Work sheet #4b

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#1.The table below shows the data about shoe size and height. Create a data frame.

```
S <- c(6.5,9.0,8.5,8.5,10.5,7.0,9.5,9.0,13.0,7.5,10.5,8.5,12.0,10.5,
          13.0,11.5,8.5,5.0,10.0,6.5,8.5,10.5,6.5,10.5,11.0,9.0,13.0)

H <- c(66.0,68.0,64.5,65.0,70.0,64.0,70.0,71.0,72.0,
            64.0,74.5,67.0,71.0,71.0,77.0,72.0,59.0,62.0,72.0,66.0,64.0,
            73.0,69.0,72.0,71.0,69.0,70.0)

G <- c("F","F","F","M","M","F","F","F","F","M","M","F","M","M",
             "M","F","F","M","M","F","F","M","M","M","M","M","M")

DF <- data.frame(S, H, G)
DF
```

```
##       S    H G
## 1   6.5 66.0 F
## 2   9.0 68.0 F
## 3   8.5 64.5 F
## 4   8.5 65.0 M
## 5  10.5 70.0 M
## 6   7.0 64.0 F
## 7   9.5 70.0 F
## 8   9.0 71.0 F
## 9  13.0 72.0 F
## 10  7.5 64.0 M
## 11 10.5 74.5 M
## 12  8.5 67.0 F
## 13 12.0 71.0 M
## 14 10.5 71.0 M
## 15 13.0 77.0 M
## 16 11.5 72.0 F
## 17  8.5 59.0 F
## 18  5.0 62.0 M
## 19 10.0 72.0 M
## 20  6.5 66.0 F
## 21  8.5 64.0 F
## 22 10.5 73.0 M
## 23  6.5 69.0 M
## 24 10.5 72.0 M
## 25 11.0 71.0 M
```

```
## 26  9.0 69.0 M
## 27 13.0 70.0 M
```

#a. Describe the data.

```
"The dataset is made up of 27 entries, and for each person, three types of information were collected: h
```

```
## [1] "The dataset is made up of 27 entries, and for each person, three types of information were colle
```

#b. Create a subset by males and females with their corresponding shoe size and height. #What its result? Show the R scripts.

```
M_data <- subset(DF, G == "M", select = c(S, H, G))
F_data <- subset(DF, G == "F", select = c(S, H, G))

M_data
```

```
##       S    H G
## 4   8.5 65.0 M
## 5  10.5 70.0 M
## 10  7.5 64.0 M
## 11 10.5 74.5 M
## 13 12.0 71.0 M
## 14 10.5 71.0 M
## 15 13.0 77.0 M
## 18  5.0 62.0 M
## 19 10.0 72.0 M
## 22 10.5 73.0 M
## 23  6.5 69.0 M
## 24 10.5 72.0 M
## 25 11.0 71.0 M
## 26  9.0 69.0 M
## 27 13.0 70.0 M
```

```
F_data
```

```
##       S    H G
## 1   6.5 66.0 F
## 2   9.0 68.0 F
## 3   8.5 64.5 F
## 6   7.0 64.0 F
## 7   9.5 70.0 F
## 8   9.0 71.0 F
## 9  13.0 72.0 F
## 12  8.5 67.0 F
## 16 11.5 72.0 F
## 17  8.5 59.0 F
## 20  6.5 66.0 F
## 21  8.5 64.0 F
```

#c. Find the mean of shoe size and height of the respondents. Write the R scripts and its #result.

```
S_mean <- mean(DF$S)
H_mean <- mean(DF$H)

S_mean
```

```
## [1] 9.407407
```

```
H_mean
```

```
## [1] 68.66667
```

#d. Is there a relationship between shoe size and height? Why?

```
"Yeah, in general, people with bigger shoe sizes in the dataset also tend to be taller. That makes sens
```

```
## [1] "Yeah, in general, people with bigger shoe sizes in the dataset also tend to be taller. That mak
```

#2. Construct character vector months to a factor with factor() and assign the result to #factor_months_vector. Print out factor_months_vector and assert that R prints out #the factor levels below the actual values.

```
M_vector <- c(
  "March","April","January","November","January",
  "September","October","September","November","August",
  "January","November","November","February","May","August",
  "July","December","August","August","September","November","February",
  "April"
)
factor_Mvector <- factor(M_vector)
factor_Mvector
```

```
##  [1] March     April     January   November  January   September October
##  [8] September November  August    January   November  November  February
## [15] May       August    July      December  August    August    September
## [22] November  February  April
## 11 Levels: April August December February January July March May ... September
```

#3. Then check the summary() of the months_vector and factor_months_vector. Interpret the results of both vectors. Are they both equally useful in this case?

```
summary(M_vector)
```

```
##    Length     Class      Mode
##        24 character character
```

```
summary(factor_Mvector)
```

```
##     April    August  December  February   January      July     March       May
##         2         4         1         2         3         1         1         1
##  November   October September
##         5         1         3
```

```
"No, A regular character vector is basically just a list of words, it doesn't tell you how often someth
```

```
## [1] "No, A regular character vector is basically just a list of words, it doesn't tell you how often
```

#4. Create a vector and factor for the table below.

```
F_data <- c("East", rep("West", 4), rep("North", 3))
F_data
```

```
## [1] "East"  "West"  "West"  "West"  "West"  "North" "North" "North"
```

```
New_data <- factor(F_data, levels = c("East", "West", "North"))
print(New_data)
```

```
## [1] East  West  West  West  West  North North North
## Levels: East West North
```

#5. Enter the data below in Excel with file name = import_march.csv

```
import_march <- read.table("import_march.csv", header = TRUE, sep = ",")
import_march
```

```
##   Students Strategy.1 Strategy.2 Strategy.3
## 1     Male          8         10          8
## 2                   4          8          6
## 3                   0          6          4
## 4   Female         14          4         15
## 5                  10          2         12
## 6                   6          0          9
```

#Using Conditional Statements (IF-ELSE) #6. Full Search

```
num <- as.integer(readline("Select a number from 1 to 50: "))
```

```
## Select a number from 1 to 50:
```

```
cat("Chosen number:", num, "\n")
```

```
## Chosen number: NA
```

```
if (is.na(num)) {
  cat("Invalid input. Please enter a number.\n")

} else if (num < 1 || num > 50) {
  cat("The number selected is beyond the range of 1 to 50\n")

} else if (num == 20) {
  print(TRUE)

} else {
  print(num)
}
```

```
## Invalid input. Please enter a number.
```

#7. Change

```
Min_bills <- function(price) {
  bills <- c(1000, 500, 200, 100, 50)

  remaining <- price
  count <- 0

  for (b in bills) {
    if (remaining >= b) {
      count <- count + (remaining %/% b)
      remaining <- remaining %% b
    }
  }

  return(count)
}
```

#8. The following is each student's math score for one semester. Based on this, answer the following questions.

#a. Create a dataframe from the above table. Write the R codes and its output.

```
students <- data.frame(
  Name = c("Annie", "Thea", "Steve", "Hanna"),
  Grade1 = c(85, 65, 75, 95),
  Grade2 = c(65, 75, 55, 75),
  Grade3 = c(85, 90, 80, 100),
  Grade4 = c(100, 90, 85, 90)
)

students
```

```
##    Name Grade1 Grade2 Grade3 Grade4
## 1 Annie     85     65     85    100
## 2  Thea     65     75     90     90
## 3 Steve     75     55     80     85
## 4 Hanna     95     75    100     90
```

#b. Without using the rowMean function, output the average score of students whose average math score over 90 points during the semester. write R code and its output.

```
for (i in 1:nrow(students)) {
  avg <- (students$Grade1[i] + students$Grade2[i] +
          students$Grade3[i] + students$Grade4[i]) / 4

  if (avg > 90) {
    cat(students$Name[i], "'s average grade this semester is ", avg, ".\n", sep="")
  }
}
```

#c. Without using the mean function, output as follows for the tests in which the average score was less than 80 out of 4 tests.

```
tests <- students[, 2:5]

for (j in 1:4) {
  total <- sum(tests[, j])
  avg <- total / nrow(tests)

  if (avg < 80) {
    cat("The", j, "th test was difficult.\n")
  }
}
```

```
## The 2 th test was difficult.
```

#d. Without using the max function, output as follows for students whose highest score for a semester exceeds 90 points.

```
for (i in 1:nrow(students)) {
  grades <- students[i, 2:5]
  highest <- grades[1]

  for (g in grades) {
    if (g > highest) highest <- g
  }

  if (highest > 90) {
    cat(students$Name[i], "'s highest grade this semester is ", highest, ".\n", sep="")
  }
}
```

```
## Annie's highest grade this semester is 100.
## Hanna's highest grade this semester is 100.
```