Spring 2022 courses

ds Quiz 3 - control flow

This third quiz deals with the first DataCamp assignment (conditionals and logical control flow). For the first run, challenge yourself - after the deadline, you can play this quiz as often as you like (until the final exam).

What is the result of this operation?

```
as.character(1) == "1"
```

```
[1] TRUE
```

TRUE:

- TRUE

FALSE:

- FALSE
- 1
- "1"
- NA

Feedback: `as.character` turns a `numeric` object into a `character` object. So `1` becomes `"1"`.

What is the result of this operation?

```
Inf <= -Inf
```

```
[1] FALSE
```

TRUE:

- FALSE

FALSE:

- TRUE
- Inf
- -Inf
- NaN

Feedback: `Inf` is an infinite number. Its negative value is smaller than its positive value.

What is the result of this operation?

```
NA != NA
```

```
[1] NA
```

TRUE:

- `NA`

FALSE:

- `TRUE`
- `FALSE`
- `Error`
- `NaN`

Feedback: You cannot compute with missing values.

What is the result of the last operation?

```
foo <- 1 == 1
bar <- 2*2 == 5
foo < bar
```

```
[1] FALSE
```

TRUE:

- FALSE

FALSE:

- `TRUE`
- `1`
- `5`
- `4`

Feedback: `foo`, `1==1`, is `TRUE` or `1`. `bar`, `2*2==5`, is `FALSE` or `0`. `1 < 0` is `FALSE`

Is `LETTERS` greater than `letters`?

Tip: Both of these are constant character vectors. `LETTERS` contains of the upper-case letters of the alphabet, while `letters` contains the lower-case letters of the alphabet.

TRUE

What is `LETTERS > letters`?

Tip: Both of these are constant character vectors. `LETTERS` contains of the upper-case letters of the alphabet, while `letters` contains the lower-case letters of the alphabet.

TRUE:

- `rep(TRUE, length(letters))`
- A `logical` vector

FALSE:

- TRUE
- FALSE

Feedback: The result of this operation is a `logical` vector of alphabet length (26) all of whose elements are `TRUE`.

`is.na(NA)` is `TRUE`. What is `!is.na(!NA)`

Tip: `is.na()` checks if its argument is a missing value (`NA`).

FALSE

Feedback: `!NA` is still just `NA`, a missing value. Applying the negation operator `!` to a missing value does not change it, hence the result of `!is.na(NA)`, which is `FALSE`, still is `FALSE`.

What is the result of this operation?

```
c(TRUE,FALSE) && c(TRUE, TRUE)
```

```
[1] TRUE
```

TRUE:

- TRUE

FALSE:

- TRUE FALSE
- c(TRUE,FALSE)

Feedback: The double Boolean operator `&&` means that only the first element of each vector is examined - `TRUE` & `TRUE` is `TRUE`.

What is the result of the last operation?

```
foo <- c(1,2,3,4,5)
bar <- tail(foo,2)
foo[1:2] < bar
```

```
[1] TRUE TRUE
```

TRUE:

- TRUE TRUE

FALSE:

- `FALSE FALSE`
- `TRUE FALSE`
- `FALSE TRUE`
- `TRUE`
- `FALSE`

What is the result of the last operation?

```
first <- head(1:10,1)
first < 5 || first > 10
```

```
[1] TRUE
```

TRUE

Feedback: `first` is the first element of `1:10`, or `1`, which is smaller than `5`, hence the epxression is `TRUE`, because the binary `||` operator is true if only one of its arguments is true. In this case, `|` is the same as `||` because we are checking a scalar.

ds Quiz 2: GNU Emacs installation and first steps

Update notice

Quiz 2 (10 questions) is now available to you. Try to complete it before class tomorrow (3 PM). Takes no more than 5-10 minutes. Cheers!

Settings text

This is the second quiz of the term. It addresses last week's class contents (see recording/whiteboard in GDrive, or `notes.org` in GitHub). Feedback is provided where useful and applicable.

This quiz is not graded. You can play it once before the next class. You can play it unlimited times thereafter. The most difficult questions may reappear in the final exam.

Which of these are valid `PATH` settings?

TRUE:

- `C:\Program Files\Emacs\x86_64\bin`
- `C:\Program Files (x86)\R\R-4.1.2\x64\bin`
- `~/R/R-4.1.2`

FALSE:

- `C:/Program Files/Emacs/x86_64/bin`
- `C:/Program Files (x86)/R/R-4.1.2/x64/bin`
- `c:/usr/bin`

Feedback: Under Windows, the folders in the search `PATH` are separated by a backslash (\\), while on MacOS/Linux, they are separated by a forward slash (/). Under MacOS/Linux, path names have no drive identifier like `E:` or `C:`.

The `PATH` is a variable only for the Windows operating system

FALSE

Feedback: Every computer must search for a program when you ask for it. The `PATH` variable is the list of folders that the computers searches, in Windows, MacOS/Unix and Linux.

Know your shell

`--version` and `-nw` in the following code chunk are program options or flags.

```
prompt> R --version
prompt> emacs -nw
```

TRUE

Feedback: `R --version` returns the program version that is installed on your PC, while `emacs -nw` opens Emacs in the terminal (without certain graphics capabilities), as long as either programis in the `PATH`.

You can configure GNU Emacs using a "hidden" initial configuration file `~/.emacs`

TRUE

Feedback: the dot (.) before the file name marks this file as "hidden" in the sense that you normally need to tell the Operating System that you wish to see these files, too (except under Linux, of course, where users are not afraid of extra information).

Which symbols mark Org-mode meta data?

Tip: Org-mode meta data include the document title, author information, and different options for how to render the Org-mode file.

TRUE:

- `#+`

FALSE:

- `##`
- `/* */`
- `//`

Feedback: Examples are `#+CAPTION:` for an image caption, `#+TITLE:`, `#+OPTION:` and `#+STARTUP:`. Check any of my Org-mode files on GitHub to see these in action. `##` is Org-mode comment, `/* */` and `//` are C programming comments.

Font, font size and theme of a GNU Emacs buffer cannot be changed

FALSE

Feedback: To change the font size, use `C-x C-=`. To change the custom theme, enter `M-x custom-themes RET`. For font setting information, check the Emacs manual, or type `C-h a font RET` (a~propos ~font).

Keybindings for Emacs functions can be changed

TRUE

Feedback: Emacs is fully customizable. You can, for example, switch Emacs' kill/yank keys (`C-w~/~C-y`) to the keys for cut/copy/paste that you're used to, by entering `M-x cua-mode RET` (toggles - i.e. applying the function again returns to the default state).

How can you abort or quit any command in GNU Emacs?

TRUE:

- `C-g`

FALSE:

- `q()`

Feedback: `q()` or `quit()` exits the R shell program, not Emacs.

How can you see all Emacs buffers that are currently open?

TRUE:

- `M-x list-buffers`
- `C-x C-b`

FALSE:

- `ListBuffers()`
- `C-M-\`

Feedback: Each key sequence, like `C-x C-b`, corresponds to a Lisp function, in this case `list-buffers`. To find the function belonging to a key, type `C-h k <key sequence>`. `C-M-\` is the `indent-region` function. Check it yourself!

How can you close all buffers except one?

TRUE:

- `C-x 1`

FALSE:

- `C-x 2`
- `C-x 3`
- `C-x 5 2`
- `C-x 5 0`

Feedback: `C-x 2~/~C-x 3` opens another horizontal/vertical buffer window. `C-x 5 2` creates another Emacs frame. `C-x 5 0` closes the current frame.

ds Quiz 1: Course introduction and installation of R

This is the first weekly quiz. Time = 15 minutes, 10 points max. After the first play, the quiz will be opened for unlimited play. The quiz questions may be reused in the final exam.

Bring the data science pipeline steps in the right order

1. Import data
2. Clean data
3. Understand data
4. Communicate insights

One-fifth of published genetics papers have errors due to improper spreadsheet usage

TRUE

> "Gene Name Errors Are Widespread in the Scientific Literature" by Mark Ziemann, Yotam Eren, and Assam El-Osta, Genome Biol 17, 177 (2016). 10.1186/s13059-016-1044-7

What is the Tidyverse?

TRUE:

- A bundle of R packages

FALSE:

- A tidy universe of R
- An R package

You cannot do data science just on the command line

FALSE

> Yes, you can. I showed a recent (technical) book with that title.

What are regular expressions?

TRUE:

- Search pattern
- Sequence of characters

FALSE:

- Data structures | regex are just text, not separate data structures
- Variables | regex can be used to defined variables
- Programming language | No, though regex are used by languages like awk

Which of these are interactive notebooks?

TRUE:

- GNU Emacs Org-mode
- Kaggle notebooks
- Google Colaboratory
- Jupyter notebooks

You have to complete an EDA project in this course

FALSE

> Unlike last term, your grade is not determined by a project. You can, however, complete a project as extra credit if you like, or as an honors project.

What is the right order for the R installation under Windows?

1. Download base R from CRAN
2. Check the `checksum` of the download
3. Run installer executable
4. Check `PATH` to R
5. Start R console program

Which files are automatically created when you save the R workspace upon exiting?

TRUE:

- `.Rhistory` | All the R session commands you typed
- `.RData` | Binary data file to recreate last R session

FALSE:

- `.Rprofile` | This is a configuration file that you can create
- `.Rplots` | This is created if you created plots only

What do you need to run R inside GNU Emacs?

TRUE:

- The ESS (Emacs Speaks Statistics) package

FALSE:

- Linux
- The latest version of R
- The latest version of Emacs

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