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SRT411- Assignment0

This assignment covers basics of using R and R studio and provides instructions of working in GitHub.

I will be following tutorial provided by my professor.

Tutorial link:<https://cran.r-project.org/doc/contrib/Torfs+Brauer-Short-R-Intro.pdf>

This tutorial consists of basic explanation of what R language is and 14 questions(ToDos), answers to which I included below.

I added short explanation to each answer along with the code I used for it. I also added plots whenever they are needed.

Note that some of the answers are generating a new text files or using specific scripts. All of the files and scripts needed for this assignment can be found in my repository at the GitHub.

I also provided links I used as a resources for this assignment in the end of this document.

Question 1

ToDo: Compute the difference between 2014 and the year you started at this university and divide this by the difference between 2014 and the year you were born. Multiply this with 100 to get the percentage of your life you have spent at this university. Use brackets if you need them.

Answer: For my code I used year 2018, so I will get positive numbers. This code is basic arithmetic calculation.

```
((2018-2015) / (2018-1998)) * 100
```

```
## [1] 15
```

Question 2

ToDo: Repeat the previous ToDo, but with several steps in between. You can give the variables any name you want, but the name has to start with a letter.

Answer: This ToDo goal is to create variable and make some simple calculations with it.

```
loan = 5000  
loan * 0.5
```

```
## [1] 2500
```

```
loan
```

```
## [1] 5000
```

```
loan = loan / 9  
loan
```

```
## [1] 555.5556
```

Question 3

ToDo: Compute the sum of 4, 5, 8 and 11 by first combining them into a vector and then using the function sum.

Answer: Create vector with few values inside. Calculate their sum with sum() function.

```
d=c(4,5,8,11)  
sum(x=d)
```

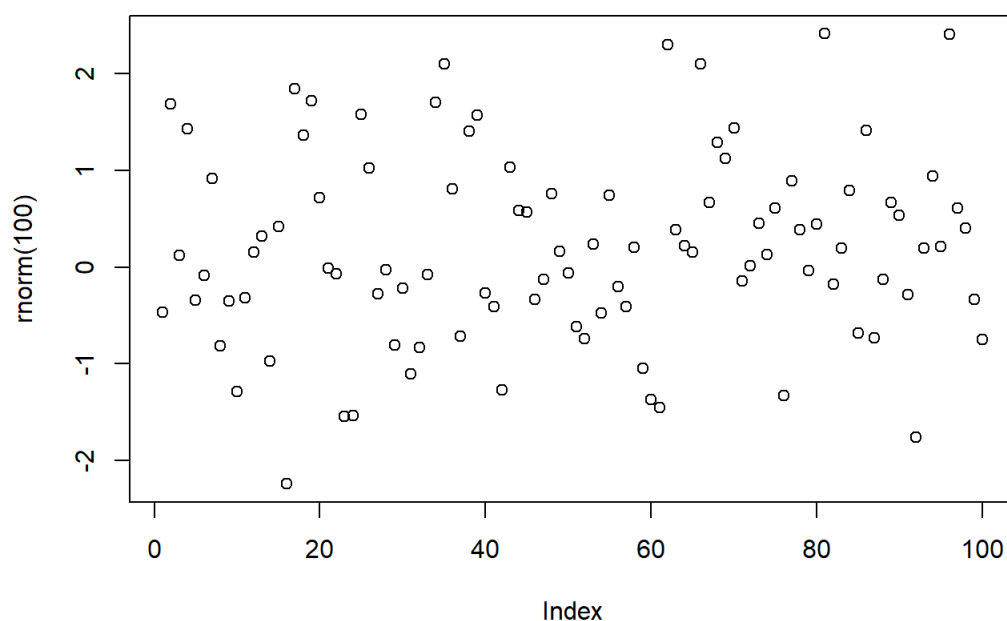
```
## [1] 28
```

Question 4

ToDo: Plot 100 normal random numbers.

Answer: Using rnorm() function to generate random numbers.

Plot:



Question 5

ToDo: Find help for the sqrt function.

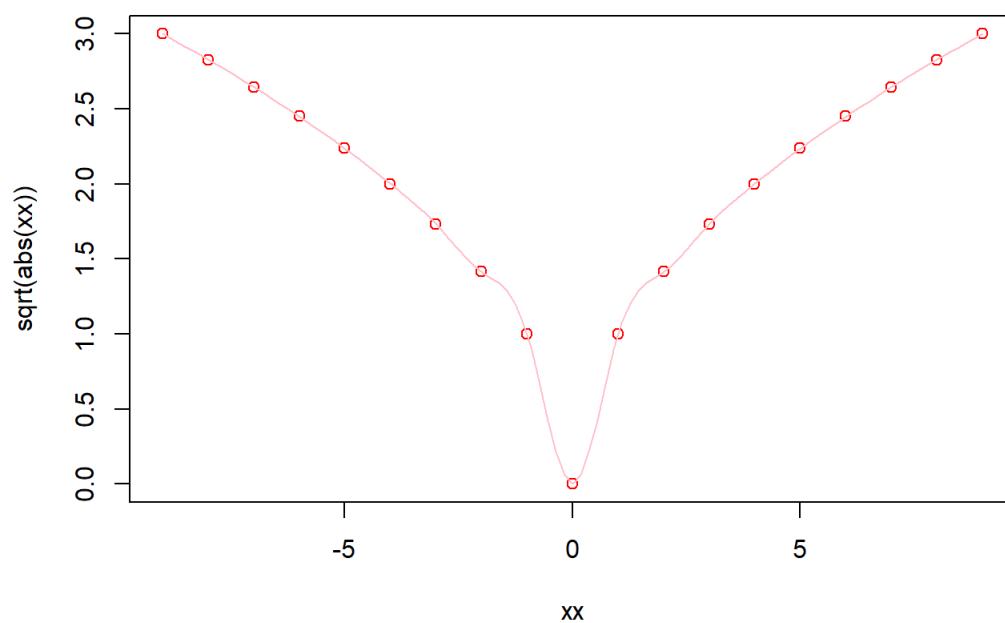
Answer: Using R commands to find more about 'sqrt' function.

```
help(sqrt)
```

```
## starting httpd help server ... done
```

```
example(sqrt)
```

```
##  
## sqrt> require(stats) # for spline  
##  
## sqrt> require(graphics)  
##  
## sqrt> xx <- -9:9  
##  
## sqrt> plot(xx, sqrt(abs(xx)), col = "red")
```



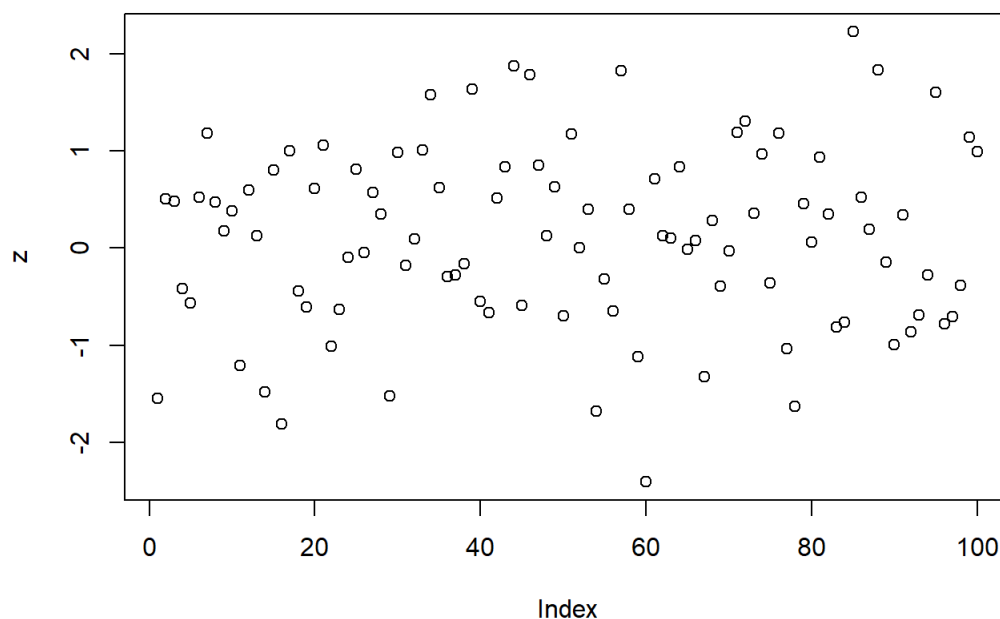
```
##  
## sqrt> lines(spline(xx, sqrt(abs(xx)), n=101), col = "pink")
```

Question 6

ToDo: Make a file called firstscript.R containing Rcode that generates 100 random numbers and plots them, and run this script several times.

Answer: Run a script. The script itself can be found in my GitHub repository.

```
source("firstscript.R")
```



Question 7

ToDo: Put the numbers 31 to 60 in a vector named P and in a matrix with 6 rows and 5 columns named Q. Tip: use the function seq. Look at the different ways scalars, vectors and matrices are denoted in the workspace window.

Answer: First, I created vector 'P' and specified that it should include numbers from 31 to 60. Next, I created matrix 'Q', which specified that I need 5 columns and 6 rows.

```
P = seq(from=31, to=60, by=1)
Q = matrix(data=c(P), ncol = 5, nrow = 6)
```

P

```
## [1] 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
## [24] 54 55 56 57 58 59 60
```

Q

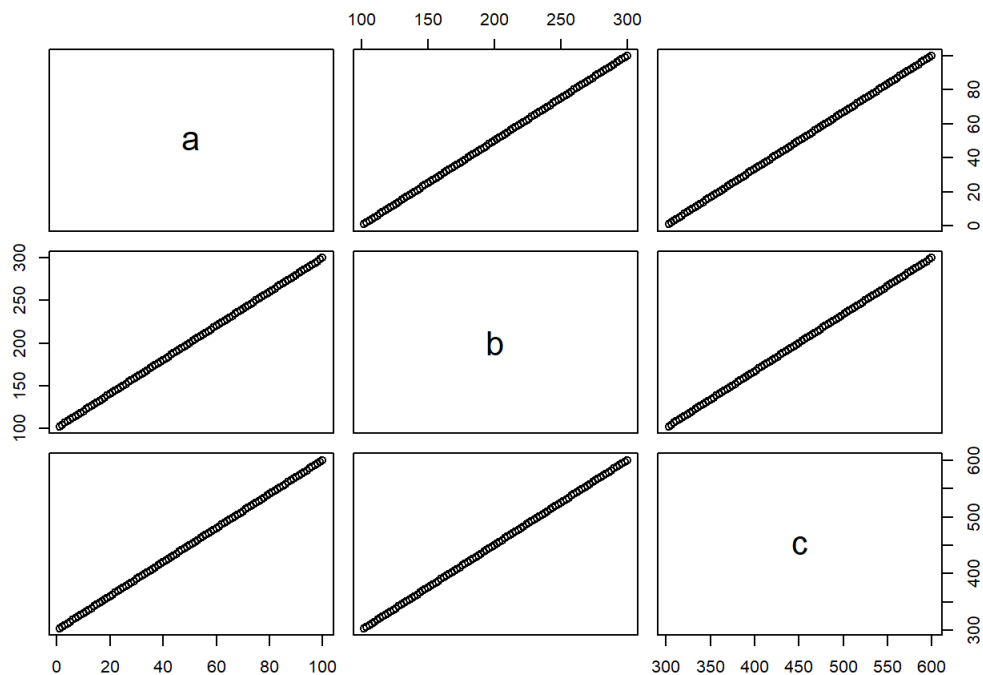
```
##      [,1] [,2] [,3] [,4] [,5]
## [1,]  31  37  43  49  55
## [2,]  32  38  44  50  56
## [3,]  33  39  45  51  57
## [4,]  34  40  46  52  58
## [5,]  35  41  47  53  59
## [6,]  36  42  48  54  60
```

Question 8

ToDo: Make a script file which constructs three random normal vectors of length 100. Call these vectors x1, x2 and x3. Make a data frame called t with three columns (called a, b and c) containing respectively x1, x1+x2 and x1+x2+x3.

Answer: I create file secondscript1.R, because I will need to modify it in the following ToDo's, but I want to provide clear answer for this question.

```
source("secondscript1.R")
```



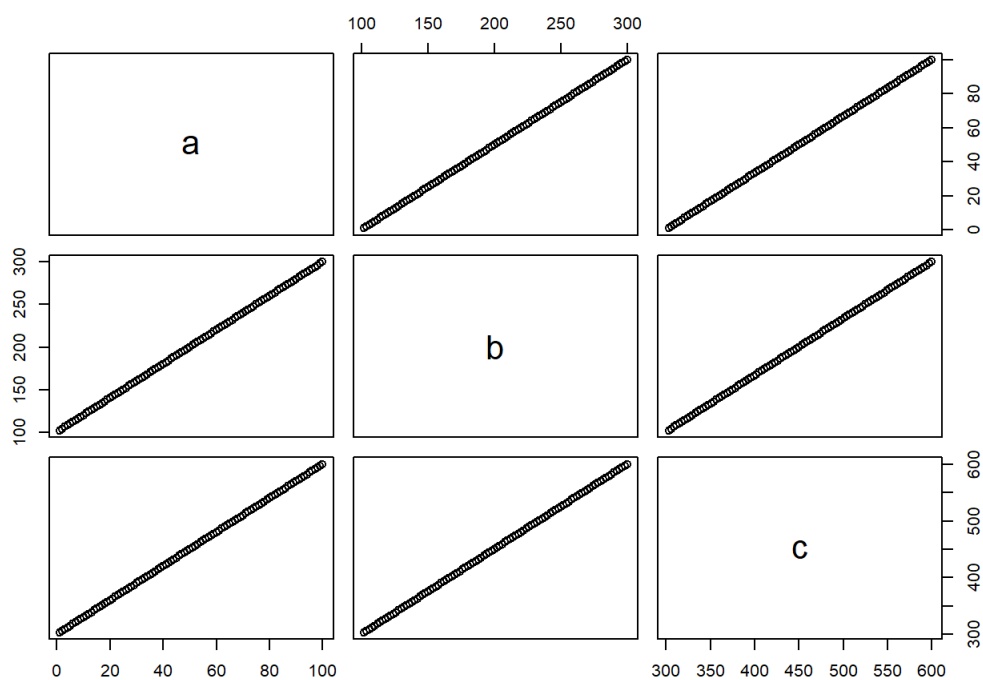
Question 9

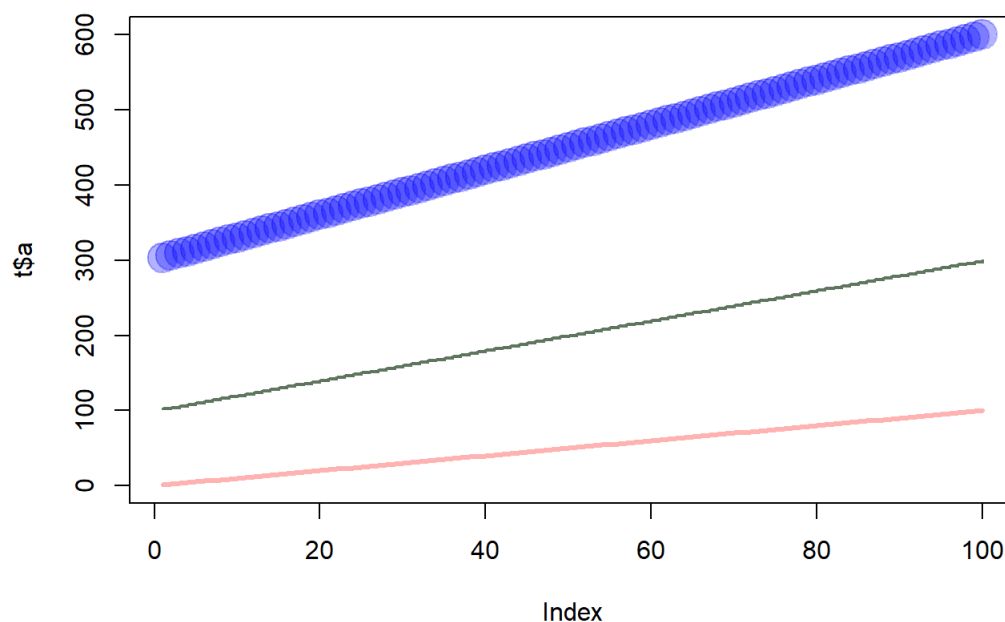
ToDo: Add following lines to the script file of the previous section.

Lines to add: `plot(t
a, type = "l", ylim = range(t), lwd = 3, col = rgb(1, 0, 0, 0.3))lines(tb, type="s", lwd=2,col=rgb(0.3,0.4,0.3,0.9))
points(t$c, pch=20, cex=4,col=rgb(0,0,1,0.3))`

Answer: I added this lines to the copy of file from previous question. Run the script. (Can be found in my itHub repository).

```
source("secondscript2.R")
```





Abbreviations:

rgb - red/blue/green. Identifies the colors.

lwd - line width.

pch - option to specify symbols to use when plotting points.

cex - number indicating the amount by which plotting text.

and symbols should be scaled relative to the default

Question 10

ToDo: Make a file called `tst1.txt` in Notepad from the example in Figure 4 and store it in your working directory. Write a script to read it, to multiply the column called `g` by 5 and to store it as `tst2.txt`.

Answer: Firstly, I create data frame and add values to it. Next, I write (save) it to the `'tst1.txt'` file. After that I copy data from `'tst1.txt'` to the new `'d2'` data frame. I change the column of `'g'` value, multiplying it by 5 and save changed values to the file `'tst2.txt'`. (All the files in my GitHub repository)

```
d = data.frame(a = c(1,2,4,8,16,32), g = c(2,4,8,16,32,64), x = c(3,6,12,24,48,96))
write.table(d, file="tst1.txt", row.names=FALSE)
d2 = read.table(file="tst1.txt", header=TRUE)
write.table(d2$g*5, file="tst2.txt")
```

Question 11

ToDo: Compute the mean of the square root of a vector of 100 random numbers.

Answer: I am using `rnorm` function to generate random numbers.

```
sqrt(mean(rnorm(100)))
```

```
## Warning in sqrt(mean(rnorm(100))): NaNs produced
```

```
## [1] NaN
```

Question 12

ToDo: Make a graph with on the x-axis: today, Sinterklaas 2014 and your next birthday and on the y-axis the number of presents you expect on each of these days.

Answer: Note- I am using 2017 insted of 2014 from in question.

```
date1=strptime( c("20171226", "20180331"), format="%Y%m%d")
presents = c(4,3)
```

Question 13

ToDo: Make a vector from 1 to 100. Make a for-loop which runs through the whole vector. Multiply the elements which are smaller than 5 and larger than 90 with 10 and the other elements with 0.1.

Answer: For this question I firstly create 2 vectors. 'vec13' contains values from 1 to 100, and 'h' is an empty one that I will need to use in loops. First loop is for loop: For all 'i'(objects) from 1 to 100, I declare that if objects in 'vec13' are either less than 5 or larger than 90 they should be multiply by 10. Otherwise, multiply by 0.1.

```
vec13 = seq(from=1, to=100)
h = c()
for(i in 1:100)
{
  if (vec13[i]<5 && vec13[i]>90){
    h[i]=vec13[i]*10
  }
  else{
    h[i]=vec13[i]*0.1
  }
}
```

vec13

```
## [1] 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
## [18] 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34
## [35] 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51
## [52] 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68
## [69] 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85
## [86] 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100
```

h

```
## [1] 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4
## [15] 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8
## [29] 2.9 3.0 3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 4.0 4.1 4.2
## [43] 4.3 4.4 4.5 4.6 4.7 4.8 4.9 5.0 5.1 5.2 5.3 5.4 5.5 5.6
## [57] 5.7 5.8 5.9 6.0 6.1 6.2 6.3 6.4 6.5 6.6 6.7 6.8 6.9 7.0
## [71] 7.1 7.2 7.3 7.4 7.5 7.6 7.7 7.8 7.9 8.0 8.1 8.2 8.3 8.4
## [85] 8.5 8.6 8.7 8.8 8.9 9.0 9.1 9.2 9.3 9.4 9.5 9.6 9.7 9.8
## [99] 9.9 10.0
```

Question 14

ToDo: Write a function for the previous ToDo, so that you can feed it any vector you like (as argument). Use a for-loop in the function to do the computation with each element. Use the standard R function length in the specification of the counter.

Answer:

```
function14= function(arg1,arg2 )
{
  vec13[i]=arg1[i];
  for(i in length(vec13)){
  }
}
```

vec13

```
##      [1]      1      2      3      4      5      6      7      8      9     10     11     12     13     14     15     16     17
##    [18]     18     19     20     21     22     23     24     25     26     27     28     29     30     31     32     33     34
##    [35]     35     36     37     38     39     40     41     42     43     44     45     46     47     48     49     50     51
##    [52]     52     53     54     55     56     57     58     59     60     61     62     63     64     65     66     67     68
##    [69]     69     70     71     72     73     74     75     76     77     78     79     80     81     82     83     84     85
##    [86]     86     87     88     89     90     91     92     93     94     95     96     97     98     99    100
```

Resources used:

- 1)<https://www.dataquest.io/blog/how-to-share-data-science-portfolio/>
- 2)<https://rmarkdown.rstudio.com/>
- 3)<https://nicercode.github.io/guides/reports/>
- 4)http://kbroman.org/knitr_knutshell/pages/markdown.html
- 5)http://kbroman.org/knitr_knutshell/pages/Rmarkdown.html
- 6)<https://www.rstudio.com/wp-content/uploads/2015/02/rmarkdown-cheatsheet.pdf>
- 7)<https://www.statmethods.net/advgraphs/parameters.html>
- 8)<https://cran.r-project.org/doc/contrib/Torfs+Brauer-Short-R-Intro.pdf>