RWorksheet#4b

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```
# 1
matrix_result <- matrix(0, nrow = 5, ncol = 5)
A <- c(1, 2, 3, 4, 5)
for (i in 1:5) {
  for (j in 1:5) {
    matrix_result[i, j] <- abs(i - j)
  }
}

matrix_result
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,]    0    1    2    3    4
## [2,]    1    0    1    2    3
## [3,]    2    1    0    1    2
## [4,]    3    2    1    0    1
## [5,]    4    3    2    1    0
```

```
# 2
for (i in 1:5) {
  cat(rep("* ", i), "\n")
}
```

```
## *
## *  *
## *  *  *
## *  *  *  *
## *  *  *  *  *
```

```
first <- 5

if (is.na(first) || first <= 0) {
  stop("Please provide a valid positive integer.")
}

fibonacci <- c(first)
cat(fibonacci[1], "")
```

```
## 5
```

```
repeat {
  if (length(fibonacci) < 2) {
    next_num <- fibonacci[1]
  } else {
    next_num <- sum(tail(fibonacci, 2))
  }

  if (next_num > 500) break

  cat(next_num, "")
  fibonacci <- c(fibonacci, next_num)
}
```

```
## 5 10 15 25 40 65 105 170 275 445
```

```
# 4a
directory_path <- "C:/Users/Client/OneDrive/Documents/CS101/RWorksheet#4/RWorksheet#4b"
data <- read.csv(file.path(directory_path, "sample_data.csv"))
print(head(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   64.0      F
```

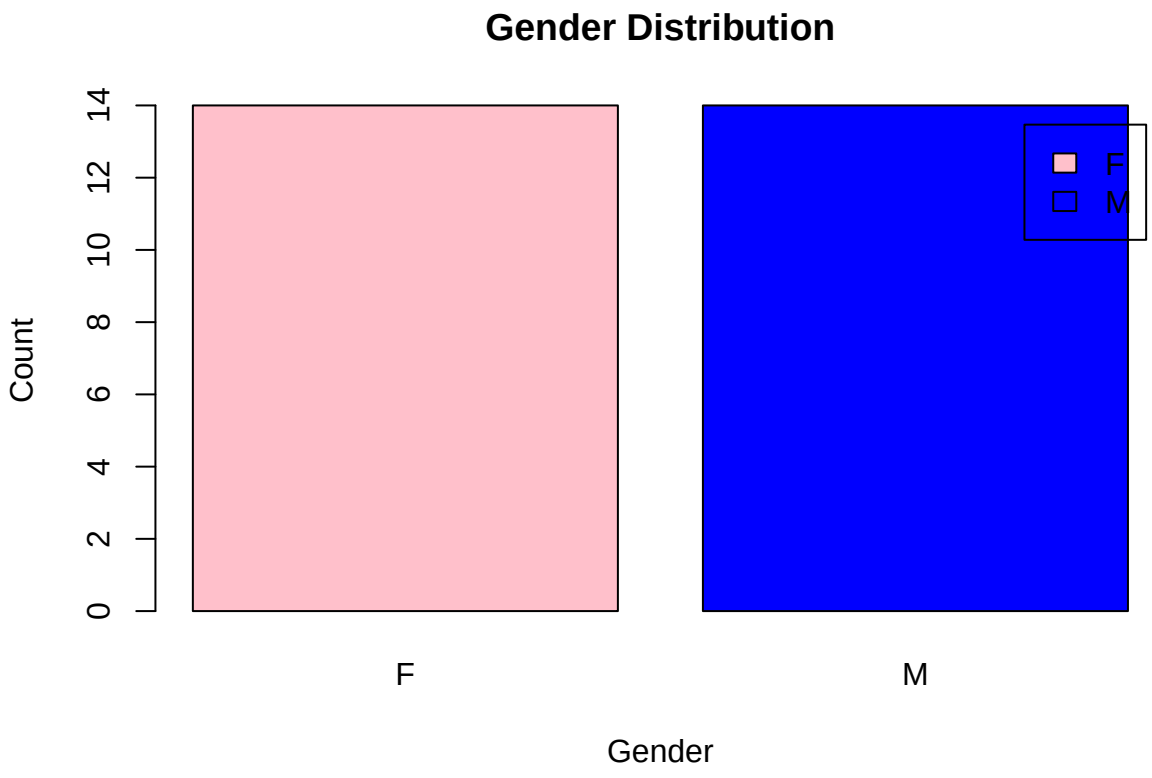
```
femdata <- subset(data, Gender == "F")
maledata <- subset(data, Gender == "M")
cat("Female count:", nrow(femdata), "\n")
```

```
## Female count: 14
```

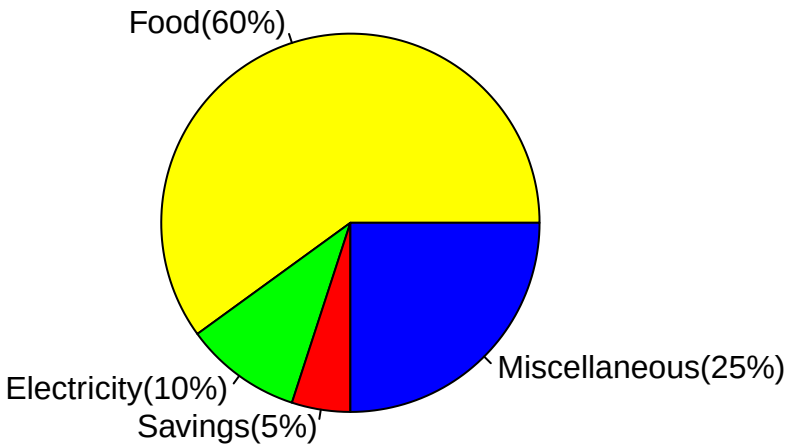
```
cat("Male count:", nrow(maledata), "\n")
```

```
## Male count: 14
```

```
gender_count <- table(data$Gender)
barplot(gender_count, main = "Gender Distribution", col = c("pink", "blue"),
        xlab = "Gender", ylab = "Count", legend = TRUE)
```




```r
# 5
expenses <- c(Food = 60, Electricity = 10, Savings = 5, Miscellaneous = 25)
percent <- paste0(names(expenses),"(", round(100*expenses / sum(expenses), 1), "%)")
pie(expenses, labels= percent, col = c("yellow", "green", "red", "blue"), main = "Monthly Family Expens
```



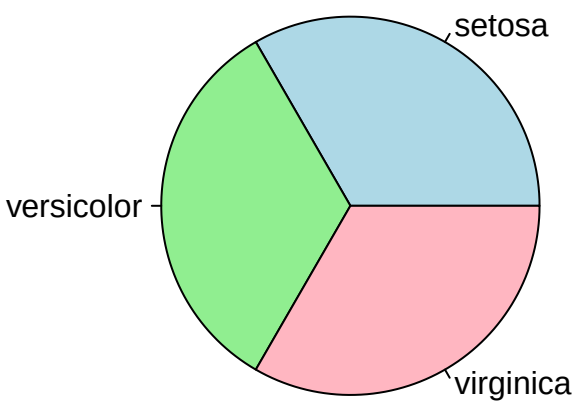

```
# 6a
data(iris)
str(iris)
```

```
## 'data.frame':    150 obs. of  5 variables:
##  $ Sepal.Length: num  5.1 4.9 4.7 4.6 5 5.4 4.6 5 4.4 4.9 ...
##  $ Sepal.Width : num  3.5 3 3.2 3.1 3.6 3.9 3.4 3.4 2.9 3.1 ...
##  $ Petal.Length: num  1.4 1.4 1.3 1.5 1.4 1.7 1.4 1.5 1.4 1.5 ...
##  $ Petal.Width : num  0.2 0.2 0.2 0.2 0.2 0.4 0.3 0.2 0.2 0.1 ...
##  $ Species     : Factor w/ 3 levels "setosa","versicolor",..: 1 1 1 1 1 1 1 1 1 1 ...
```

```
# 6b
mean_values <- colMeans(iris[, c("Sepal.Length", "Sepal.Width", "Petal.Length", "Petal.Width")])
mean_values
```

```
## Sepal.Length  Sepal.Width Petal.Length  Petal.Width
##     5.843333     3.057333     3.758000     1.199333
```

```
# 6c
species_counts <- table(iris$Species)
pie(species_counts, main="Species Distribution", col=c("lightblue", "lightgreen", "lightpink"),
    labels=names(species_counts))
```




```r
# 6d
setosa <- subset(iris, Species == "setosa")
versicolor <- subset(iris, Species == "versicolor")
virginica <- subset(iris, Species == "virginica")

# Show last 6 rows of each subset
tail(setosa, 6)
```

```
##    Sepal.Length Sepal.Width Petal.Length Petal.Width Species
## 45          5.1         3.8          1.9         0.4  setosa
## 46          4.8         3.0          1.4         0.3  setosa
## 47          5.1         3.8          1.6         0.2  setosa
## 48          4.6         3.2          1.4         0.2  setosa
## 49          5.3         3.7          1.5         0.2  setosa
## 50          5.0         3.3          1.4         0.2  setosa
```

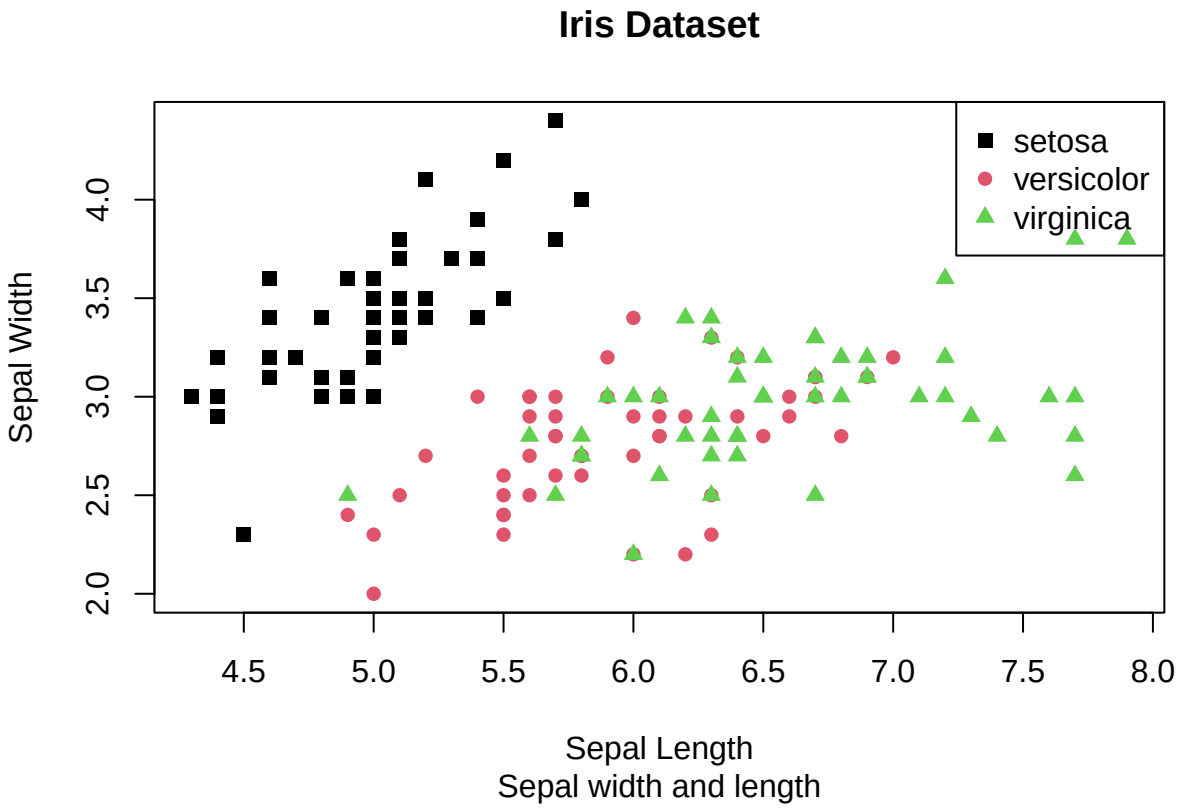
```r
tail(versicolor, 6)
```

```
##     Sepal.Length Sepal.Width Petal.Length Petal.Width    Species
## 95           5.6         2.7          4.2         1.3 versicolor
## 96           5.7         3.0          4.2         1.2 versicolor
## 97           5.7         2.9          4.2         1.3 versicolor
## 98           6.2         2.9          4.3         1.3 versicolor
## 99           5.1         2.5          3.0         1.1 versicolor
## 100          5.7         2.8          4.1         1.3 versicolor
```

```r
tail(virginica, 6)
```

```
##     Sepal.Length Sepal.Width Petal.Length Petal.Width   Species
## 145          6.7         3.3          5.7         2.5 virginica
## 146          6.7         3.0          5.2         2.3 virginica
## 147          6.3         2.5          5.0         1.9 virginica
## 148          6.5         3.0          5.2         2.0 virginica
## 149          6.2         3.4          5.4         2.3 virginica
## 150          5.9         3.0          5.1         1.8 virginica
```

```r
# 6e
iris$Species <- as.factor(iris$Species)
plot(iris$Sepal.Length, iris$Sepal.Width,
     col = iris$Species,
     pch = as.numeric(iris$Species) + 14, # Different symbols by species
     main = "Iris Dataset",
     sub = "Sepal width and length",
     xlab = "Sepal Length",
     ylab = "Sepal Width")

legend("topright", legend = levels(iris$Species), col = 1:3, pch = 15:17)
```




```r
# 6f
#In this plot, we can observe the classification of species based on sepal dimensions. Example, Setosa
```

```r
# 7
options(repos = c(CRAN = "https://cran.rstudio.com/"))
install.packages("readxl")
```

```
## Installing package into 'C:/Users/Client/AppData/Local/R/win-library/4.4'
## (as 'lib' is unspecified)

## package 'readxl' successfully unpacked and MD5 sums checked

## Warning: cannot remove prior installation of package 'readxl'

## Warning in file.copy(savedcopy, lib, recursive = TRUE): problem copying
## C:\Users\Client\AppData\Local\R\win-library\4.4\00LOCK\readxl\libs\x64\readxl.dll
## to C:\Users\Client\AppData\Local\R\win-library\4.4\readxl\libs\x64\readxl.dll:
## Permission denied

## Warning: restored 'readxl'

##
## The downloaded binary packages are in
##  C:\Users\Client\AppData\Local\Temp\Rtmpw5u3S7\downloaded_packages
```

```r
library(readxl)

data <- read_excel("C:/Users/Client/OneDrive/Documents/CS101/RWorksheet#4/RWorksheet#4b/alexa_file.xlsx
View(data)

data$variation <- gsub("Old Name", "New Name", data$variation)
data$variation <- gsub("Black", "Charcoal Fabric", data$variation)

# Check for image file existence
image_path <- "C:/CS101/Worksheet4/imaget4b/data_cs101.png"
if (file.exists(image_path)) {
  knitr::include_graphics(image_path)
} else {
  cat("Image file not found at:", image_path, "\n")
}
```

```
## Image file not found at: C:/CS101/Worksheet4/imaget4b/data_cs101.png
```

```r
install.packages("dplyr")
```

```
## Installing package into 'C:/Users/Client/AppData/Local/R/win-library/4.4'
## (as 'lib' is unspecified)

## package 'dplyr' successfully unpacked and MD5 sums checked

## Warning: cannot remove prior installation of package 'dplyr'
```

```
## Warning in file.copy(savedcopy, lib, recursive = TRUE): problem copying
## C:\Users\Client\AppData\Local\R\win-library\4.4\00LOCK\dplyr\libs\x64\dplyr.dll
## to C:\Users\Client\AppData\Local\R\win-library\4.4\dplyr\libs\x64\dplyr.dll:
## Permission denied
```

```
## Warning: restored 'dplyr'
```

```
##
## The downloaded binary packages are in
##  C:\Users\Client\AppData\Local\Temp\Rtmpw5u3S7\downloaded_packages
```

```
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
```

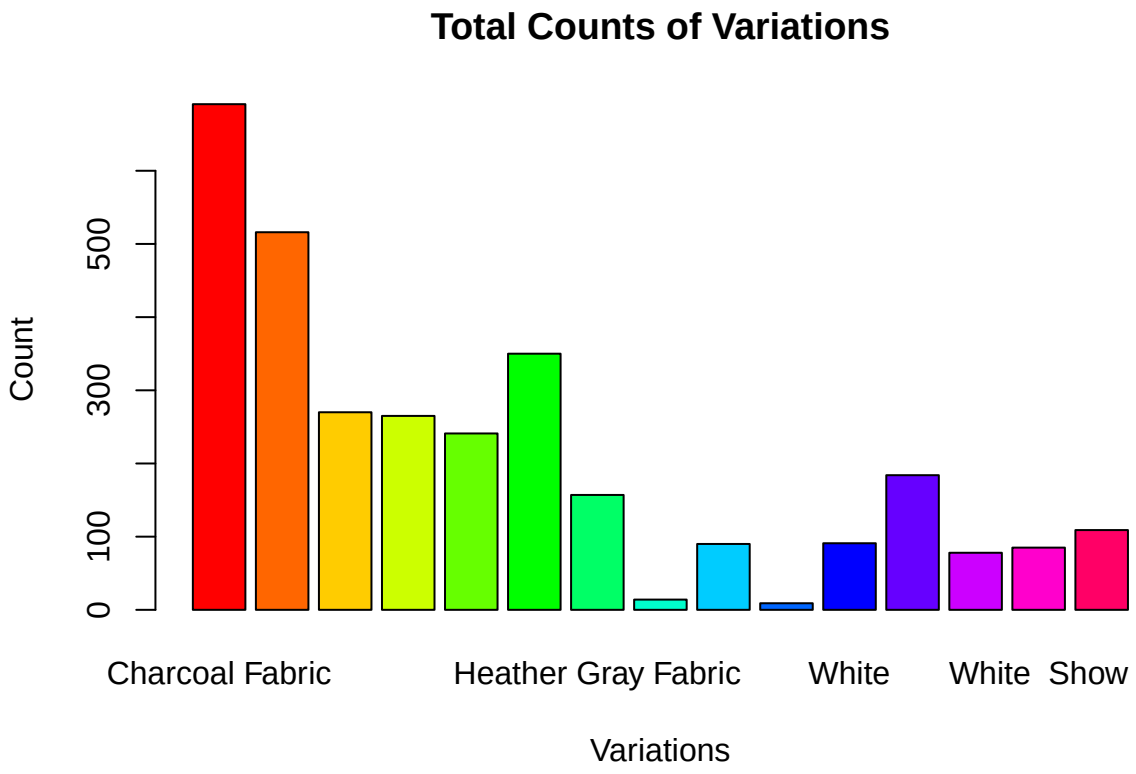
```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
variation_counts <- data %>%
  count(variation)

save(variation_counts, file = "variations.RData")

variation_counts
```

```
## # A tibble: 15 x 2
##    variation                       n
##    <chr>                       <int>
##  1 Charcoal Fabric               691
##  2 Charcoal Fabric  Dot          516
##  3 Charcoal Fabric  Plus         270
##  4 Charcoal Fabric  Show         265
##  5 Charcoal Fabric  Spot         241
##  6 Configuration: Fire TV Stick  350
##  7 Heather Gray Fabric           157
##  8 Oak Finish                     14
##  9 Sandstone Fabric               90
## 10 Walnut Finish                   9
## 11 White                          91
## 12 White  Dot                    184
## 13 White  Plus                    78
## 14 White  Show                    85
## 15 White  Spot                   109
```

```r
load("variations.RData")

barplot(variation_counts$n, names.arg = variation_counts$variation,
        col = rainbow(length(variation_counts$variation)),
        main = "Total Counts of Variations",
        xlab = "Variations",
        ylab = "Count")
```




```r
black_variants <- variation_counts %>% filter(grepl("Black", variation))
white_variants <- variation_counts %>% filter(grepl("White", variation))

par(mfrow = c(1, 2))

if (nrow(black_variants) > 0) {
    barplot(black_variants$n, names.arg = black_variants$variation,
            col = rainbow(length(black_variants$variation)),
            main = "Black Variants",
            xlab = "Total Numbers",
            ylab = "Variants")
} else {
    plot.new()
    title(main = "No Black Variants Found")
}

if (nrow(white_variants) > 0) {
```

```
    barplot(white_variants$n, names.arg = white_variants$variation,
            col = rainbow(length(white_variants$variation)),
            main = "White Variants",
            xlab = "Total Numbers",
            ylab = "Variants")
} else {
    plot.new()
    title(main = "No White Variants Found")
}
```