MAR536: Biological Statistics II

R Laboratory Exercise 1

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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 Gavin 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`.