2      4      5      5      1      4      6      3      2      3      1      3      2      3      1      3
## 7.9 8 8.1 8.2 8.3 8.4 8.5 8.6 8.7 8.8 8.9 9 9.1 9.2 9.3 9.4
##      3      2      1      2      1      2      3      1      1      1      3      1      1      1      3      2
## 9.5 9.6 9.7 9.8 9.9 10 10.2 10.3 10.4 10.5 10.7 10.8 10.9 11 11.3 11.5
##      3      3      2      2      1      3      2      1      1      2      2      1      2      1      1      1
## 11.8 12 12.3 12.4 12.6 12.8 12.9 13.4 13.8 14 14.5 14.9
##      1      1      1      1      1      1      1      1      1      1      1      1
```

```
summary(data_set_1)
```

```
##      Threshold
##      Min.      : 1.000
##      1st Qu.: 3.700
##      Median : 4.650
##      Mean    : 5.252
##      3rd Qu.: 6.100
##      Max.    :14.900
```

3.2

```
attach(data_set_1) # attach() $
summary(data_set_1) #summary()      1 3
```

```
##      Threshold
##      Min.      : 1.000
##      1st Qu.: 3.700
##      Median : 4.650
##      Mean    : 5.252
##      3rd Qu.: 6.100
##      Max.    :14.900
```

```
table(data_set_1) #table()
```

```
## Threshold
##      1 1.1 1.4 1.5 1.7 1.9 2 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9
##      2 1 3 1 1 1 1 8 3 4 4 4 5 5 7 3
##      3 3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 4 4.1 4.2 4.3 4.4 4.5
##      4 10 12 5 9 14 10 9 10 5 7 19 17 14 8 15
## 4.6 4.7 4.8 4.9 5 5.1 5.2 5.3 5.4 5.5 5.6 5.7 5.8 5.9 6 6.1
## 14 14 18 11 8 9 9 5 8 5 6 6 5 8 4 3
```



```
## 6.2 6.3 6.4 6.5 6.6 6.7 6.8 6.9 7 7.1 7.2 7.4 7.5 7.6 7.7 7.8
## 2 4 5 5 1 4 6 3 2 3 1 3 2 3 1 3
## 7.9 8 8.1 8.2 8.3 8.4 8.5 8.6 8.7 8.8 8.9 9 9.1 9.2 9.3 9.4
## 3 2 1 2 1 2 3 1 1 1 3 1 1 1 3 2
## 9.5 9.6 9.7 9.8 9.9 10 10.2 10.3 10.4 10.5 10.7 10.8 10.9 11 11.3 11.5
## 3 3 2 2 1 3 2 1 1 2 2 1 2 1 1 1
## 11.8 12 12.3 12.4 12.6 12.8 12.9 13.4 13.8 14 14.5 14.9
## 1 1 1 1 1 1 1 1 1 1 1 1
```

```
x <- table(data_set_1)
names(x)[which(x==max(x))]
```

```
## [1] "4.1"
```

```
min(data_set_1)
```

```
## [1] 1
```

```
max(data_set_1)
```

```
## [1] 14.9
```

```
y <- range(data_set_1)
diff(y)
```

```
## [1] 13.9
```

```
length(data_set_1)
```

```
## [1] 1
```

```
length(data_set_1$Threshold) #length()
```

```
## [1] 470
```

```
quantile(data_set_1$Threshold)
```

```
## 0% 25% 50% 75% 100%
```

```
## 1.00 3.70 4.65 6.10 14.90
```

```
quantile(data_set_1$Threshold,0.25)
```

```
## 25%
```

```
## 3.7
```

```
quantile(data_set_1$Threshold,0.75)
```

```
## 75%
```

```
## 6.1
```

```
IQR(data_set_1$Threshold) # IQR Q3 Q1 IQR = Q3 - Q1
```

```
## [1] 2.4
```

```
mean(Threshold) #      attach()
```

```
## [1] 5.251702
```

```
median(Threshold) #
```

```
## [1] 4.65
```

```
var(Threshold) #
```

```
## [1] 5.959731
```

```
sd(Threshold) #
```

```
## [1] 2.441256
```

3.3

4 R

4.1

Footnotes are put inside the square brackets after a caret `^[]`. Like this one ².

4.2

Reference items in your bibliography file(s) using `@key`.

For example, we are using the **bookdown** package [Xie, 2023] (check out the last code chunk in `index.Rmd` to see how this citation key was added) in this sample book, which was built on top of R Markdown and **knitr** [Xie, 2015] (this citation was added manually in an external file `book.bib`). Note that the `.bib` files need to be listed in the `index.Rmd` with the YAML `bibliography` key.

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²This is a footnote.

5 R

5.1

Here is an equation.

$$f(k) = \binom{n}{k} p^k (1-p)^{n-k} \quad (1.1)$$

You may refer to using `\@ref{eq:binom}`, like see Equation (1.1).

5.2

Labeled theorems can be referenced in text using `\@ref{thm:tri}`, for example, check out this smart theorem 1.1.

Theorem 1.1. *For a right triangle, if c denotes the length of the hypotenuse and a and b denote the lengths of the **other** two sides, we have*

$$a^2 + b^2 = c^2$$

Read more here <https://bookdown.org/yihui/bookdown/markdown-extensions-by-bookdown.html>.

5.3

The R Markdown Cookbook provides more help on how to use custom blocks to design your own callouts: <https://bookdown.org/yihui/rmarkdown-cookbook/custom-blocks.html>

6 R

6.1 Publishing

HTML books can be published online, see: <https://bookdown.org/yihui/bookdown/publishing.html>

6.2 404 pages

By default, users will be directed to a 404 page if they try to access a webpage that cannot be found. If you'd like to customize your 404 page instead of using the default, you may add either a `_404.Rmd` or `_404.md` file to your project root and use code and/or Markdown syntax.

Bookdown HTML books will provide HTML metadata for social sharing on platforms like Twitter, Facebook, and LinkedIn, using information you provide in the `index.Rmd` YAML. To setup, set the `url` for your book and the path to your `cover-image` file. Your book's `title` and `description` are also used.

This `gitbook` uses the same social sharing data across all chapters in your book— all links shared will look the same.

Specify your book's source repository on GitHub using the `edit` key under the configuration options in the `_output.yml` file, which allows users to suggest an edit by linking to a chapter's source file.

Read more about the features of this output format here:

<https://pkgs.rstudio.com/bookdown/reference/gitbook.html>

Or use:

```
?bookdown::gitbook
```


7 R

7.1 Publishing

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```


Bibliography

Yihui Xie. *Dynamic Documents with R and knitr*. Chapman and Hall/CRC, Boca Raton, Florida, 2nd edition, 2015. URL <http://yihui.org/knitr/>. ISBN 978-1498716963.

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