Miscelaneous Tips

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1 Using LaTeX

- Start and end inline mathematics with one `$`
- Start and end displayed mathematics with two `$$`
- For more complex environments, click here.
- Symbol table
- To bold mathematics, use `\mathbf{}`. For example, to bold Σ use `\mathbf{\Sigma}` $\rightarrow \mathbf{\Sigma}$
- To create a superscript with text, use `^{\text{Your text}}`. For example, to write the ith example use `$i^{\text{th}}$`.

2 Labeling Equations with `bookdown`

Equation labels must start with the prefix `eq:` in `bookdown`. All labels in `bookdown` must only contain alphanumeric characters, `:`, `-`, and/or `/`. Equation references work best for LaTeX/PDF output, and they are not well supported in Word output or e-books. For HTML output, `bookdown` can only number the equations with labels. Please make sure equations without labels are not numbered by either using the `equation*` environment or adding `\nonumber` or `\notag` to your equations. The same rules apply to other math environments, such as `eqnarray`, `gather`, `align`, and so on (e.g., you can use the `align*` environment).

To create Equation (1), use the code shown in the gray box below.

$$f(x) = (x+a)(x+b) \tag{1}$$

```
\begin{equation}
 f(x)=(x+a)(x+b)
 (\#eq:label1)
\end{equation}
```

To refer to Equation (1), use `\@ref(eq:label1)`.

To create the aligned Equation (2), use the code shown in the gray box below.

$$f(x) = x^4 + 7x^3 + 2x^2$$
$$+ 10x + 12 \tag{2}$$

```
\begin{align}
 f(x) &= x^4 + 7x^3 + 2x^2 \nonumber \\
      &\qquad {} + 10x + 12
(\#eq:aligned)
\end{align}
```

To write the piece-wise function in Equation (3), use the code shown in the gray box below.

$$u(x) = \begin{cases} \exp x & \text{if } x \geq 0 \\ 1 & \text{if } x < 0 \end{cases} \tag{3}$$

```
\begin{equation}
 u(x) =
  \begin{cases}
   \exp{x} & \text{if } x \geq 0 \\
   1       & \text{if } x < 0
  \end{cases}
  (\#eq:piece)
\end{equation}
```

3   Labeling Graphs with `bookdown`

Figure 1 was created using the `R` code chunk and code below. Note that to refer to Figure 1, the name of the code chunk label is used. In this case, the code chunk label is `HISTO` and to refer to Figure 1 one uses the syntax `\@ref(fig:HISTO)`.

````
```{r, label = "HISTO", fig.cap = "Write your descriptive caption here", echo = FALSE}
stuff <- rnorm(10000, 100, 15)
DF <- data.frame(x = stuff)
library(ggplot2)
ggplot(data = DF, aes(x = x)) +
  geom_histogram(fill = "pink", color = "red", binwidth = 5) +
  theme_bw()
```
````

4   Labeling Tables with `bookdown`

Table 1 was created using the `R` code chunk and code below. Note that to refer to Table 1, the name of the code chunk label is used. In this case, the code chunk label is `FT` and to refer to Table 1 one uses the syntax `\@ref(tab:FT)`.

````
```{r, label = "FT", echo = FALSE}
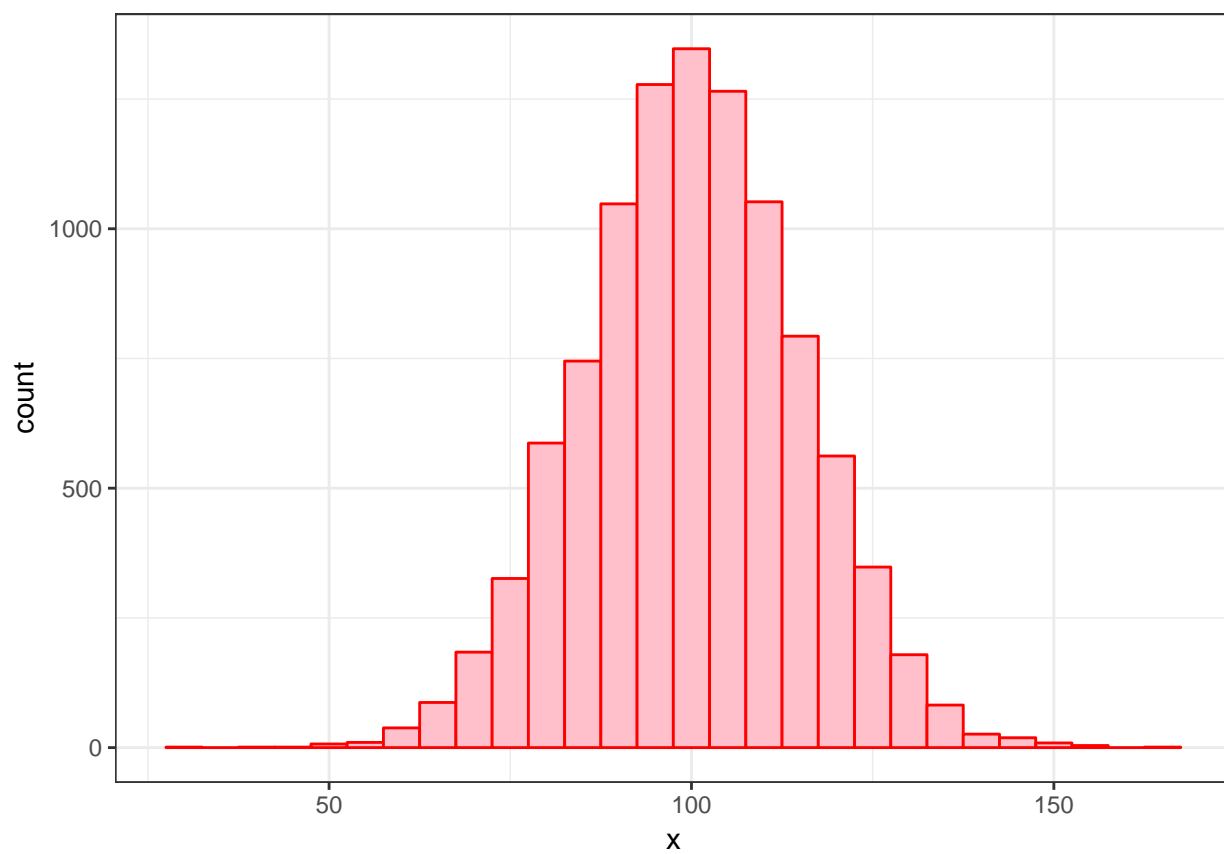knitr::kable(head(iris), booktabs = TRUE,
````

Figure 1: Write your descriptive caption here

Table 1: The first six rows of 'iris'

Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
5.1	3.5	1.4	0.2	setosa
4.9	3.0	1.4	0.2	setosa
4.7	3.2	1.3	0.2	setosa
4.6	3.1	1.5	0.2	setosa
5.0	3.6	1.4	0.2	setosa
5.4	3.9	1.7	0.4	setosa

```
caption = 'The first six rows of `iris`'
)
```

5 Automagically Creating R Package References

```{r, echo = FALSE, results = "hide"}
PackagesUsed <- c("ggplot2", "bookdown")
# Write bib information
knitr::write_bib(PackagesUsed, file = "./packages.bib")
# Load packages
lapply(PackagesUsed, library, character.only = TRUE)
```

The above R code creates a file named `packages.bib` to cite the `ggplot2` package used to create Figure 1. Figure 1 was created with `ggplot2` by Wickham and Chang (2016). To cite a package in the `*.bib` file, use the syntax `@name_of bib_entry`. This document specifies the output as `bookdown::html_document2`. The function `bookdown::html_document2` is from `bookdown` written by Xie (2016).

6 Use Inline R!

Although one can compute statistics and hard code the values in a report, it is much better to use inline R code to report all answers. The mean, standard deviation, and IQR of the ranodmly generated values in `DF` are computed and stored in the tibble `NDF`. Each time this document is compiled, different values will be stored in `DF` and hence the values in `NDF` will likely be different.

```r
library(dplyr)
NDF <- DF %>%
  summarize(Mean = mean(x), SD = sd(x), iqr = IQR(x))
NDF
```

```
      Mean       SD      iqr
1 100.0661 14.97965 19.95715
```

To report the mean of the variable `x` in `NDF` using two decimal places, use the inline R code

```r
`r round(NDF$Mean, 2)`
```

which returns the value 100.07.

References

Wickham, Hadley, and Winston Chang. 2016. *Ggplot2: Create Elegant Data Visualisations Using the Grammar of Graphics.* https://CRAN.R-project.org/package=ggplot2.

Xie, Yihui. 2016. *Bookdown: Authoring Books and Technical Documents with R Markdown.* https://github.com/rstudio/bookdown.