

## MAR536: Biological Statistics II

### R Laboratory Exercise 1

January 18, 2023

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Create and open a new project in R Studio. (name it 'biostats2\_lab1' or something similar)

(RStudio cloud project: <https://rstudio.cloud/spaces/47288/project/856390>)

Open a new R script. Save it. (name it lastname\_lab1.R or something similar)

At the top of the script, add comments with your name and lab 1. (comments are text preceded by a "#")

Work in pairs or individually. Submit your R script to Amanda before lab next week.

1. Write code that evaluates the following when run.

$$7 + 5(4 + 3)$$
$$e^{-5(0.2+0.15)}$$
$$\frac{\sqrt{1 + 2(3 + 2)}}{\ln(3^2 + 2)}$$

2. Create vectors using `seq()`, `rep()`, and mathematical operators. Only use `c()` when absolutely necessary. *hint* Remember you can get help on a function by typing `?functionname`

- Positive integers from 1 to 99
- Odd integers between 1 and 99
- The numbers 1,1,1, 2,2,2, 3,3,3
- The numbers -5,-4,-3,-5,-4,-3,-5,-4,-3
- The fractions 1, 1/2, 1/3, 1/4, ..., 1/10
- The cubes 1, 8, 27, 64, 125, 216

3. Complete the following using the vector `y`:

$$y = c(3, 2, 15, -1, 22, 1, 9, 17, 5)$$

- Display the first and last values.
- Find the last value for a vector of any length.
- Display the values that are greater than the mean of `y`.
- Display the positions (indices) of the values greater than the mean.
- Are all the values positive?
- Are any of the values equal to the mean?
- Are any of the values equal to the median?

4. The dataframe 'hills' contains record times for Scottish hill races. (hills is in the MASS package. To load, type `library(MASS)`)

- Display the first 5 rows of the `hills` dataframe.
- Find the fastest time.
- Display the hill races (and distance, climbs, and times) with the 3 fastest times.
- Extract and display the record time for Cairngorm.
- Find how many hill races have a climb greater than the mean.
- Display the names of the hill races that have a climb greater than the mean.
- Display the names and times of the races that are at least 10 miles long and have a climb greater than 4000 feet.
- Find the positions (indices) of hills that either have a climb greater than 5000 feet or have a record time less than 20 minutes.

- Find the standard deviation of the record times for all races except for the highest climb, the Bens of Jura.
- Display the range (minimum and maximum) of the average speed for the races.
- Find the race that had the fastest average speed.
- **bonus** Find the mean of the record times for races whose names start with letters A through K.