Day 1 - R intro exercises

2024-09-05

Workflow
Create a new emtpy R script. Solve the exercises one by one. Here you just type in the R-commands on empty line one by one. To execute your code place the cursor at the specified line and use the keyboard shortcuts:

- Run code/selection and move to next line: `Ctrl + Enter` (Ctrl + Enter) and Mac: `Command + Return` (Command + Return)
- Run current line/selection (retain cursor position): `Alt + Enter` (Alt + Enter) and Mac: `Option + Return` (Option + Return)

Once you are happy with the solution, you can **compile** the document as a stand-alone html-file. You do this by either

- Go 'File > Knit Document' in the drop-down menu,
- click on the small *notebook* icon in the editor window, or
- use the keyboard shortcut `Ctrl + Shift + K` (Ctrl + Shift + K) and on Mac: `Shift + Command + K`) (Shift + Ctrl + K).

Exercises

Create the following two vectors:

```
v1 <- c(1, -5, 3, -7, 12, -9)
v2 <- c(30, 50, 10)
```

A) Simple arithmetic

A.1) Add 10 to each element of `v1`.

A.2) Multiply each element of `v1` by 10.

A.3) Add `v1` to `v2`. Make sure you understand the result.

B) Vector operations

B.1) Select the 2nd and 5th element of `v1` (from above)

B.2) Select all except the 2nd and 5th element from `v1`.

B.3) Create the logical vector `ww` which elements are `TRUE` if the elements of `v1` are larger or equal to 3 and `FALSE` otherwise.

B.4) Concatenate `v1` and `v2` and call this vector `v12`.

B.5) Find out whether any element of `v12` lies between 2 and 4. *Hint: `any()` is your friend.*

B.6) How many negative elements does `v12` contain? *Hint: Make a logical vector telling which elements are negative and then use the function `sum()` to count the TRUE values.*

B.7) Generate the vector `g` which contains first 3 times the character value `'weak'` followed by 2 times the character value `'strong'`. *Hint: Use the `rep()` function!*

C) Basic statistics

Run the following commands:

```
set.seed(1234)
x <- round(runif(100, 0, 10))
y <- round(runif(100, 0, 10))
```

C.1) Find the smallest element in `x`.

C.2) Find the largest element in `x`.

C.3) Find the range of `x`.

C.4) Find the sum of all the elements in `x`.

C.5) Find the mean of all the elements in `x`. (Does it seem reasonable?)

C.6) Find the standard deviation of all the elements in `x`. (Does it seem reasonable?)

C.7) Make a vector from `x` where the elements no. $11 - 20$ And element no. 51 are removed. *Hint: Use indices with negative sign.*

C.8) Make a vector from `x` where all the elements with value less than 5 are removed.

C.9) Determine the index of those elements in `x` which have value either 0 or 10.

C.10) Determine the index of those elements in `x` which have the same value as the preceding one. *Hint: use the command* `diff()`.

C.11) Consider `x` and `y` as paired observations. Make a vector of those elements of `x` for which `y` takes the value 5.

C.12) Determine the indices for which `x` and `y` have the same value.

C.13) Make a vector which from every pair of `x` and `y` chooses the largest of the two values. *Hint: use the command* `ifelse()`.

C.14) Solve the exercise above even more easily with the command `pmax()`.