MATH 3070 Lab Project 8

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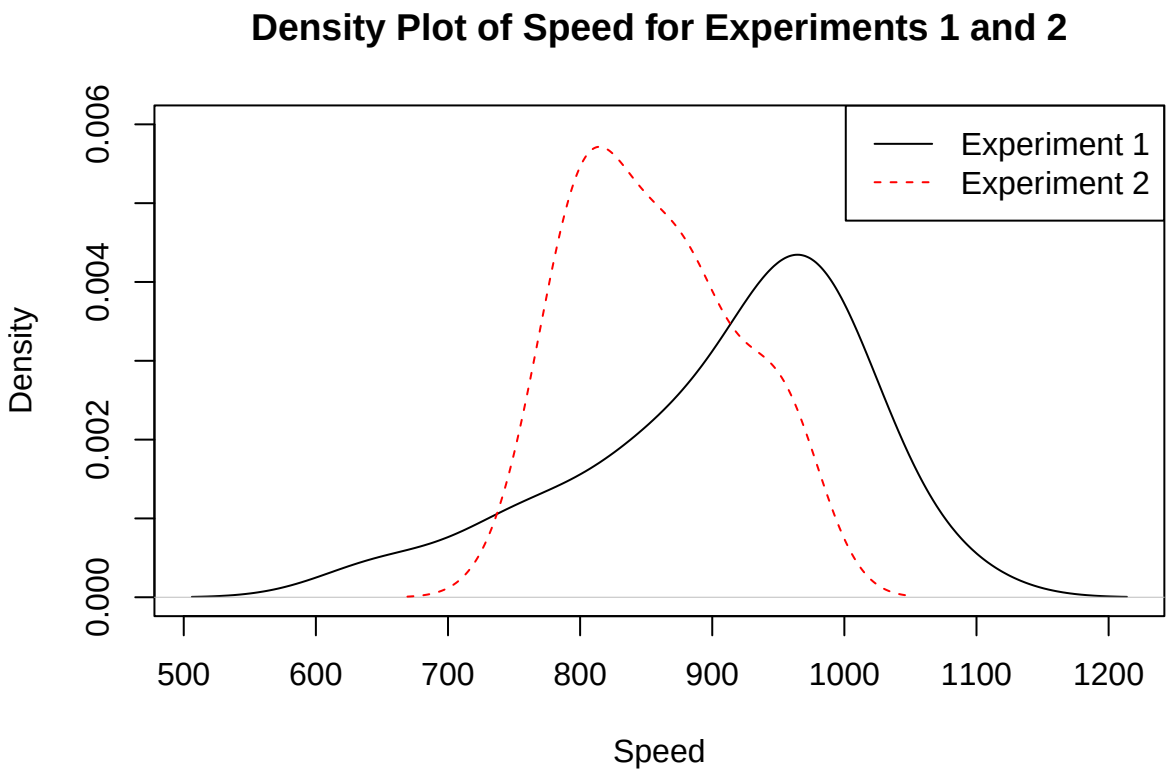
Remember: I expect to see commentary either in the text, in the code with comments created using `#`*, or (preferably) both!* ***Failing to do so may result in lost points!***

Problem 1 (Verzani problem 3.2)

For the `michelson` *(**MASS**) data set, produce a density plot comparing* `Speed` *between Experiments 1 and 2.*

```
# Load the required package and data
library(MASS)

# Split the Speed data based on the experiment (Expt)
split_data <- split(michelson$Speed, michelson$Expt)

# Extract the Speed values for Experiment 1 and Experiment 2
experiment1 <- split_data[[1]]
experiment2 <- split_data[[2]]

# Plot the density for Experiment 1
plot(density(experiment1), lty = 1, ylim = range(0, 0.006),
     main = "Density Plot of Speed for Experiments 1 and 2",
     xlab = "Speed", ylab = "Density")

# Add the density for Experiment 2
lines(density(experiment2), lty = 2, col = "red")

# Add a legend to differentiate the experiments
legend("topright", legend = c("Experiment 1", "Experiment 2"),
       lty = 1:2, col = c("black", "red"))
```



Problem 2 (Verzani problem 3.4)

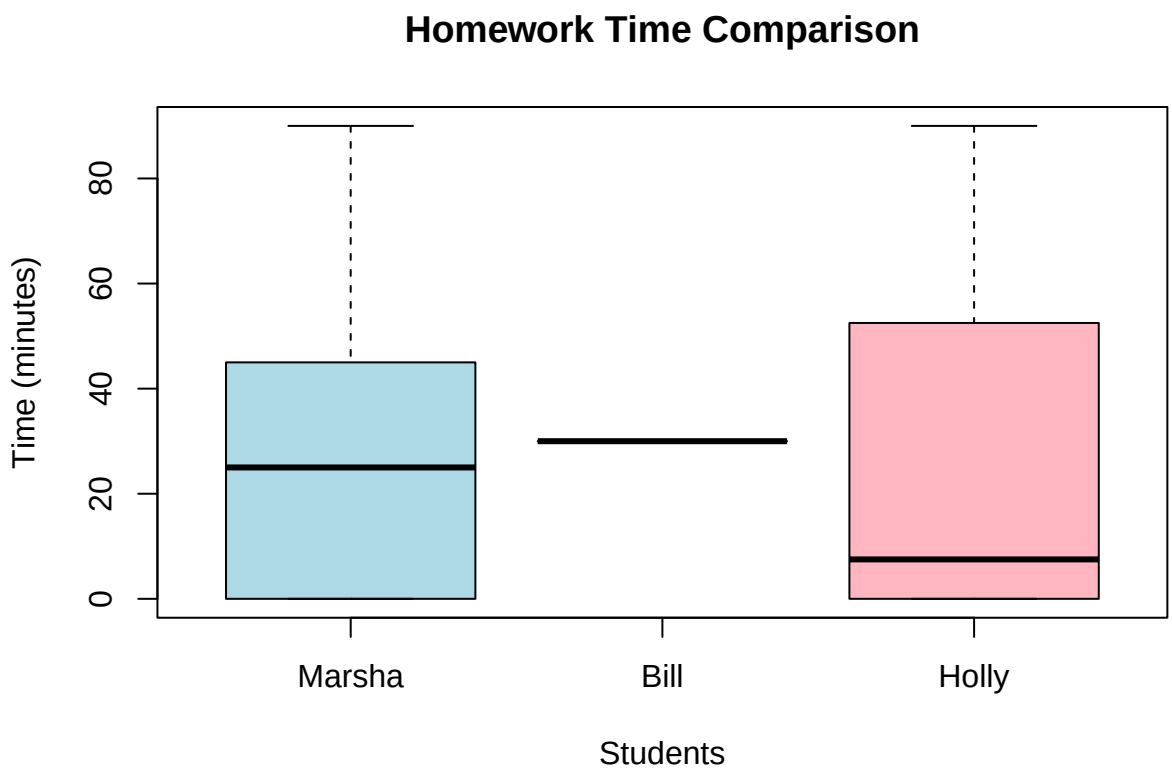
Three students record the time spent on homework per class. Their data is:

Student	1	2	3	4	5
Marsha	25	0	45	90	0
Bill	30	30	30	30	
Holly	15	0	90	0	

Use a list to store these values. Then create a boxplot to compare. (You must use `boxplot()`*'s formula interface for this problem.)*

```
# Storing the data in a list
homework_data <- list(
  Marsha = c(25, 0, 45, 90, 0),
  Bill = c(30, 30, 30, 30),
  Holly = c(15, 0, 90, 0)
)

# Create boxplot using the formula interface
boxplot(homework_data,
        main = "Homework Time Comparison",
        ylab = "Time (minutes)",
```

```
        xlab = "Students",
        col = c("lightblue", "lightgreen", "lightpink"))
```




```
#Billy spends the same amount of time on homework no
# matter what the class is Onaverage Marsha spends the most time studying
```

Problem 3 (Verzani problem 3.5)

A group of nursing students take turns measuring some basic assessments. Their data is:

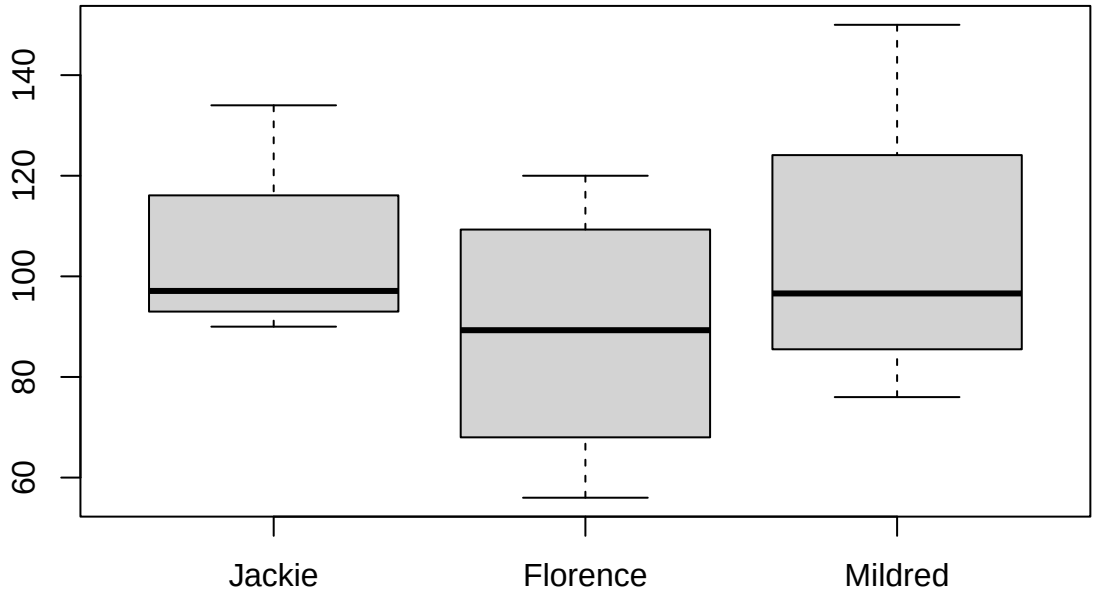
	Temp	Pulse	Systolic	Diastolic
Jackie	98.2	96	134	90
Florence	98.6	56	120	80
Mildred	98.2	76	150	95

Create a data frame of these values. Will `plot()` *and* `boxplot()` *produce the same graphic?*

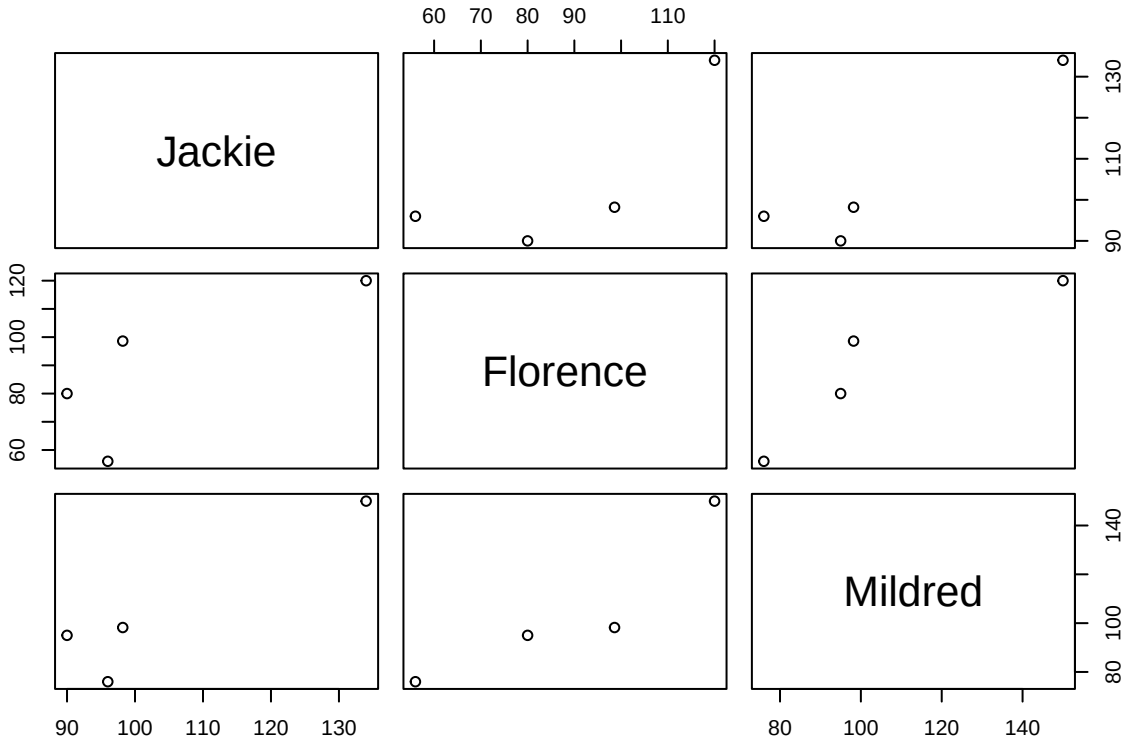
```
# Your code here
# Create data frame
Jackie <- c(98.2,96,134,90)
Florence <- c(98.6,56,120,80)
Mildrend <- c(98.2,76,150,95)
df <- data.frame(Jackie,Florence,Mildrend)
df
```

```
##   Jackie Florence Mildrend
## 1   98.2     98.6     98.2
## 2   96.0     56.0     76.0
## 3  134.0    120.0    150.0
## 4   90.0     80.0     95.0
```

```r
names(df) <- c("Jackie", "Florence", "Mildred")
boxplot(df)
```




```r
plot(df)
```




```
# The plot() function produces a scatter plot, showing the relationship
# between different variables. On the other hand,
# boxplot() visualizes the distribution of each variable.
# The two functions generate different types of visuals-one
# for relationships and the other for distribution.
```

Problem 4 (Verzani problem 3.8)

The second argument to `split` *can be a list of factors. The result is that all interactions (possible combinations) are used for the groups. In the* `ToothGrowth` *data set, growth (*`len`*) is measured for two types of supplements (*`supp`*) and three doses (*`dose`*). Split this* `len` *value into 6 groups.*

```
# Load the ToothGrowth data
data("ToothGrowth")

# Use split to divide len into 6 groups based on supp and dose
tooth_growth_groups <- split(ToothGrowth$len, list(ToothGrowth$supp, ToothGrowth$dose))

# Display
tooth_growth_groups
```

```
## $OJ.0.5
##  [1] 15.2 21.5 17.6  9.7 14.5 10.0  8.2  9.4 16.5  9.7
##
```

```
## $VC.0.5
##  [1]  4.2 11.5  7.3  5.8  6.4 10.0 11.2 11.2  5.2  7.0
##
## $OJ.1
##  [1] 19.7 23.3 23.6 26.4 20.0 25.2 25.8 21.2 14.5 27.3
##
## $VC.1
##  [1] 16.5 16.5 15.2 17.3 22.5 17.3 13.6 14.5 18.8 15.5
##
## $OJ.2
##  [1] 25.5 26.4 22.4 24.5 24.8 30.9 26.4 27.3 29.4 23.0
##
## $VC.2
##  [1] 23.6 18.5 33.9 25.5 26.4 32.5 26.7 21.5 23.3 29.5
```