

RWorksheet4a in R

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#1.

#A.

```
shoe_size <- c(6.5,9.0,8.5,8.5,10.5,7.5,9.5,9.0,13.0,7.5,10.5,8.5,12.0,10.5,13.0,11.5,8.5,5.0,10.0,6.5,  
shoe_height <- c(66,68,64.5,65,70,64,70,71,72,64,74.5,67,71,71,77,72,59,62,72,66,64,67,73,69,72,70,69,70,
```

```
table <- data.frame (  
  Shoe_Size = shoe_size,  
  Shoe_Height = shoe_height  
)
```

```
print(table)
```

##	Shoe_Size	Shoe_Height
## 1	6.5	66.0
## 2	9.0	68.0
## 3	8.5	64.5
## 4	8.5	65.0
## 5	10.5	70.0
## 6	7.5	64.0
## 7	9.5	70.0
## 8	9.0	71.0
## 9	13.0	72.0
## 10	7.5	64.0
## 11	10.5	74.5
## 12	8.5	67.0
## 13	12.0	71.0
## 14	10.5	71.0
## 15	13.0	77.0
## 16	11.5	72.0
## 17	8.5	59.0
## 18	5.0	62.0
## 19	10.0	72.0
## 20	6.5	66.0
## 21	7.5	64.0
## 22	8.5	67.0
## 23	10.5	73.0
## 24	8.5	69.0
## 25	10.5	72.0
## 26	11.0	70.0
## 27	9.0	69.0
## 28	13.0	70.0

```
str(table)
```

```
## 'data.frame': 28 obs. of 2 variables:
## $ Shoe_Size : num 6.5 9 8.5 8.5 10.5 7.5 9.5 9 13 7.5 ...
## $ Shoe_Height: num 66 68 64.5 65 70 64 70 71 72 64 ...
```

```
write.csv(table, "shoe_data.csv", row.names = FALSE)
```

```
#B.
```

```
table$gender <- c("Male", "Male", "Female", "Male", "Female", "Male", "Female", "Male", "Female",
                  "Male", "Female", "Male", "Female", "Male", "Female", "Male", "Female", "Male", "Female",
                  "Male", "Female", "Male", "Female", "Male", "Female", "Male", "Female", "Male")
```

```
print(table)
```

```
##      Shoe_Size Shoe_Height gender
## 1         6.5         66.0   Male
## 2         9.0         68.0   Male
## 3         8.5         64.5 Female
## 4         8.5         65.0   Male
## 5        10.5         70.0 Female
## 6         7.5         64.0   Male
## 7         9.5         70.0 Female
## 8         9.0         71.0   Male
## 9        13.0         72.0 Female
## 10        7.5         64.0   Male
## 11        10.5         74.5 Female
## 12         8.5         67.0   Male
## 13        12.0         71.0 Female
## 14        10.5         71.0   Male
## 15        13.0         77.0 Female
## 16        11.5         72.0   Male
## 17         8.5         59.0 Female
## 18         5.0         62.0   Male
## 19        10.0         72.0 Female
## 20         6.5         66.0   Male
## 21         7.5         64.0 Female
## 22         8.5         67.0   Male
## 23        10.5         73.0 Female
## 24         8.5         69.0   Male
## 25        10.5         72.0 Female
## 26        11.0         70.0   Male
## 27         9.0         69.0 Female
## 28        13.0         70.0   Male
```

```
males <- subset(table, gender == "Male")
females <- subset(table, gender == "Female")
```

```
print(males)
```

```
##      Shoe_Size Shoe_Height gender
```

```
## 1      6.5      66  Male
## 2      9.0      68  Male
## 4      8.5      65  Male
## 6      7.5      64  Male
## 8      9.0      71  Male
## 10     7.5      64  Male
## 12     8.5      67  Male
## 14     10.5     71  Male
## 16     11.5     72  Male
## 18      5.0      62  Male
## 20      6.5      66  Male
## 22      8.5      67  Male
## 24      8.5      69  Male
## 26     11.0      70  Male
## 28     13.0      70  Male
```

```
print(females)
```

```
##      Shoe_Size Shoe_Height gender
## 3          8.5        64.5 Female
## 5         10.5        70.0 Female
## 7          9.5        70.0 Female
## 9         13.0        72.0 Female
## 11         10.5        74.5 Female
## 13         12.0        71.0 Female
## 15         13.0        77.0 Female
## 17          8.5        59.0 Female
## 19         10.0        72.0 Female
## 21          7.5        64.0 Female
## 23         10.5        73.0 Female
## 25         10.5        72.0 Female
## 27          9.0        69.0 Female
```

```
#C.
mean(table$Shoe_Height)
```

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

```
#D.
#Yes there are, because taller individuals tend to have bigger footsize.
```

```
###2.
```

```
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.

```
summary(months)
```

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

```
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.

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

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

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

###5.

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

```
#B.  
print(data)
```

```
##      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
```

###6.

```
search <- function() {  
  user_input <- readline(prompt = "Please enter a number between 1 and 50: ")  
  chosen_number <- as.numeric(user_input)  
  if (is.na(chosen_number)) {  
    print("Invalid input. Please enter a numeric value.")  
  } else if (chosen_number < 1 || chosen_number > 50) {  
    print("The number selected is beyond the range of 1 to 50")  
  }  
}
```

```

} else if(chosen_number == 20) {
  cat("TRUE")
} else {
  cat(chosen_number)
}
}

```

```
search()
```

```

## Please enter a number between 1 and 50:
## [1] "Invalid input. Please enter a numeric value."

```

```
###7.
```

```

min_bills <- function() {
  user_input <- readline(prompt="Enter the price of the snack (must be a number divisible by 50): ")
  snack_price <- as.numeric(user_input)

  if (is.na(snack_price) || snack_price <= 0 || snack_price %% 50 != 0) {
    cat("Invalid input: Please enter a positive numeric value divisible by 50.\n")
    return(NULL)
  }

  bills <- c(1000, 500, 200, 100, 50, 20)
  remaining <- snack_price
  count <- 0

  #large first
  for (bill in bills) {
    if (remaining >= bill) {
      num_bills <- floor(remaining / bill)
      count <- count + num_bills
      remaining <- remaining %% bill
      if (num_bills > 0) {
        cat(sprintf("- %d x %s%d bill(s)\n", num_bills, "\u20b1", bill))
      }
    }
  }

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

min_bills()

```

```

## Enter the price of the snack (must be a number divisible by 50):
## Invalid input: Please enter a positive numeric value divisible by 50.

```

```
## NULL
```

```
###8.
```

```
#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
```

```
#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.
```

```
high_achievers
```

```
##      Name Grade1 Grade2 Grade3 Grade4
## 4 Hanna      95      75     100      90
```

```
high_averages
```

```
## [1] 90
```

```
#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.
```

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