Vectors/Iterators Lab

David Gerard

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Learning Objectives

- Practice manipulating vectors.
- Practice for loops.
- Practice `purrr`.

Exercise 1: Simulations

1. Write a function that uses a for loop that, for each iteration, randomly draws 5 observations from an exponential distribution with rate parameter 1 (use `rexp()`) and calculates its mean. It should do this 10,000 times. Choose an appropriate plot to plot the distribution of means.
2. Repeat part 1 by using a `map_*()` function.
3. Repeat part 1 by using the `replicate()` function.
4. Use a another for loop that will print out plots for sample sizes of 5, 10, and 20 observations (instead of just 5).

Exercise 2: Star Trek

For this exercise, load in the following dataset.

```
library(tidyverse)
library(lubridate)
```

```
st <- list(
  franchise = "Star Trek",
  series = c("TOS", "TNG", "DS9", "VOY", "ENT"),
  starship = tribble(~ID,         ~class,         ~name,       ~length,  ~launched,
                     ##----------/---------------/------------/---------/----------
                     "NCC-1701",  "constitution", "Enterprise", 288.646, 2245,
                     "NCC-1701D", "galaxy",       "Enterprise", 642.5,   2361,
                     "NX-74205",  "defiant",      "Defiant",    170,     2370,
                     "NCC-74656", "intrepid",     "Voyager",    343,     2371),
  captain = tribble(~firstname,  ~lastname, ~ship,       ~drink,
                    ##----------/----------/------------/----------
                    "James",     "Kirk",    "NCC-1701",  "brandy",
                    "Jean-luc",  "Picard",  "NCC-1701D", "tea",
                    "Benjamin",  "Sisko",   "NX-74205",  "coffee",
                    "Katherine", "Janeway", "NCC-74656", "coffee"),
  age = as.duration(today() - ymd(19660908))
)
```

1. Use an appropriate function to see the components of `st` in a concise way.
2. Use R code to determine the class of each element of `st`.
3. It seems that `starship` and `captain` can be merged into one data frame. Do this now.

   Your `st` list should now look like this:

```
## List of 4
##  $ franchise: chr "Star Trek"
##  $ series   : chr [1:5] "TOS" "TNG" "DS9" "VOY" ...
##  $ starship :Classes 'tbl_df', 'tbl' and 'data.frame':   4 obs. of  8 variables:
##   ..$ ID       : chr [1:4] "NCC-1701" "NCC-1701D" "NX-74205" "NCC-74656"
##   ..$ class    : chr [1:4] "constitution" "galaxy" "defiant" "intrepid"
##   ..$ name     : chr [1:4] "Enterprise" "Enterprise" "Defiant" "Voyager"
##   ..$ length   : num [1:4] 289 642 170 343
##   ..$ launched : num [1:4] 2245 2361 2370 2371
##   ..$ firstname: chr [1:4] "James" "Jean-luc" "Benjamin" "Katherine"
##   ..$ lastname : chr [1:4] "Kirk" "Picard" "Sisko" "Janeway"
##   ..$ drink    : chr [1:4] "brandy" "tea" "coffee" "coffee"
##  $ age      :Formal class 'Duration' [package "lubridate"] with 1 slot
##   .. ..@ .Data: num 1.66e+09
```

Exercise 3: Diamonds

1. Load in the `diamonds` data frame from the ggplot2 package.
2. Calculate summary statistics (using `summary()`) for all quantitative variables.
3. To fit a linear model of `price` on `depth` and extract the p-value for the regression coefficient of `depth`, you would use the following R code:

```
lmout  <- lm(price ~ depth, data = diamonds)
sumout <- summary(lmout)
sumout$coefficients["depth", "Pr(>|t|)"]
```

   Fit a separate linear model for `price` on `depth` for each level of `color`. Extract the p-values for the regression coefficients.

4. Plot `depth` vs `price`, faceting by `color`, including an OLS line. Do the p-values in the previous question roughly match what you would expect based on the plots?