Stat 359 Assignment 1

2023-01-29

Question 2

Step one: create a data frame that represents the given data

```
plant_plot <- c(1,1,1,1,1,1,1,1,1,1,1,1,2,2,2,2,2,2,2,2,2,2,2,2)
plant_pot <- c(1,1,2,2,3,3,1,1,2,2,3,3,1,1,2,2,3,3,1,1,2,2,3,3)
plant_treatment <- c(1,1,1,1,1,1,2,2,2,2,2,2,1,1,1,1,1,1,2,2,2,2,2,2)
plant_growth <- c(14.6,15.2,13.2,12.9,16.4,12.2,
                  7.1,7.7,6.8,6.0,10.0,8.3,
                  18.5,16.7,22.2,18.8,24.7,20.3,
                  9.7,8.8,6.8,9.0,10.4,11.3)
df <- data.frame(plant_plot, plant_pot, plant_treatment, plant_growth)
df
```

```
##    plant_plot plant_pot plant_treatment plant_growth
## 1           1         1               1         14.6
## 2           1         1               1         15.2
## 3           1         2               1         13.2
## 4           1         2               1         12.9
## 5           1         3               1         16.4
## 6           1         3               1         12.2
## 7           1         1               2          7.1
## 8           1         1               2          7.7
## 9           1         2               2          6.8
## 10          1         2               2          6.0
## 11          1         3               2         10.0
## 12          1         3               2          8.3
## 13          2         1               1         18.5
## 14          2         1               1         16.7
## 15          2         2               1         22.2
## 16          2         2               1         18.8
## 17          2         3               1         24.7
## 18          2         3               1         20.3
## 19          2         1               2          9.7
## 20          2         1               2          8.8
## 21          2         2               2          6.8
## 22          2         2               2          9.0
## 23          2         3               2         10.4
## 24          2         3               2         11.3
```

Step two: Sort the data by plant growth

```
df[order(plant_growth),]
```

```
##    plant_plot plant_pot plant_treatment plant_growth
## 10          1         2               2          6.0
## 9           1         2               2          6.8
```

```
## 21          2          2                2          6.8
## 7           1          1                2          7.1
## 8           1          1                2          7.7
## 12          1          3                2          8.3
## 20          2          1                2          8.8
## 22          2          2                2          9.0
## 19          2          1                2          9.7
## 11          1          3                2         10.0
## 23          2          3                2         10.4
## 24          2          3                2         11.3
## 6           1          3                1         12.2
## 4           1          2                1         12.9
## 3           1          2                1         13.2
## 1           1          1                1         14.6
## 2           1          1                1         15.2
## 5           1          3                1         16.4
## 14          2          1                1         16.7
## 13          2          1                1         18.5
## 16          2          2                1         18.8
## 18          2          3                1         20.3
## 15          2          2                1         22.2
## 17          2          3                1         24.7
```

Step three: Calculate the mean and standard deviation of plant growth

```
mean(plant_growth)
```

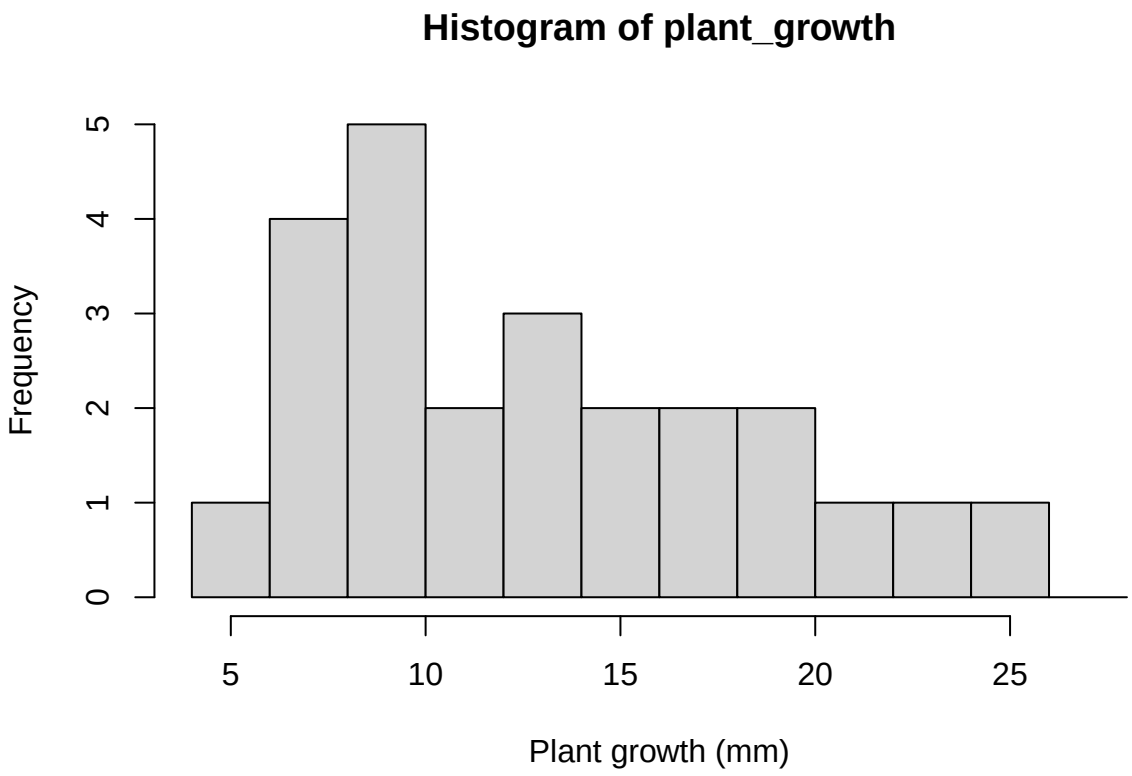
```
## [1] 12.81667
```

```
sd(plant_growth)
```

```
## [1] 5.296813
```

Step four: plot the data as a histogram

```
hist(plant_growth, xlab = "Plant growth (mm)", breaks = seq(from=4, to=28, by=2))
```



Question 3

```
calculate_variance <- function(y) {
  n <- length(y)
  mean_y <- mean(y)
  variance <- sum((y - mean_y)^2) / (n - 1)
  return(variance)
}

y <- c(11,11,10,8,11,3,15,11,7,6)
variance <- calculate_variance(y)
variance
```

```
## [1] 11.34444
```