Rworksheet_simpron#4a

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#1.

```
#A.Create data frame
shoe_data <- data.frame(
  ShoeSize = c(6.5, 9.0, 8.5, 8.5, 10.5, 7.0, 9.5, 7.0, 7.5, 7.5, 8.5, 10.5,
               13.0, 11.5, 8.5, 5.0, 10.0, 6.5, 7.5, 10.5, 8.0, 11.0, 9.0, 13.0),
  Height = c(66.0, 68.0, 64.5, 65.0, 70.0, 70.0, 71.0, 72.0, 64.0, 64.0, 67.0, 71.0,
             77.0, 72.0, 59.0, 60.0, 72.0, 66.0, 64.0, 69.0, 67.0, 70.0, 69.0, 70.0),
  Gender = c('F', 'F', 'F', 'F', 'M', 'F', 'F', 'F', 'F', 'F', 'F', 'M',
             'M', 'M', 'F', 'F', 'M', 'F', 'F', 'M', 'F', 'M', 'M', 'M')
)
shoe_data
```

```
##    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   70.0      F
## 7       9.5   71.0      F
## 8       7.0   72.0      F
## 9       7.5   64.0      F
## 10      7.5   64.0      F
## 11      8.5   67.0      F
## 12     10.5   71.0      M
## 13     13.0   77.0      M
## 14     11.5   72.0      M
## 15      8.5   59.0      F
## 16      5.0   60.0      F
## 17     10.0   72.0      M
## 18      6.5   66.0      F
## 19      7.5   64.0      F
## 20     10.5   69.0      M
## 21      8.0   67.0      F
## 22     11.0   70.0      M
## 23      9.0   69.0      M
## 24     13.0   70.0      M
```

```
# A, Describe data
summary(shoe_data)
```

```
##     ShoeSize          Height         Gender
##  Min.   : 5.000   Min.   :59.00   Length:24
##  1st Qu.: 7.500   1st Qu.:64.88   Class :character
##  Median : 8.500   Median :68.50   Mode  :character
##  Mean   : 8.917   Mean   :67.81
##  3rd Qu.:10.500   3rd Qu.:70.25
##  Max.   :13.000   Max.   :77.00
```

```
# B
# Subset for females
female_data <- subset(shoe_data, Gender == "F", select = c(ShoeSize, Height))
female_data
```

```
##    ShoeSize Height
## 1       6.5   66.0
## 2       9.0   68.0
## 3       8.5   64.5
## 4       8.5   65.0
## 6       7.0   70.0
## 7       9.5   71.0
## 8       7.0   72.0
## 9       7.5   64.0
## 10      7.5   64.0
## 11      8.5   67.0
## 15      8.5   59.0
## 16      5.0   60.0
## 18      6.5   66.0
## 19      7.5   64.0
## 21      8.0   67.0
```

```
# Subset for males
male_data <- subset(shoe_data, Gender == "M", select = c(ShoeSize, Height))
male_data
```

```
##    ShoeSize Height
## 5      10.5     70
## 12     10.5     71
## 13     13.0     77
## 14     11.5     72
## 17     10.0     72
## 20     10.5     69
## 22     11.0     70
## 23      9.0     69
## 24     13.0     70
```

```
# C
# Mean of all respondents
mean_shoe <- mean(shoe_data$ShoeSize)
mean_height <- mean(shoe_data$Height)

mean_shoe
```

```
## [1] 8.916667
```

```r
mean_height
```

```
## [1] 67.8125
```

```r
# D
# Correlation test
correlation <- cor(shoe_data$ShoeSize, shoe_data$Height)
correlation
```

```
## [1] 0.6723337
```

###2.

```r
months <- c("March","April","January","November","January","September","October","September","November"

factor_months_vector <- factor(months)

factor_months_vector
```

```
##  [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.

```r
summary(months)
```

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

```r
summary(factor_months_vector)
```

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

###4.

```r
direction <- c("Easy", "West", "North")
frequency <- c(1,4,3)

table <- data.frame (
  Direction = direction,
  Frequency = frequency
)
print(table)
```

```
##   Direction Frequency
## 1      Easy         1
## 2      West         4
## 3     North         3
```

```
factor_direction <- factor(direction,levels = c("Easy", "West", "North"))
print(factor_direction)
```

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

##5.

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

```
##   Students Strategy1 Strategy2 Strategy3
## 1     Male         8        10         8
## 2     Male         4         8         6
## 3     Male         0         6         4
## 4   Female        14         4        15
## 5   Female        10         2        12
## 6   Female         6         0         9
```

###6.

```
exhaustive_search <- function(num) {
  if (is.na(num)) {
    cat("Invalid input. Please enter a numeric value.\n")
  } else if (num < 1 || num > 50) {
    cat("The number selected is beyond the range of 1 to 50\n")
  } else {
    if (num == 20) {
      cat("TRUE\n")
    } else {
      cat(num, "\n")
    }
  }
}

# Test with sample inputs
exhaustive_search(20)
```

```
## TRUE
```

```
exhaustive_search(25)
```

```
## 25
```

```r
exhaustive_search(100)
```

```
## The number selected is beyond the range of 1 to 50
```

###7.

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

  if (price %% 50 != 0) {
    cat("Error: Price must be divisible by 50.\n")
    return(NULL)
  }

  count <- 0
  remaining <- price

  #large first
  for (bill in bills) {
    if (remaining >= bill) {
      num_bills <- remaining %/% bill
      count <- count + num_bills
      remaining <- remaining %% bill
    }
  }

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

min_bills(300)
```

```
## Minimum number of bills needed: 2
```

```
## [1] 2
```

```r
min_bills(1000)
```

```
## Minimum number of bills needed: 1
```

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

```r
min_bills(650)
```

```
## Minimum number of bills needed: 3
```

```
## [1] 3
```

###8.

```r
#A.
grades_df <- 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)
)

grades_df
```

```
##    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
```

```r
#B.
averages <- (grades_df$Grade1 + grades_df$Grade2 + grades_df$Grade3 + grades_df$Grade4) / 4

high_achievers <- grades_df[averages >= 90, ]
high_averages <- averages[averages >= 90]

for (i in 1:nrow(high_achievers)) {
  cat(high_achievers$Name[i], "'s average grade this semester is ", high_averages[i], ".\n", sep = "")
}
```

```
## Hanna's average grade this semester is 90.
```

```r
#C.
avg_grade1 <- sum(grades_df$Grade1) / nrow(grades_df)
avg_grade2 <- sum(grades_df$Grade2) / nrow(grades_df)
avg_grade3 <- sum(grades_df$Grade3) / nrow(grades_df)
avg_grade4 <- sum(grades_df$Grade4) / nrow(grades_df)

test_avgs <- c(avg_grade1, avg_grade2, avg_grade3, avg_grade4)
test_names <- c("Grade1", "Grade2", "Grade3", "Grade4")

for (i in 1:length(test_avgs)) {
  if (test_avgs[i] < 80) {
    cat("The", test_names[i], "was difficult.\n")
  }
}
```

```
## The Grade2 was difficult.
```

```r
#D.
highest_grades <- apply(grades_df[, 2:5], 1, function(row) {
  sorted <- sort(as.numeric(row))
  sorted[length(sorted)]
})
```

```r
for (i in 1:nrow(grades_df)) {
  name <- grades_df$Name[i]
  high_score <- highest_grades[i]
  if (high_score > 90) {
    cat(name, "'s highest grade this semester is ", high_score, ".\n", sep = "")
  }
}
```

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