Command Line Exercises for R

(To be completed *before* the R training days)

(1) Creating and manipulating vectors and matrices

a. Create a vector **a** = [1 0 -1 0 1 2 3] and a vector **b** = [1 1 0 0 -1 -2 -1].

b. Multiply all elements in **b** with 2, keep the result as the new vector **b**.

c. Compute the dot product of **a** and **b**

d. Compute matrix **c** as the outer product of **a** and **b**.

(2) Indexing vectors and matrices

a. Compute vector **d** as the 3th row of matrix **c**

b. Compute **e** as the 7th row, 6th column entry of **c**.

c. Compute vector **f** containing entries [3,1], [6,5], and [1,7], where the first value in each pair of brackets denotes the row and the second value denotes the column of the requested entry.

(3) Logical indexing: Given x=[7 6 1 2 0 -1 4 3 -2 0], what are the commands that will execute the following operations:

a. Sets the negative values of x to zero.

b. Extract the values of x greater than 3 in a vector y.

c. Add 3 to the values of x that are even.

d. Set the values of x that are less than the mean to zero.

e. Set the values of x that are greater than the mean to their difference with the mean.

(4) Generating and plotting curves

a. Compute the logistic function y = 1/(1+exp(-(x-a)*b)) for values of x from -3 to 3 in steps of 0.1. Use b = 1 and a = 0.

b. Plot y as a function of x

c. Do the same for a = 1, what happens?

d. Do the same for a = 0 and b = 3, what happens?

(5) Random numbers and histograms

a. Generate a vector **m** with 100 values drawn at random from a normal (Gaussian) distribution with mean 0.5 and standard deviation 0.15.

b. Generate a vector **t** with 100 values drawn at random from an exponential distribution with mean = 0.4.

c. plot histogram of the sum of **m** and **t**

d. Generate a vector **n** of 100 normally distributed values (mean = 0.5, SD = 0.15) such that **n** has a correlation of 0.7 with **m.** Add to **n** a new random vector **u** drawn from an exponential distribution with mean 0.8.

e. Produce a scatterplot of **n**+**u** as a function of **m**+**t**.