HW4

IST 772 Homework 4

Due November 2, 2021 at 8:00AM EDT

Homework 4 by Nora Lin: I produced the material below with no assistance.

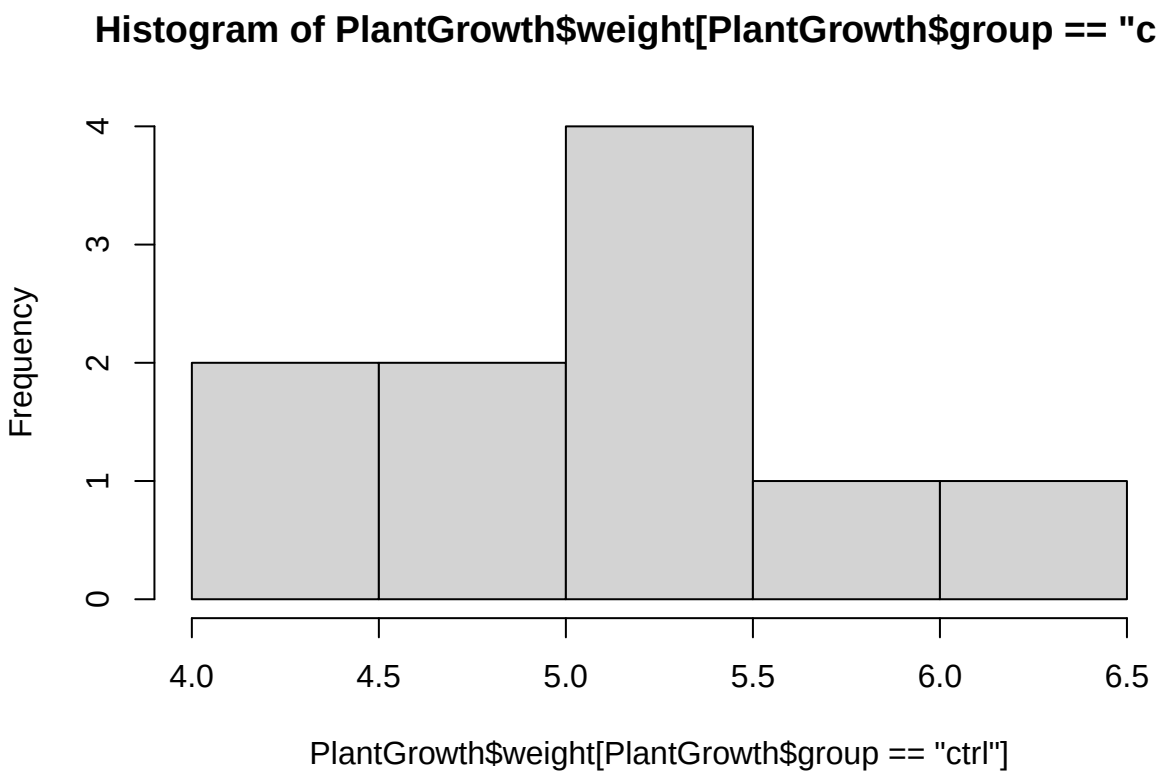
Exercise 7 p.66

```
#inspecting data set:
#head(PlantGrowth)
#summary of dataset:
summary(PlantGrowth)
```

```
##      weight       group
##  Min.   :3.590   ctrl:10
##  1st Qu.:4.550   trt1:10
##  Median :5.155   trt2:10
##  Mean   :5.073
##  3rd Qu.:5.530
##  Max.   :6.310
```

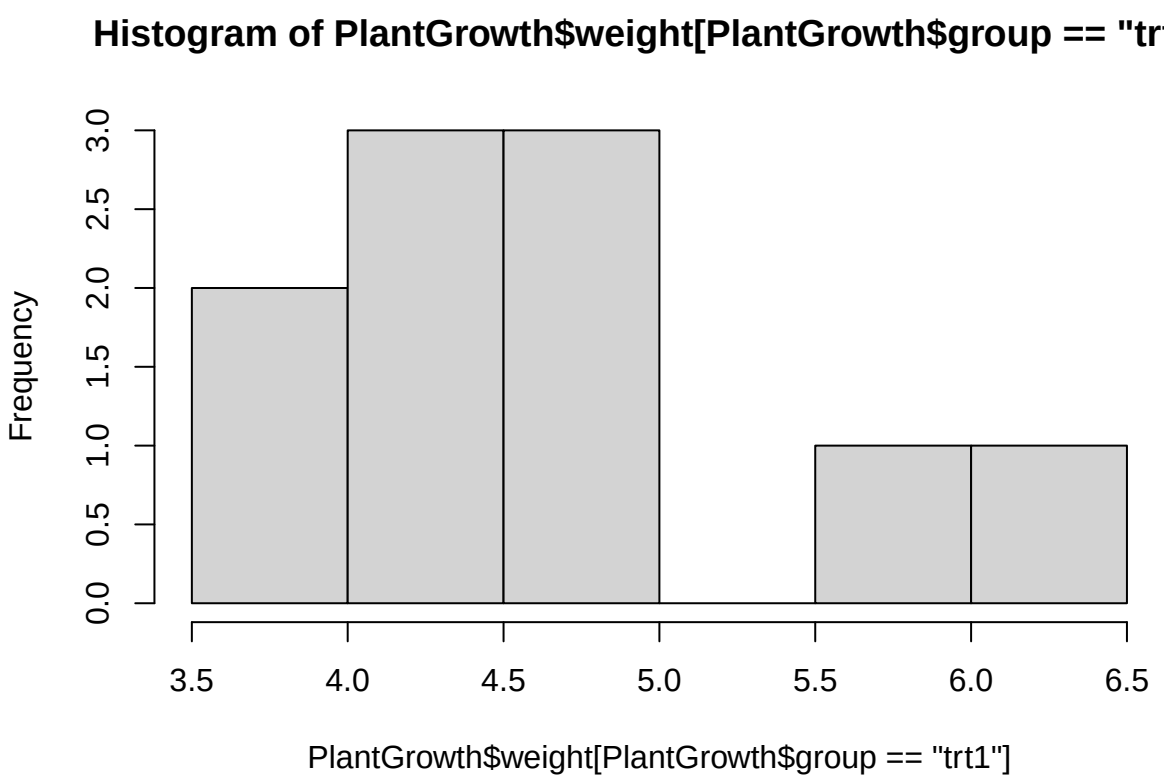
The PlantGrowth data set has three difference groups: the control group, treatment1, and treatment2. The dried weight is measured for each of 30 plants in the data set.The minimum weight is 3.590and maximum weight is 6.310. The average or mean weight is 5.073 and the media is 5.155.

```
hist(PlantGrowth$weight[PlantGrowth$group == "ctrl"])
```



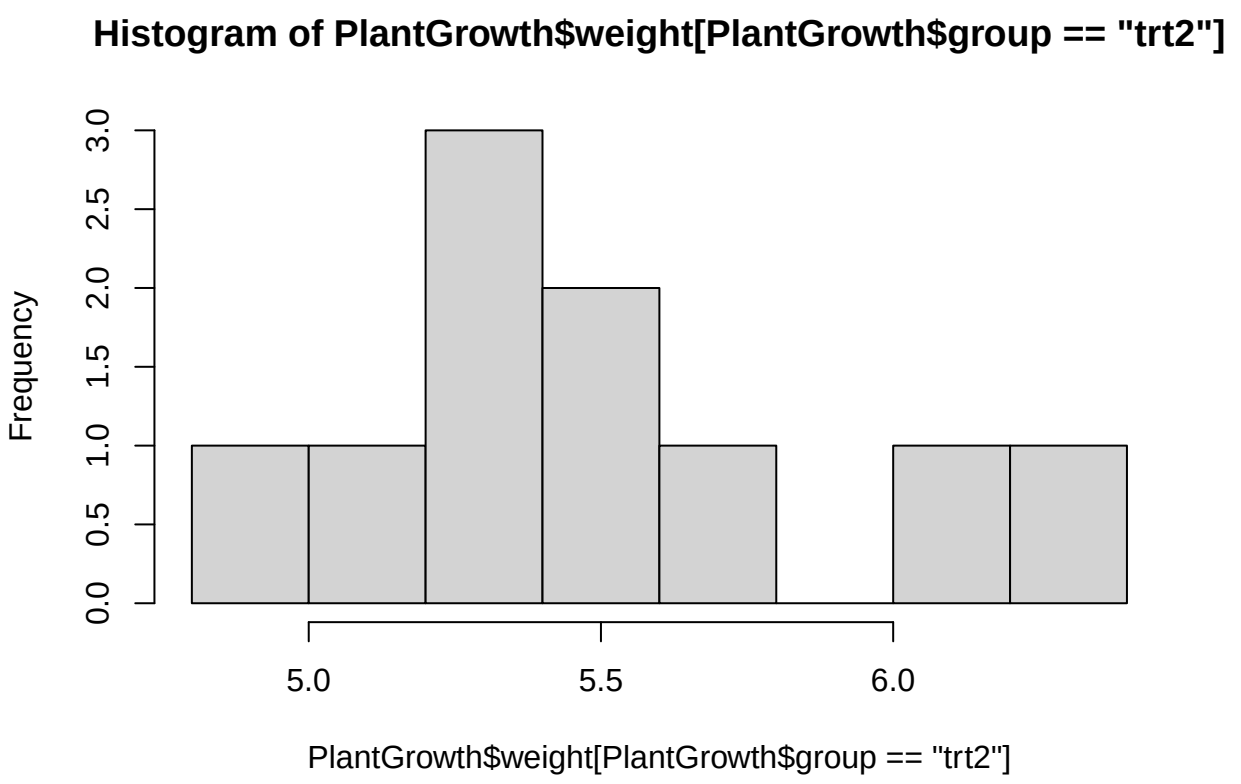
Histogram 1: Control Group Weight in PlantGrowth data set

```
hist(PlantGrowth$weight[PlantGrowth$group == "trt1"])
```



Histogram 2: Treatment 1 Group Weight in PlantGrowth data set

```
hist(PlantGrowth$weight[PlantGrowth$group == "trt2"])
```

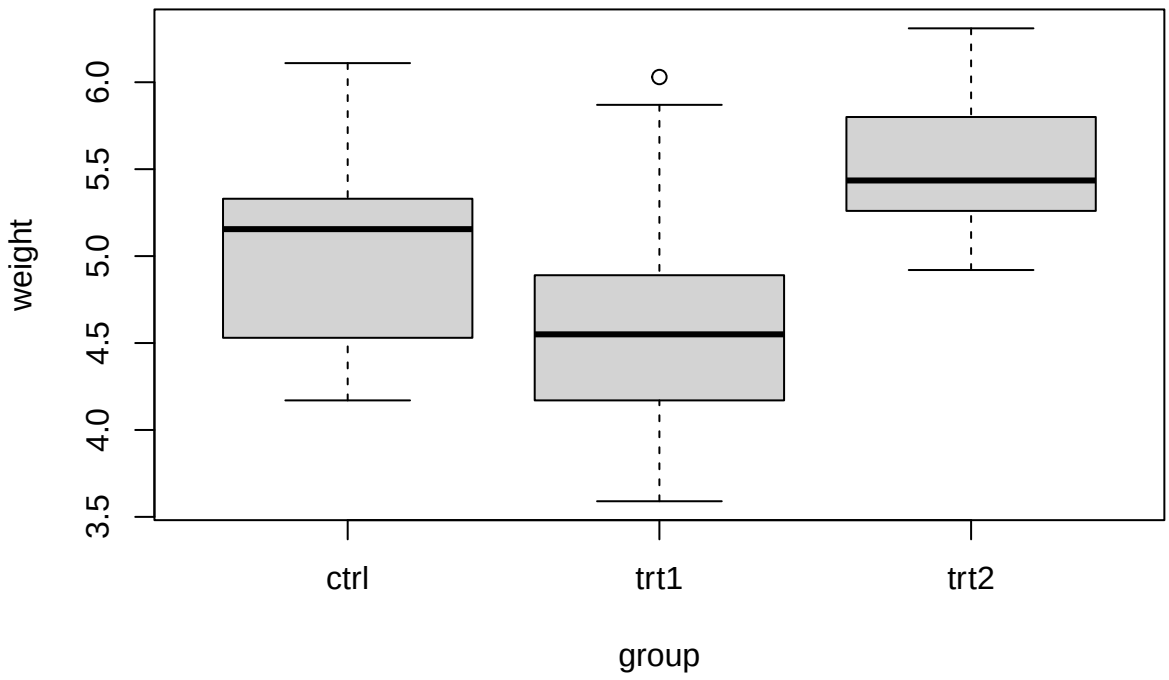


Histogram 3: Treatment 1 Group Weight in PlantGrowth data set

Analysis: Histogram 1 of the control group is unimodal while Histogram 2&3 of treatment 1 and treatment 2 are bimodal. All three histograms are asymmetrical. The ranges also seem to vary, however we can't tell too much else.

Exercise 8 p.66

```
boxplot(weight~group,data=PlantGrowth)
```



Analysis: First, none of the three groups overall. Second, the height of treatment 2 seems to be smaller than that of the control and treatment 1 groups. This means that the treatment 2 group plants are considered to be less variable than treatment 1 or control group. The median of all three groups are different. With the control group, the median is median is closest to the third quantile. And in the treatment 2 group, the median is closest to the first quantile.

Exercise 9 p.66

```
t.test(PlantGrowth$weight[PlantGrowth$group=="ctrl"],PlantGrowth$weight[PlantGrowth$group=="trt1"])
```

```
##
##  Welch Two Sample t-test
##
## data:  PlantGrowth$weight[PlantGrowth$group == "ctrl"] and PlantGrowth$weight[PlantGrowth$group == "
## t = 1.1913, df = 16.524, p-value = 0.2504
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -0.2875162  1.0295162
## sample estimates:
## mean of x mean of y
##     5.032     4.661
```

Analysis: Our t-value is 1.1913. The degrees of freedom is 16.524. The p-value is 0.2504. We are 95% confident that the population parameter is between -0.2875162 and 1.0295162.

Exercise 10 p.66

```
t.test(PlantGrowth$weight[PlantGrowth$group=="trt1"],PlantGrowth$weight[PlantGrowth$group=="trt2"])
```

```
##
##  Welch Two Sample t-test
##
## data:  PlantGrowth$weight[PlantGrowth$group == "trt1"] and PlantGrowth$weight[PlantGrowth$group == "
## t = -3.0101, df = 14.104, p-value = 0.009298
## alternative hypothesis: true difference in means is not equal to 0
## 95 percent confidence interval:
##  -1.4809144 -0.2490856
## sample estimates:
## mean of x mean of y
##     4.661     5.526
```

Analysis: Our t-value is -3.0101. The degrees of freedom is 14.104. The p-value is 0.009298. We are 95% confident that the population parameter is between -1.4809144 and -0.2490856.

End of Homework 4