BDA - Assignment X

Anonymous

Contents

Loaded packages

```
# To install aaltobda, see the General information in the assignment.
library(aaltobda)
```

Exercise 1)

Subtasks in each assignments should be numbered and use header (in rmd use ##).

a)

For each subtask include necessary textual explanation, equations, code and figures so that the answer to the question flows naturally. You can think what kind of report would you like to review, and what kind of information would make it easier where there is error (if there are errors).

Code

We can easily add R code as chunks in the following way:

```
5 + 5
```

```
## [1] 10
```

This R code is evaluated when running the notebook or when rendering to PDF.

If you want to show and run the code, but the output is very long or messy and you prefer to hide the output from the rendered report you can use option results='hide'. This is useful especially later as Stan may output many lines.

```
5 + 5
```

If you want to use some code in the notebook, but think it's not helpful for the reviewers you can exclude it from the generated PDF with option `include=FALSE`. You will see the next block in rmd, but not in the generated PDF.

Plots

Include plots, where we can specify the width and height of the figure.

```
data("drowning") # Access the data in aaltobda package
plot(drowning$year, drowning$drownings)
```

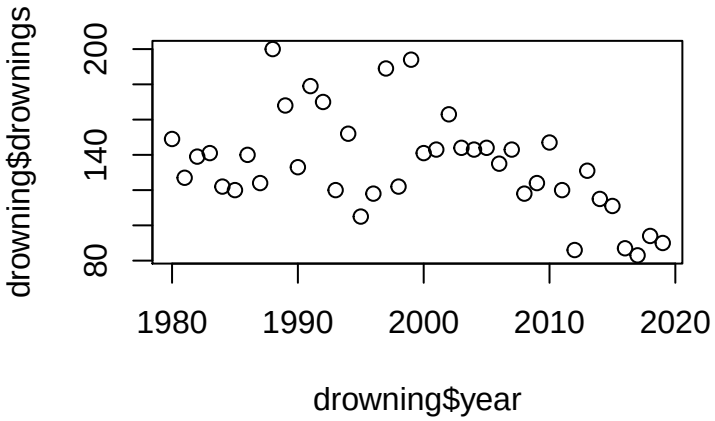

Figure 1: Number of drownings per year.

Or using `qplot()` from `ggplot2` package:

```
library(ggplot2)
# see themes at https://ggplot2.tidyverse.org/reference/ggtheme.html
theme_set(theme_classic())
qplot(drowning$year, drowning$drownings)+
  labs(x="Year", y="Drownings")
```

```
## Warning: `qplot()` was deprecated in ggplot2 3.4.0.
```

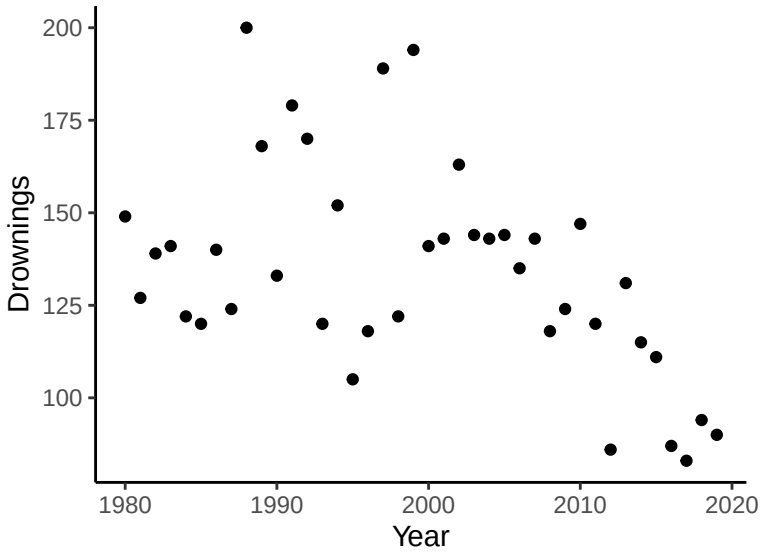

Figure 2: Number of drownings per year with qplot.

Or using ggplot from ggplot2 package without pipe. In the following code bloc `eval=FALSE` is used to show the code, but not display the same plot again.

```
ggplot(data=drowning, aes(x=year, y=drownings)) +
  geom_point() +
  labs(x='Year', y='Number of drownings')
```

Images

You can include an existing image (e.g. scanned copy of pen and paper equations).

Equations

You can write equations using LaTeX syntax, or you can include them as images if, for example, you use Microsoft Equations.

In Markdown, equations can easily be formulated using LaTeX in line as $f(k) = \binom{n}{k} p^k (1-p)^{n-k}$. Or use the math environment as follows:

$$\begin{matrix} x_{11} & x_{12} & x_{13} \\ x_{21} & x_{22} & x_{23}. \end{matrix}$$

The above example illustrated also multicolumn 'array'. Alternative way to make multiline equations with alignment is to use 'aligned' as follows;

$$\begin{aligned} y &\sim \text{normal}(\mu, 1) \\ \mu &\sim \text{normal}(0, 1). \end{aligned}$$

If you are new to LaTeX equations, you could use the latext4technics equation editor to create LaTeX equations to include in the report.

More information on using LaTeX in R markdown can be found in 2.5.3 in R Markdown: The Definite Guide.

A short introduction to equations in LaTeX can be found at https://www.overleaf.com/learn/latex/Mathematical_expressions.

Tables

You can use `knitr::kable` to add formatted tables. Captioning and labeling works similarly as with plots.

```
knitr::kable(head(drowning))
```

year	drownings
1980	149
1981	127
1982	139
1983	141
1984	122
1985	120

Compare this to raw output:

```
# Raw output
head(drowning)
```

```
##   year drownings
## 1 1980       149
## 2 1981       127
## 3 1982       139
## 4 1983       141
## 5 1984       122
## 6 1985       120
```

Language

The language used in the course is English. Hence the report needs to be written in English.

Jupyter Notebook and other report formats

You are allowed to use any format to produce your report, such as Jupyter Notebook, as long as you follow the formatting instructions in this template.