Lab 1: R basics

Objective

- Create and run scripts to perform basic calculations and draw graphs in R.
- Use the following R commands: c, mean, getwd, setwd, rm, list, ls, read.csv, names, dim, plot, log, barplot, subset, points

Exercises

1. What is the sex ratio at birth of red deer? You have data from six deer mothers on the sex of all their offspring, as follows:

   Deer 1: 3 female, 2 male

   Deer 2: 2 female, 5 male

   Deer 3: 1 female, 3 male

   Deer 4: 5 female, 4 male

   Deer 5: 4 female, 1 male

   Deer 6: 3 female, 2 male

   Write an R script to do the following:

- Store these data in vectors.
- Calculate the sex ratio (proportion of females) for the first deer mother.
- Calculate the sex ratio for all of the deer mothers.
- Calculate the average sex ratio across the six mothers.

   Do red deer appear to have an equal sex ratio at birth?

1. Body mass index (BMI) is a measure of body weight designed to account for differences in height. It is equal to weight divided by height squared, with weight measured in kilograms and height in meters). You have data on the height and weight of ten people, as follows:

   1: 167 cm, 64 kg

   2: 175 cm, 72 kg

   3: 180 cm, 73 kg

   4: 155 cm, 65 kg

   5: 173 cm, 75 kg

   6: 185 cm, 74 kg

7: 181 cm, 82 kg

8: 163 cm, 69 kg

9: 179 cm, 79 kg

10: 170 cm, 72 kg

Put these data in an Excel file and save it as a CSV file (comma separated values).

Write an R script to do the following:

- Show the current working directory.
- Change the working directory to where the CSV file is located.
- Clear the workspace of any previously defined variables.
- Read the data into a data frame.
- Show the size of the data frame.
- Show the names of the data frame's variables.
- Calculate the average weight of the ten people.
- Calculate the BMI of each person and store it in the data frame.
- Make a scatterplot of BMI vs. weight. Be sure to label the plot axes (for this plot and all other plots that you make).

Does BMI appear to depend on weight?

1. How fast does the concentration of a toxin in the bloodstream decrease? A typical pattern is that the concentration decreases by a fixed proportion each unit time (e.g., it goes down by half every 2 hours). File toxin.csv contains data on the concentration (in parts per million) of a toxin in the bloodstream of a rat, measured every hour for eight hours. Write an R script to do the following:
    - Read the data into a data frame.
    - Plot toxin concentration over time.
    - Plot the logarithm of concentration over time.

    How do the two plots compare?

1. How do the weights of male and female monitor lizards compare? File lizards.csv contains the weights of ten male and ten female lizards. Write an R script to do the following:
    - Calculate the average weight of males and females.
    - Make a bar plot showing the average weight of each sex.

    Does one sex seem bigger?

1. Can lion age be told by the amount of black pigmentation on the nose? File lions.csv contains the sex, age (in years), and proportion of black pigmentation on the nose for 20 lions. Write an R script to do the following:

    - Make a scatter plot of the relation between age and proportion black for male lions.
    - On the same plot, add a second set of points (in a different color) showing the relation between age and proportion black for female lions.

    Based on these plots, what can you say about the usefulness of nose pigmentation for estimating lion age?

Assignment: Turn in a single file containing all of the R scripts you wrote. After each script, you must paste the answer you got from R, including plots. You will be shown during the lab how to produce these files.