# Software Tools, R - MidTerm Project

**Due date** : 18 Now 2020, 23:59

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**Objectives**

- Manage Working Directory, R-Files and R-Projects
- Download, Copy, Paste and Find the Data
- Read and Write Data
- Identify and Indexing Data
- Use Logical Operators
- Create a Function
- Plot the Data

**Hints** : You can use these functions and the main web page of our course - LINK

```
getwd()
setwd()
list.files()
file.path()

read.csv()
read.delim()
read.table()

class()
str()
length()
sim()
attributes()
attr()
typeof()

mean()
sum()
colMeans()
rowMeans()

na.omit()

plot()
View()
```

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# Instructions

### PART-1 Download, Get or Find and Read Data

R-STUDIO AND DATA

1. Go to the webpage of the course
2. Open Data "Istanbul_Goztepe_Mean_Temperature_1839-2013_Monthly" (.dat) by click the LINK
3. Copy and Paste it in your "Downloads" directory in a text file with ".dat" extension
4. Open your R-Studio, Create an R-Project, Create an R-Script (*you will write and save your all codes from now in this script*), and try to read the data file with each of these ways:

WAY 1 - **GO TO FILE**

5. Check your Project Name and your Working directory
6. Go to "Downloads" directory in R-Studio, using console
7. List files and Read Data with three different read functions ( *read.csv(), read.delim(), read.table()*)
8. Choose the best for you ( *or change the options if it is necessary, regarding header or separators* )
9. Assign your data as "temp_1"

WAY 2 - **CALL THE FILE**

10. Go Back to your Working directory
11. Define your data file path with file.path() ( *remember, you downloaded the data in your Downloads folder* )
12. Assign the path a new variable as "path_my_file"
13. Use your best read...() function to read the file with "path_my_file"
14. Assign your data as "temp_2"

WAY 3 - **IMPORT THE FILE**

15. Use "Import Datase"
16. Chose "From Text (base)" option
17. Try to assign your data as "temp_3" at this time

WAY 4 - **GET THE FILE (WITH URL)**

18. Copy the LINK of data
19. Use your best read() function
20. Read the file with this function and LINK
21. Assign your data as "temp_4"

LAST STEP

22. Choose your favorite data ( *temp_1, temp_2, temp_3 or temp_4* ) and assign as just "**temp**"

**PART-2 Play with the Data**

MEET WITH THE DATA

1. Look at class and structure
2. Learn attributes and dimensions
3. Rename attributes ( *ex: Months for each column and years for each raw* ) ( *attributes() and month.name or month.abb* )

- ***By the way, your data have to include just temperature values when you print it. Years and months have to be just attributes of data.***

CLEAR **NA** AND CHOOSE COLUMN

4. Print "temp". Do you see irrelevant numbers ? If so, change them as **NA**

- ***Now your "temp" data must seem like this***

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1839 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 6.9 |
| 1840 | 4.3 | 3.8 | 4.3 | 7.7 | 16.6 | 19.0 | 24.5 | 22.7 | 20.3 | 15.7 | 12.6 | 3.7 |
| 1841 | 6.6 | 4.2 | 4.9 | 10.7 | 15.5 | 21.3 | NA | NA | NA | NA | NA | NA |
| 1842 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1843 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1844 | 4.5 | 9.1 | 8.6 | 8.8 | 14.2 | 21.3 | 24.7 | 24.6 | 21.1 | 17.2 | 14.3 | 5.2 |
| 1845 | 6.3 | 5.6 | 10.3 | 14.2 | 18.8 | 21.1 | NA | NA | NA | NA | NA | NA |
| 1846 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| 1847 | 5.8 | 8.7 | 8.5 | 15.7 | 19.6 | 23.4 | 25.2 | 25.5 | 23.4 | 15.8 | 11.2 | 5.9 |
| 1848 | 3.0 | 5.5 | 7.7 | 13.6 | 16.2 | 25.0 | 24.4 | 23.8 | 19.0 | 18.9 | 12.0 | 5.4 |
| 1849 | 3.4 | 2.2 | 6.0 | 12.2 | 16.5 | 21.8 | 22.9 | 23.4 | 20.9 | 16.9 | 12.6 | 7.0 |
| 1850 | 3.4 | 3.6 | 5.0 | 9.7 | 15.0 | 21.7 | 24.3 | 25.7 | 19.3 | 18.2 | 10.2 | 5.7 |

5. Delete rows which include NA ( *which() or na.omit()* )

- ***Now your "temp" data must seem like this***

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1840 | 4.3 | 3.8 | 4.3 | 7.7 | 16.6 | 19.0 | 24.5 | 22.7 | 20.3 | 15.7 | 12.6 | 3.7 |
| 1844 | 4.5 | 9.1 | 8.6 | 8.8 | 14.2 | 21.3 | 24.7 | 24.6 | 21.1 | 17.2 | 14.3 | 5.2 |
| 1847 | 5.8 | 8.7 | 8.5 | 15.7 | 19.6 | 23.4 | 25.2 | 25.5 | 23.4 | 15.8 | 11.2 | 5.9 |
| 1848 | 3.0 | 5.5 | 7.7 | 13.6 | 16.2 | 25.0 | 24.4 | 23.8 | 19.0 | 18.9 | 12.0 | 5.4 |
| 1849 | 3.4 | 2.2 | 6.0 | 12.2 | 16.5 | 21.8 | 22.9 | 23.4 | 20.9 | 16.9 | 12.6 | 7.0 |
| 1850 | 3.4 | 3.6 | 5.0 | 9.7 | 15.0 | 21.7 | 24.3 | 25.7 | 19.3 | 18.2 | 10.2 | 5.7 |
| 1851 | 4.7 | 3.3 | 7.5 | 12.4 | 19.2 | 19.3 | 22.9 | 24.3 | 20.1 | 17.7 | 15.7 | 5.4 |
| 1852 | 6.2 | 5.4 | 5.2 | 8.6 | 16.4 | 21.4 | 22.4 | 22.6 | 20.0 | 17.6 | 12.8 | 9.1 |
| 1853 | 8.6 | 9.0 | 10.1 | 11.1 | 17.1 | 21.6 | 24.3 | 23.6 | 20.9 | 18.4 | 11.1 | 8.5 |
| 1855 | 4.3 | 6.6 | 9.9 | 10.5 | 19.9 | 20.9 | 23.5 | 22.2 | 17.3 | 15.7 | 13.5 | 9.8 |
| 1857 | 8.8 | 4.5 | 6.4 | 10.8 | 15.3 | 19.3 | 21.4 | 22.1 | 16.9 | 16.0 | 9.6 | 4.3 |
| 1858 | 1.6 | 1.9 | 7.8 | 11.0 | 17.5 | 20.1 | 25.5 | 24.5 | 19.7 | 18.5 | 12.3 | 7.7 |
| 1859 | 3.1 | 4.8 | 7.8 | 13.6 | 18.1 | 20.3 | 22.8 | 24.6 | 21.0 | 17.0 | 12.4 | 9.2 |

6. Assign it as new "temp" again
7. Select summer season
8. Assign it as "temp_summer" ( *three months*)

USE LOGICAL OPERATORS

9. Compare June and July: Find and print the years when June temperatures were **less than** July. ( *which()* )
10. Calculate mean temperature for each months (*you will probably need the* ***na.rm*** *(NA Remove) option* ) and assign it as "avg_month"
11. Print minimum and maximum values for "avg_month" and find which year and which month they were observed
12. Calculate the mean temperature for each years (*you will probably need the* ***na.rm*** *(NA Remove) option* ) "avg_year"
13. Calculate the mean temperature of all data and assign it as "avg_temp" and print it
14. Print the years of "avg_year" **which** are **greater than or equal to** "avg_temp"

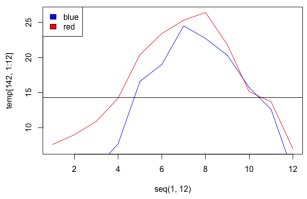
PLOT

14. Plot temperature for June ( *for each year* ), add title and unit
15. Edit y-axis and x-axis label ( *to see which years are they* )
16. What about July and August ? Plot them on the same figure with June.
17. Is there any strangeness thing, what do you think ? Compare three plots
18. Plot "avg_month", make the type of line as "line" and colorful. What is reason of the *inverted V letter* shape
19. Plot "avg_year", make the line dashed line. What do you think
20. Plot just temperature for just 1990 ( *my birth year* )

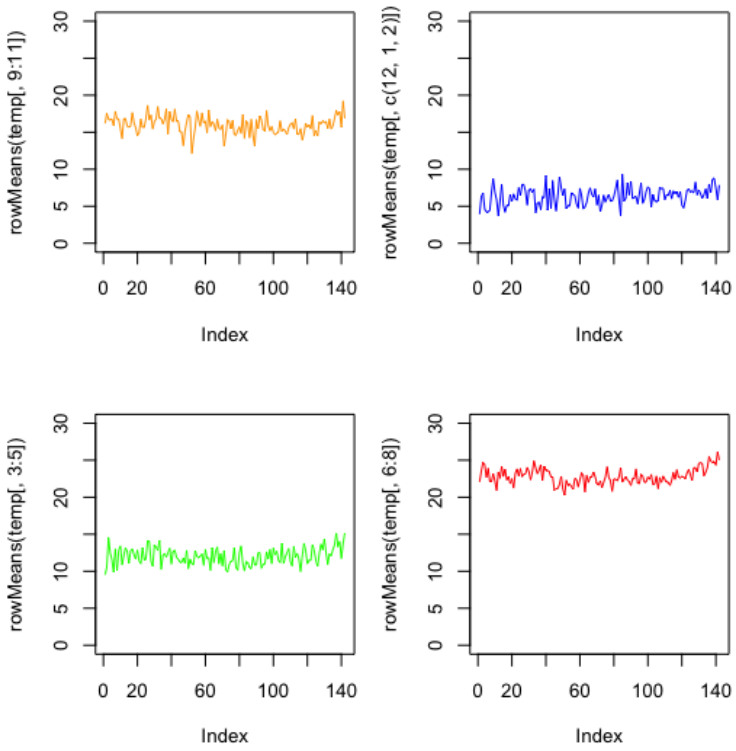
THE LAST BUT NOT LEAST

21. **Run these codes.** Can you explain what am I doing with my codes which were given below? What are these x-axis and y-axis in here? ( *which years or months are they?* ) What is the result of this figure, what do you see and what do you think? what do colors mean? Can you edit title and x-axis and y-axis labels?

```
plot(seq(1,12),  temp[142,1:12] , type = "l", col = "red")
lines(seq(1,12), temp[1,1:12]   , type = "l", col = "blue")
legend("topleft",c("blue","red"),fill=c("blue","red"))
abline(h = mean(colMeans(temp, na.rm = T)))
```




```
par(mfrow = c(2, 2))    #or try par(mfrow = c(4, 1))
plot(ylim = c(0,30), rowMeans(temp[,9:11])      , type="l", col="orange")
plot(ylim = c(0,30), rowMeans(temp[,c(12,1,2)]) , type="l", col="blue")
plot(ylim = c(0,30), rowMeans(temp[,3:5])       , type="l", col="green")
plot(ylim = c(0,30), rowMeans(temp[,6:8])       , type="l", col="red")
```

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***For questions or problems, please use Ninova***

*Emir*

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