Worksheet#4a

Missy Key Sadsad

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

```
shoeSize <- 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.
Height <- 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, 71.0,77.0,72.0,5
Gender <- c("F","F","F","F","M","F","F","F","M","F","M","F","M","M","M","M","F","F","M","F","F","M","M"

HouseholdData <- data.frame(shoeSize,Height,Gender)
HouseholdData
```

```
##    shoeSize Height Gender
## 1       6.5   66.0      F
## 2       9.0   68.0      F
## 3       8.5   64.5      F
## 4       8.5   65.0      F
## 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      M
## 10      7.5   64.0      F
## 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      M
## 17      8.5   59.0      F
## 18      5.0   62.0      F
## 19     10.0   72.0      M
## 20      6.5   66.0      F
## 21      7.5   64.0      F
## 22      8.5   67.0      M
## 23     10.5   73.0      M
## 24      8.5   69.0      F
## 25     10.5   72.0      M
## 26     11.0   70.0      M
## 27      9.0   69.0      M
## 28     13.0   70.0      M
```

```
#a Describe the data.
#The df_output data frame contains data for two groups of individuals. Group 1 includes information on
```

```r
#b. Create a subset by males and females with their corresponding shoe size and height. What its result
males_subset <- HouseholdData[HouseholdData$Gender == "M", c("shoeSize", "Height")]
females_subset <- HouseholdData[HouseholdData$Gender == "F", c("shoeSize", "Height")]
```

```r
#c. Find the mean of shoe size and height of the respondents. Write the R scripts and itsresult.
mean(HouseholdData$shoeSize)
```

```
## [1] 9.410714
```

```r
mean(HouseholdData$Height)
```

```
## [1] 68.57143
```

```r
#d. Is there a relationship between shoe size and height? Why?
#The correlation between shoe size and height can be calculated to understand their relationship. A pos
```

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.

```r
vectorM <- 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_month <- factor(vectorM)
factor_month
```

```
##  [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. | Inter-pret the results of both vectors. Are they both equally useful in this case?

```r
summary(vectorM)
```

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

```r
summary(factor_month)
```

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

```
#The summary(vectorM) provides counts of each month as text, useful for raw frequency information. The
```

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

```
vector_direction <- c("East","West","North")
vector_frequency <- c(1,4,3)

new_data <- factor(vector_direction,levels = c("East","West","North"))
print(new_data)
```

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

```
new_data1 <- factor(vector_frequency,levels = c(1,4,3))
print(new_data1)
```

```
## [1] 1 4 3
## Levels: 1 4 3
```

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

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

6. Create an R Program that allows the User to randomly select numbers from 1 to 50. Then display the chosen number. If the number is beyond the range of the selected choice, it will have to display a string "The number selected is beyond the range of 1 to 50". If number 20 is inputted by the User, it will have to display "TRUE", otherwise display the input number.

```
#a
num <- readline(prompt = "Input randomly seclect numbers from 1 to 50: ")
```

```
## Input randomly seclect numbers from 1 to 50:
```

```
if(num > 50){
  print('The number selected is beyond the range of 1 to 50')
}else if(num <= 20){
    print('TRUE')
}
```

```
## [1] "TRUE"
```

7. Write a function that prints the minimum number of bills that must be paid, given the price of the snack. Input: Price of snack (a random number divisible by 50) Output: Minimum number of bills needed to purchase a snack.

```
#a
calculate_minimum_bills <- function() {
  price <- as.integer(readline(prompt = "Price of snack (a random number divisible by 50): "))

  if (is.na(price) || price %% 50 != 0) {
    cat("Invalid input. Please enter a valid price divisible by 50.\n")
    return()
  }

  num_bills <- 0
  bill_denominations <- c(1000, 500, 200, 100, 50)

  for (bill in bill_denominations) {
    num_bills <- num_bills + (price %/% bill)
    price <- price %% bill
  }

  cat("Minimum number of bills needed:", num_bills, "\n")
}

calculate_minimum_bills()
```

```
## Price of snack (a random number divisible by 50):
## Invalid input. Please enter a valid price divisible by 50.

## NULL
```

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

```
#a
  rname <- 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(95,75,100,90)
  cardDF <- data.frame(rname,grade1,grade2,grade3,grade4)
  cardDF
```

```
##   rname grade1 grade2 grade3 grade4
## 1 Annie     85     65     85     95
## 2  Thea     65     75     90     75
## 3 Steve     75     55     80    100
## 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. Example Output: Annie's average grade this semester is 88.75.

```
#b
for (i in 1:length(rname)) {
  average_score <- (grade1[i] + grade2[i] + grade3[i] + grade4[i]) / 4
  cat(paste(rname[i], "'s average grade this semester is", round(average_score, 2),".\n"))
}
```

```
## Annie 's average grade this semester is 82.5 .
## Thea 's average grade this semester is 76.25 .
## Steve 's average grade this semester is 77.5 .
## Hanna 's average grade this semester is 90 .
```

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. Example output: The nth test was difficult.

```
#c
for (test_num in 1:4) {
  total_score <- grade1 + grade2 + grade3 + grade4
  average_score <- total_score / 4

  if (average_score[test_num] < 80) {
    cat("The", test_num, "test was difficult.\n")
  }
}
```

```
## The 2 test was difficult.
## The 3 test was difficult.
```

Without using the max function, output as follows for students whose highest score for a semester exceeds 90 points. Example Output: Annie's highest grade this semester is 95.

```
#d
for (i in 1:length(rname)) {
  highest_grade <- grade1[i]

  if (grade2[i] > highest_grade) {
    highest_grade <- grade2[i]
  }
  if (grade3[i] > highest_grade) {
    highest_grade <- grade3[i]
  }
  if (grade4[i] > highest_grade) {
    highest_grade <- grade4[i]
  }

  if (highest_grade > 90) {
    cat(paste(rname[i], "'s highest grade this semester is", highest_grade, ".\n"))
  }
}
```

```
## Annie 's highest grade this semester is 95 .
## Steve 's highest grade this semester is 100 .
## Hanna 's highest grade this semester is 100 .
```