Exercises for Lecture 1

Statistical Computing with R, 2023-24

Installing `R` and RStudio

If you haven't done this yet: install `R` and RStudio on your laptop following the instructions that you can find in the slides. If you run into installation problems that you don't know how to solve, don't hesitate to ask the teaching assistants (TAs) for help!

Exercise 1

Calculate the remainder and integer part of the following divisions:

1. 12 by 5
2. 823 by 17
3. 475832 by 1342

Exercise 2

Use `R` to compute:

1. 37 * 42 + 17 / 3
2. $\frac{17}{3} - 2\left(\frac{15}{6} + 1\right)$
3. $[3(\frac{3}{4})^2 - 5]/2 + 7$

Exercise 3

Fernanda wants to open a fixed term deposit, and she is considering two alternative options. Interbank offers her a 5 year deposit with a constant 1.5% yearly interest rate. PiggyBank, instead, offers her a 5 year deposit with a 1.3% interest rate in the first 3 years, and a 2% rate in the last two years. At both banks, interest is compound year-over-year.

Fernanda loves football, astronomy and coffee, but (like most people on this planet) she isn't particularly good at math. Hopefully you can use your knowledge of math and `R` help her: which bank should Fernanda choose?

Exercise 4

Use the function `seq( )` (tip: type `?seq` in the console to see its help page) to create the following vectors:

1. (1 2 3 4 5 6 7 8)
2. (5 8 11 14 17)
3. (4.5 6.5 8.5 10.5)

Exercise 5

Use the function `rep( )` to create the following vectors:

1. (14 15 14 15 14 15)
2. (2 2 2 3 3 1 1 1 1 1 4 4)
3. (male male male female male male female female female female female male female female)

Exercise 6

The functions `is.numeric`, `is.character` and `is.factor` allow you to check whether a vector is of type numeric, character or factor, respectively. Use these functions to determine of what type the following vectors are:

```
v1 = c(exp(3), 2*pi)
v2 = c('Antonio', v1)
v3 = factor(c('green', 'green', 'red'))
v4 = c('green', 'green', 'red')
```

Exercise 7

The functions `sum( )` and `prod( )` can be used to compute the sum and the product of the elements in a vector. Use these functions to compute the following sums and products:

1. $\sum_{x=1}^{100} x$
2. $\sum_{x=3}^{98} x$
3. $\sum_{x=5}^{10} x^2$
4. $\prod_{x=7}^{14} \frac{1}{x}$