STAT461 HW1

Xiangyu Ren

9/4/2020

1. Type the soap experiment data into R. Format the data when you enter it as a data frame with twocolumns, one for the type of soap and another for the weight lost in the experiment. Each row of yourdata object should correspond to a single bar of soap (a single experimental unit), so you should endup with 12 rows.

```
soapData = data.frame("TypeofSoap" = c("Regular", "Regular", "Regular", "Regular", "Deodorant", "Deodora
soapData
```

```
##      TypeofSoap WeightLost
## 1       Regular      -0.30
## 2       Regular      -0.10
## 3       Regular      -0.14
## 4       Regular       0.40
## 5     Deodorant       2.63
## 6     Deodorant       2.61
## 7     Deodorant       2.41
## 8     Deodorant       3.15
## 9  Moisturizing       1.86
## 10 Moisturizing       2.03
## 11 Moisturizing       2.26
## 12 Moisturizing       1.82
```

2. Convert the measurements of weight lost to kilograms.

```
soapData$WeightLost = soapData$WeightLost/1000
soapData
```

```
##      TypeofSoap WeightLost
## 1       Regular   -0.00030
## 2       Regular   -0.00010
## 3       Regular   -0.00014
## 4       Regular    0.00040
## 5     Deodorant    0.00263
## 6     Deodorant    0.00261
## 7     Deodorant    0.00241
## 8     Deodorant    0.00315
```

```
## 9  Moisturizing    0.00186
## 10 Moisturizing    0.00203
## 11 Moisturizing    0.00226
## 12 Moisturizing    0.00182
```

3.Use R to compute the mean and standard deviation of the observed weight lost (in kilograms). Do this first for all 12 data points, and then compute the mean and standard deviation for each of the 3 typesof soap.

```
# mean of all 12
mean(soapData$WeightLost)
```

```
## [1] 0.0015525
```

```
# standard deviation of all 12
sd(soapData$WeightLost)
```

```
## [1] 0.00123644
```

```
# mean of Regular
mean(soapData$WeightLost[1:4])
```

```
## [1] -3.5e-05
```

```
# standard deviation of Regular
sd(soapData$WeightLost[1:4])
```

```
## [1] 0.0003025998
```

```
# mean of Deodorant
mean(soapData$WeightLost[5:8])
```

```
## [1] 0.0027
```

```
# standard deviation of Deodorant
sd(soapData$WeightLost[5:8])
```

```
## [1] 0.0003160169
```

```
# mean of Moisturizing
mean(soapData$WeightLost[9:12])
```

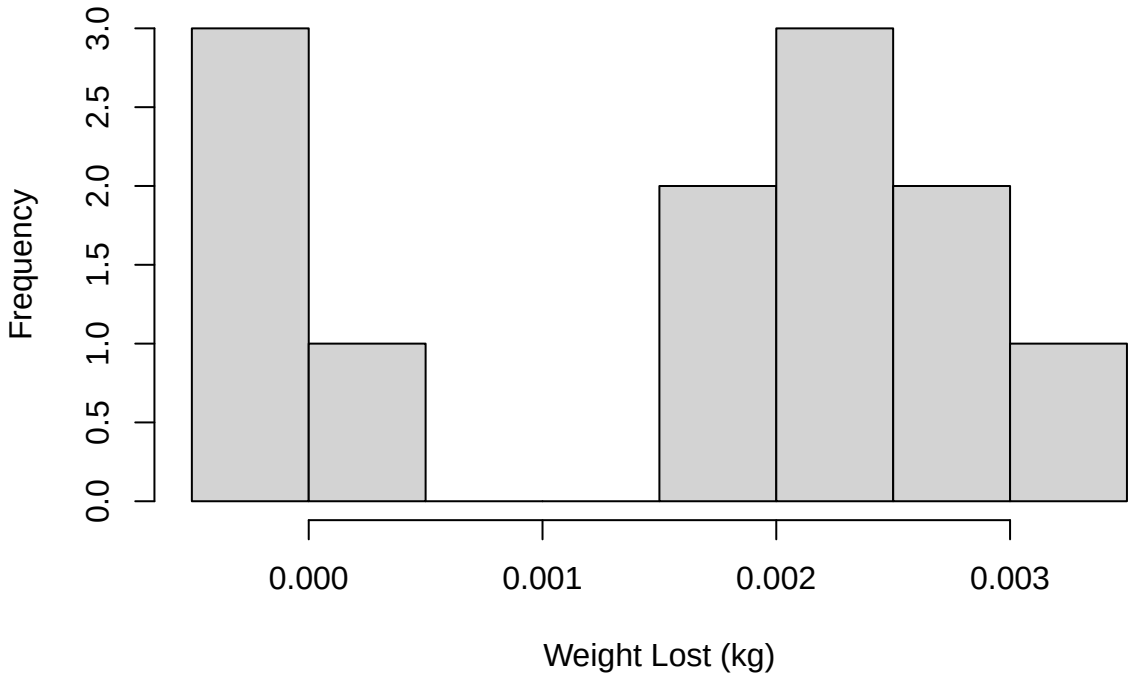
```
## [1] 0.0019925
```

```
# standard deviation of Moisturizing
sd(soapData$WeightLost[9:12])
```

```
## [1] 0.000200229
```

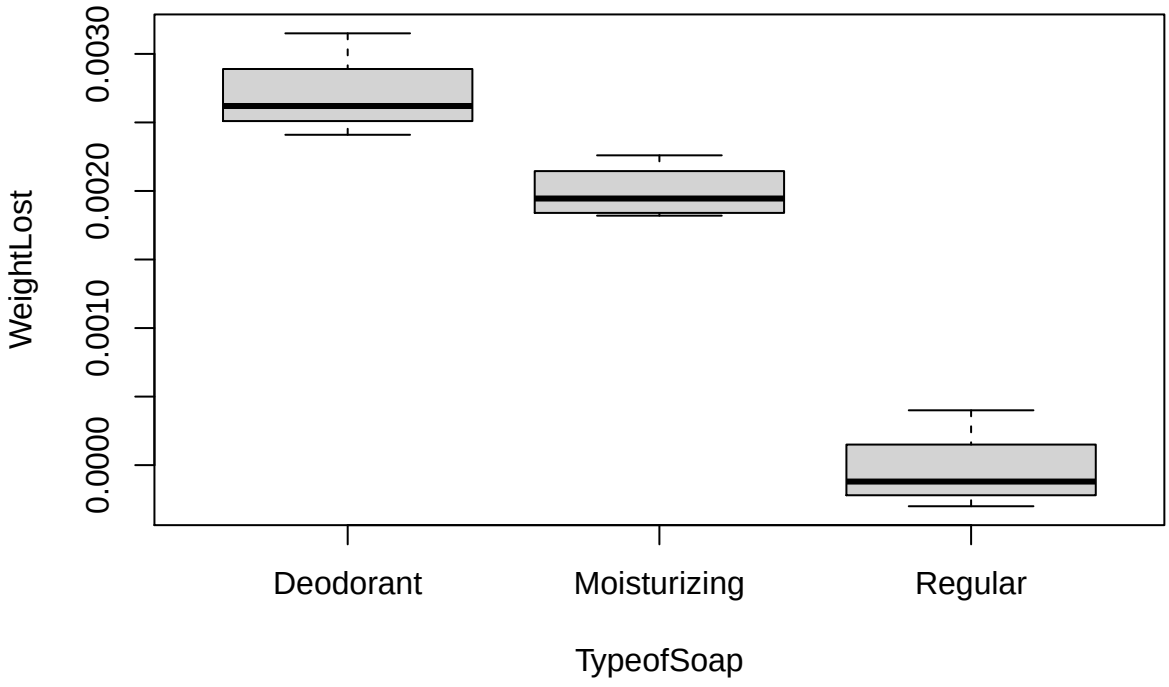
4. Plot a histogram of all of the observations from the experiment (in kilograms).

```
hist(soapData$WeightLost, xlab = "Weight Lost (kg)", main = "")
```



5. Plot side-by-side boxplots of the weight lost (in kilograms), with one boxplot for each type of soap.

```
boxplot(WeightLost~TypeofSoap, data = soapData, main = "")
```



6.Comment on any observed differences between the soap types that you think would be worth investigating further.

```
# According to the boxplot, we can see that the average loss of weight has an descending
# order with Deodorant > Moisturizing > Regular.
# Also, we can see there is a relatively huge gap between Regular type and other types.
# So I think the thing that's worthy for further investigating is whether the type is a
# significant factor on Weight loss or not.
```