Mini Project 2 (Solution)

Mini Project Duo Group # 12
Contribution of each group member
Chetan Siddappareddy – 50%
Ankit Sahu – 50%
Both of us have contributed equally to the project. We learnt R through collaboration and then write the R scripts for the corresponding and report all the findings.

Section 1

Problem 1

a) The below represents the bar plot for the variable Maine and figure 2 displays the corresponding count and proportions for each Away and Maine in Maine variable. Concluding from the data, there are 3 times more Maine runners than the away runners.

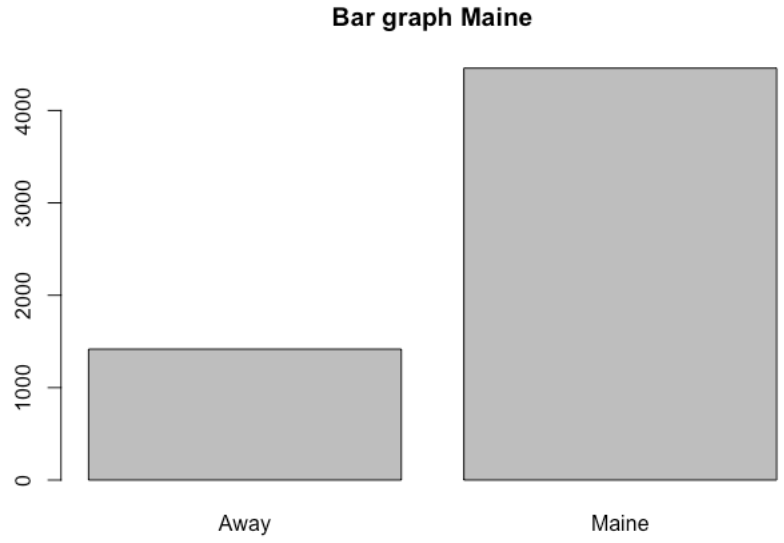


Figure 1: Bar plot for Maine Variable

Count Maine

```
Maine
 Away Maine
 1417  4458
```

Proportion Maine

```
Maine
     Away     Maine
0.2411915 0.7588085
```

Figure 2: Summary Statistics for Maine

b) Below figure shows the histograms for the Maine and Away. They look symmetric.

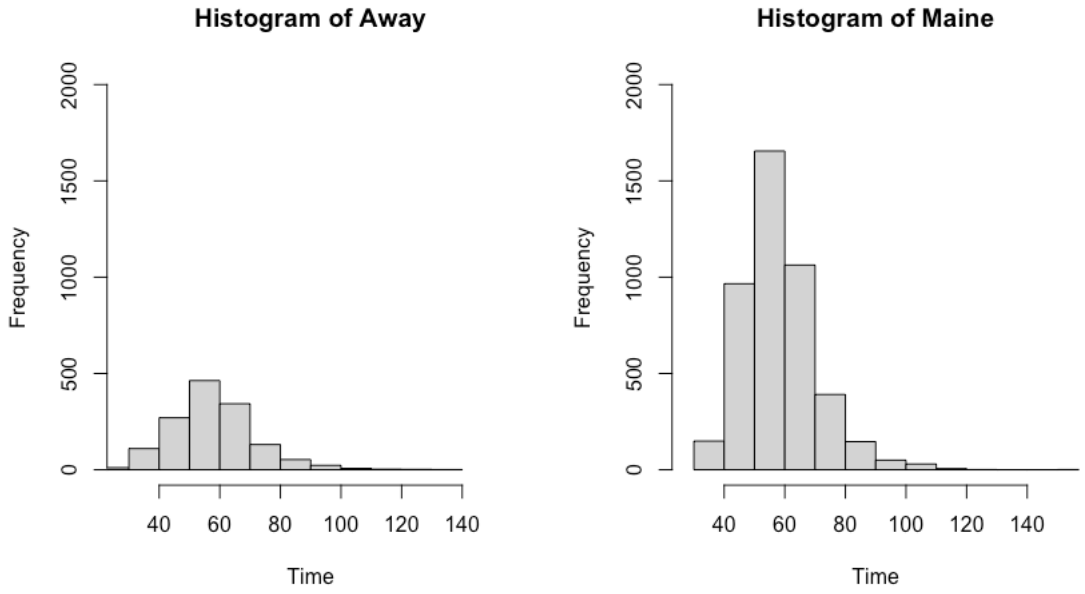


Figure 2: Histogram for Away and Maine

Summary and IQR for Away and Maine are in the below Table:

	Min	**Q1**	**Median**	**Mean**	**Q3**	**Max**	**IQR**
Away	27.78	49.15	56.92	57.82	64.83	133.71	15.67
Maine	30.57	50	57.03	58.20	64.24	152.17	14.24

Table 1: Summary and IQR of Maine and Away

c) The side-by-side plot is shown on the below figure 3. It compares the runner's times of Maine and away. Quartile 1, Median, Quartile 3 have similar values for both Maine and away, and distributions seem to be symmetric.

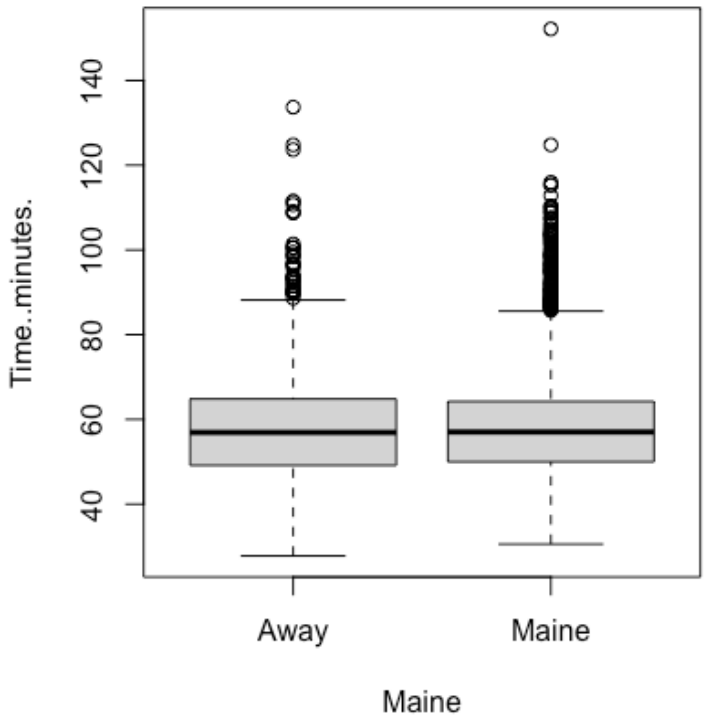


Figure 3: Side by Side boxplots for runner's time

d) Summary and IQR for male and female in shown in below table 2, and side by side box plots are shown in figure 4. It shows that all three quartiles Q1, median, and the Q3 are larger for male than the female, it shows that the distribution of male age may be different than that of female. The male runners age has larger variability than the female's age. Also, the male runners seem to be left skewed while female runner is right skewed.

	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.	IQR
Male	9.00	30.00	41.00	40.45	51.00	83.00	21
Female	7.00	28.00	36.00	37.24	46.00	86.00	18

Table 2: Summary and IQR for male and female

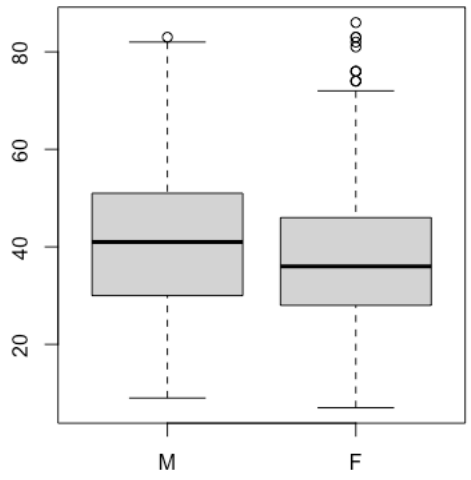


Figure 4: Side-by-Side boxplots for runner's age by sex

PROBLEM 2:

Figure 5 shows the box plot of motorcycle accidents. It can clearly be seen that the 75% of motorcycle accident is above 6. Although 2 states have very high number of motorcycle accidents but there are some states with no motorcycle accidents also. The distribution of motorcycle is right skew. Greenville and Horny are two outliers in the given data. The reason for motorcycle accidents is higher number of accidents are high population density, condition of weather and road, higher number of roads are few of them.

Min	Q1	Median	Mean	Q3	Max	IQR
0.00	6.00	13.50	17.02	23.00	60.00	17

Table 3: Summary for Motorcycle accidents

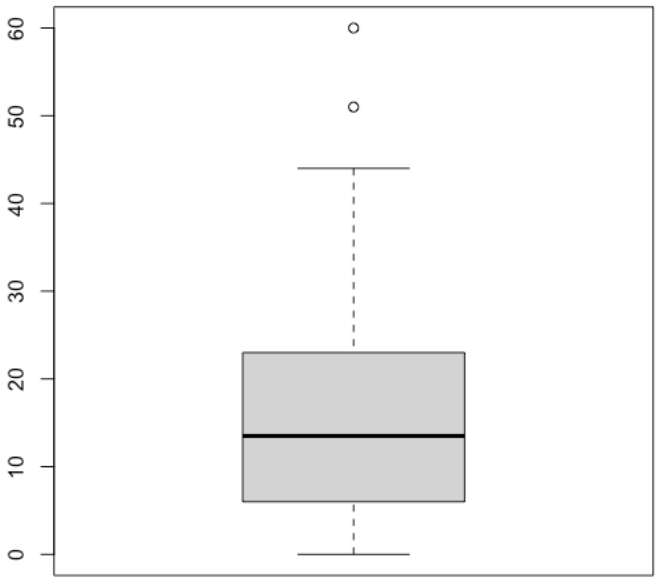


Figure 5: Boxplot for motorcycle accidents

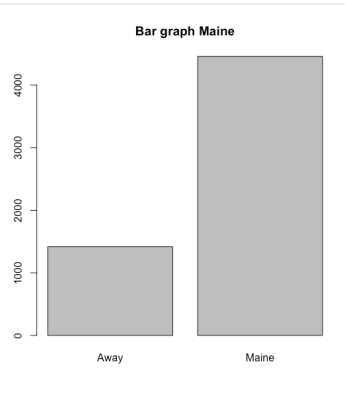
Section 2

```
#####################################
R CODE FOR PROBLEM 1:
#####################################
# Solution for Problem 1
# Part a
# Load data
roadrace = read.csv("/Users/sahuankit010/Desktop/Repo/CS-6313-Stats/Mini Projects/MP2/roadrace.csv")

# Read Data
print(summary(roadrace))
print(colnames(roadrace))
attach(roadrace)

# Bar Graph
barplot(table(Maine), main = "Bar graph Maine")
```

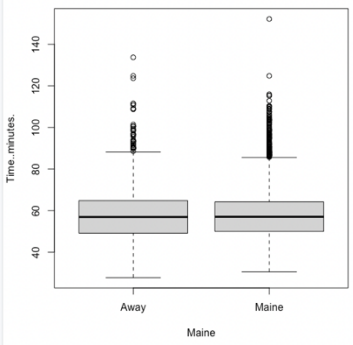
```
# summary of Maine
t <- table(Maine)
m <- prop.table(m)
print(t)
print(m)

# Part b
maine <- subset(roadrace, Maine == "Maine")$Time..minutes.
away <- subset(roadrace, Maine == "Away")$Time..minutes.

# Summary for both "maine" and "away"

summary(maine)
summary(away)
IQR(maine)
IQR(away)

# Histograms
hist(maine, xlim = c(min(away), max(maine)), ylim = c(0, 2000), xlab = "Time", main = "Histogram of Maine")
hist(away, xlim = c(min(away), max(maine)), ylim = c(0, 2000), xlab = "Time", main = "Histogram of Away")

# Part c Side by Side Plot
boxplot(Time..minutes.~Maine)

# Part d Male and Female Runnner Part

ml <- Age[Sex == "M"]
fl <- Age[Sex == "F"]
ml = strtoi(ml)
fl = strtoi(fl)

boxplot(ml, fl, names = c("M", "F"))

summary(ml)
summary(fl)
IQR(ml)
IQR(fl)
```

```
> print(summary(roadrace))
     Place      Division.Place     Division.Entrants    Division            Age              Sex            State.Country
 Min.   :   1   Length:5875        Length:5875        Length:5875        Length:5875        Length:5875        Length:5875
 1st Qu.:1470   Class :character   Class :character   Class :character   Class :character   Class :character   Class :character
 Median :2938   Mode  :character   Mode  :character   Mode  :character   Mode  :character   Mode  :character   Mode  :character
 Mean   :2938
 3rd Qu.:4406
 Max.   :5875
 Time..seconds. Mile.pace..seconds.   From.USA           Maine           Time..minutes.
 Min.   :1667   Min.   : 269.0      Length:5875        Length:5875        Min.   : 27.78
 1st Qu.:2987   1st Qu.: 481.0      Class :character   Class :character   1st Qu.: 49.78
 Median :3421   Median : 551.0      Mode  :character   Mode  :character   Median : 57.02
 Mean   :3486   Mean   : 561.6                                            Mean   : 58.11
 3rd Qu.:3869   3rd Qu.: 623.0                                            3rd Qu.: 64.48
 Max.   :9130   Max.   :1470.0                                            Max.   :152.17
> print(colnames(roadrace))
 [1] "Place"               "Division.Place"      "Division.Entrants"   "Division"            "Age"                 "Sex"
 [7] "State.Country"       "Time..seconds."      "Mile.pace..seconds." "From.USA"            "Maine"               "Time..minutes."
> attach(roadrace)
```

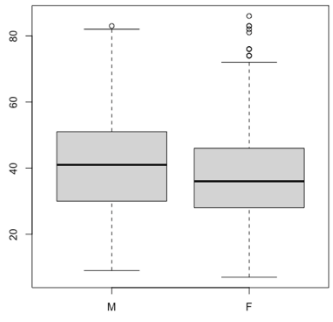
```
    Age, Division, Division.Entrants, Division.Place, From.USA, Maine, Mile.pace..seconds., Place, Sex, State.Country,
    Time..minutes., Time..seconds.

The following objects are masked from roadrace (pos = 13):

    Age, Division, Division.Entrants, Division.Place, From.USA, Maine, Mile.pace..seconds., Place, Sex, State.Country,
    Time..minutes., Time..seconds.

The following objects are masked from roadrace (pos = 14):

    Age, Division, Division.Entrants, Division.Place, From.USA, Maine, Mile.pace..seconds., Place, Sex, State.Country,
    Time..minutes., Time..seconds.

>
> # Bar Graph
> barplot(table(Maine), main = "Bar graph Maine")
> # summary of Maine
> t <- table(Maine)
> m <- prop.table(m)
> print(t)
Maine
 Away Maine
 1417  4458
> print(m)
Maine
     Away     Maine
0.2411915 0.7588085
>
```




```
> maine <- subset(roadrace, Maine == "Maine")$Time..minutes.
> away <- subset(roadrace, Maine == "Away")$Time..minutes.
>
> # Summary for both "maine" and "away"
>
> summary(maine)
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  30.57   50.00   57.03   58.20   64.24  152.17
> summary(away)
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
  27.78   49.15   56.92   57.82   64.83  133.71
> IQR(maine)
[1] 14.24775
> IQR(away)
[1] 15.674
>
> # Histograms
> hist(maine, xlim = c(min(away), max(maine)), ylim = c(0, 2000), xlab = "Time", main = "Histogram of Maine")
> hist(away, xlim = c(min(away), max(maine)), ylim = c(0, 2000), xlab = "Time", main = "Histogram of Away")
>
> # Part c Side by Side Plot
> boxplot(Time..minutes.~Maine)
>
```




```
> ml <- Age[Sex == "M"]
> fl <- Age[Sex == "F"]
> ml = strtoi(ml)
> fl = strtoi(fl)
>
> boxplot(ml, fl, names = c("M", "F"))
>
> summary(ml)
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
   9.00   30.00   41.00   40.45   51.00   83.00
> summary(fl)
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
   7.00   28.00   36.00   37.24   46.00   86.00
> IQR(ml)
[1] 21
> IQR(fl)
[1] 18
>
```



```
#####################################
R CODE FOR PROBLEM 2:
#####################################

# Solution for Problem 2

# Read the data
mc <- read.csv("/Users/sahuankit010/Desktop/Repo/CS-6313-Stats/Mini Projects/MP2/motorcycle.csv")
attach(mc)
mc

#boxplot
boxplot(Fatal.Motorcycle.Accidents)

#outliers
box <-boxplot(Fatal.Motorcycle.Accidents)
box$out
tail(mc[order(Fatal.Motorcycle.Accidents), ], 2)

#summary statistics
summary(Fatal.Motorcycle.Accidents)
IQR(Fatal.Motorcycle.Accidents)
```

R 4.2.1 · ~/Desktop/Repo/CS-6313-Stats/Mini Projects/MP2/

```
> mc <- read.csv("/Users/sahuankit010/Desktop/Repo/CS-6313-Stats/Mini Projects/MP2/motorcycle.csv")
> attach(mc)
The following objects are masked from mc (pos = 4):

    County, Fatal.Motorcycle.Accidents

The following objects are masked from mc (pos = 6):

    County, Fatal.Motorcycle.Accidents

> mc
         County Fatal.Motorcycle.Accidents
1     ABBEVILLE                          3
2         AIKEN                         28
3     ALLENDALE                          3
4      ANDERSON                         35
5       BAMBERG                          3
6      BARNWELL                          7
7      BEAUFORT                         13
8      BERKELEY                         38
9       CALHOUN                          6
10   CHARLESTON                         44
11     CHEROKEE                         11
12      CHESTER                         14
13 CHESTERFIELD                         12
14    CLARENDON                         18
15     COLLETON                         17
16   DARLINGTON                         17
```

Console Terminal

R 4.2.1 · ~/Desktop/Repo/CS-6313-Stats/Mini Projects/MP2/

```
> #boxplot
> boxplot(Fatal.Motorcycle.Accidents)
>
> #outliers
> box <-boxplot(Fatal.Motorcycle.Accidents)
> box$out
[1] 51 60
> tail(mc[order(Fatal.Motorcycle.Accidents), ], 2)
       County Fatal.Motorcycle.Accidents
23 GREENVILLE                         51
26      HORRY                         60
>
> #summary statistics
> summary(Fatal.Motorcycle.Accidents)
   Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
   0.00    6.00   13.50   17.02   23.00   60.00
> IQR(Fatal.Motorcycle.Accidents)
[1] 17
>
```