Noémie Becker & Benedikt Holtmann WiSe 2016/17

Exercises for the course

"An introduction to R"

Exercise session Data types and structures: Wednesday, March 1 2017

Exercise 1: *Creating and handling objects in R*

a) Define the variable 'x' as a vector (5, 2, 9, -1).

   View the vector by entering 'x' on the R command line.

b) Sort variable 'x' in increasing order.

c) Create the vector 'y' with numbers from 5 to 40 using **seq()**.

d) Create the variable 'z', which is the reverse of 'y' (from 40 to 5).

e) Use the function **seq()** followed by **rep()** to create the vector 'new'.

   (1, 1, 1, 3, 3, 3, 5, 5, 5, 7, 7, 7, 9,9, 9, 1, 1, 1, 3, 3, 3, 5, 5, 5, 7, 7, 7, 9,9, 9)

f) Create your own function 'myFun' that returns the square root of a value

   Test 'myFun' with the values: 2304, 310249, and 47.

   HINT: to save time, you could use **c()**.

Exercise 2: *Data types and conversion*

a) Determine the class of 'y' from the previous exercise?

   Convert 'y' into a character.

b) Can you spot the difference: Which of these are character strings and which are numbers?

   1 "1" "one"

c) Create a vector 'Mixed' containing the following mixed elements (1, "a", 2, "b") and find out its class.

d) Create vector 'Drinks' (beer, beer, wine, water, wine) of type factor, and display its levels.

Exercise 3: *Vectors*

a) Define the vector aVector <- 120*1:100 - (1:100)^2 + 300

b) What is the length of 'aVector'?

c) What is the first element, the 58th and the last element of 'aVector'?

d) Define a vector 'half' that contains only the last half of the elements of 'aVector'. To do that use negative integers and colon (e.g. x:y).

Exercise 4: *Lists*

a) Define the list myList<- list(1:6, c("a", "b"), c(FALSE, TRUE, TRUE)).

b) What is the element with index 2 in myList?

c) Which type of data is the element with index 3 in myList?

Exercise 5: *Matrices*

a) Define the matrix
myMatrix<- matrix(data=c(16:31), nrow = 4, ncol = 4, byrow = FALSE).

b) What is the entry in the third row and forth column?

c) Define a new submatrix that contains the elements of row 2 to 4 and columns 3 to 4.

d) Assign the names "Variable1" and "Variable2" to the columns of the new submatrix.

Exercise 6:

a) Create the objects 'x' (11, 12, 13, 14), 'y' (15, 16, 17, 18), and 'z' (19, 20, 22, 23).

b) Combine the objects 'x', 'y', and 'z' to a matrix with 3 rows and 4 columns (without using the command **matrix( )**).

Exercise 7: *Data frames are the typical R representation of data sets. Here, we create a data frame by hand.*

a) Use the command **data.frame()** to create the data frame 'Results' with the following entries. Make also sure that strings are characters and not factors!

Student	**Degree**	**Points**
Alex	Bachelor	28
Eva	Bachelor	14
Jan	Master	19
Marc	Bachelor	27
Marie	Master	13
Anna	Master	10

b) Which command returns the fifth element of the vector 'Points'?

c) Create a new data frame that contains only the vectors 'Student' and 'Degree' (without using the command **data.frame( )**).

d) Use the $ operator to extract the column 'Points' from the data frame.

e) You wish to change 'Degree' into 'Deg' to save typing work. Use the command **names()** to accomplish this change. You might need to consult the help page ?names to find out how to do this.