project2

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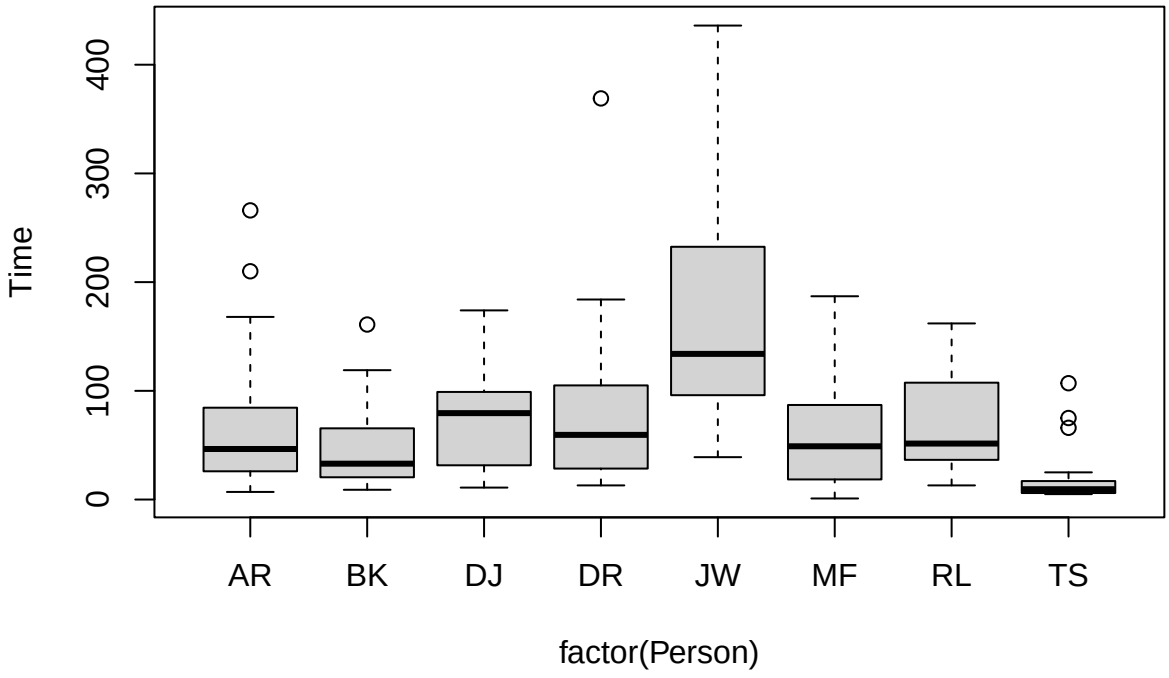
Problem 2

```
library(Stat2Data)
library(mosaic)
```

```
## Registered S3 method overwritten by 'mosaic':
##   method                           from
##   fortify.SpatialPolygonsDataFrame ggplot2

##
## The 'mosaic' package masks several functions from core packages in order to add
## additional features.  The original behavior of these functions should not be affected by this.

##
## Attaching package: 'mosaic'

## The following objects are masked from 'package:dplyr':
##
##     count, do, tally

## The following object is masked from 'package:Matrix':
##
##     mean

## The following object is masked from 'package:ggplot2':
##
##     stat

## The following objects are masked from 'package:stats':
##
##     binom.test, cor, cor.test, cov, fivenum, IQR, median, prop.test,
##     quantile, sd, t.test, var

## The following objects are masked from 'package:base':
##
##     max, mean, min, prod, range, sample, sum
```

```
library(emmeans)
library(agricolae)

baseball = read.csv("C:/Users/adhri/OneDrive/Documents/R/App_Reg_and_Time_Series/exam2/FantasyBaseball.
attach(baseball)

# a
plot(Time ~ factor(Person))
```




```
FFStats=favstats(Time ~ factor(Person))
FFStats
```

```
##   factor(Person) min    Q1 median     Q3 max      mean        sd  n missing
## 1             AR   7 26.00   46.5  79.25 266  68.29167  66.89153 24       0
## 2             BK   9 20.75   33.0  65.25 161  47.95833  39.25112 24       0
## 3             DJ  11 32.25   79.5  99.00 174  69.62500  41.61502 24       0
## 4             DR  13 29.75   59.5 103.50 369  80.12500  75.83467 24       0
## 5             JW  39 98.50  134.0 231.25 436 163.87500 104.16555 24       0
## 6             MF   1 18.75   49.0  86.50 187  63.83333  55.99664 24       0
## 7             RL  13 36.75   51.5 105.25 162  67.12500  44.55120 24       0
## 8             TS   5  6.00    9.5  17.00 107  19.33333  25.82999 24       0
```

```
# b
selectTime = aov(Time ~ factor(Person))
summary(selectTime)
```

```
##                  Df Sum Sq Mean Sq F value   Pr(>F)
## factor(Person)    7 287196   41028   10.89 1.79e-11 ***
## Residuals       184 693126    3767
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
# c

Fitted.Model<-emmeans(selectTime, ~factor(Person))
Fitted.Model
```

```
##  Person emmean   SE  df lower.CL upper.CL
##  AR       68.3 12.5 184    43.57     93.0
##  BK       48.0 12.5 184    23.24     72.7
##  DJ       69.6 12.5 184    44.91     94.3
##  DR       80.1 12.5 184    55.41    104.8
##  JW      163.9 12.5 184   139.16    188.6
##  MF       63.8 12.5 184    39.12     88.6
##  RL       67.1 12.5 184    42.41     91.8
##  TS       19.3 12.5 184    -5.38     44.1
##
## Confidence level used: 0.95
```

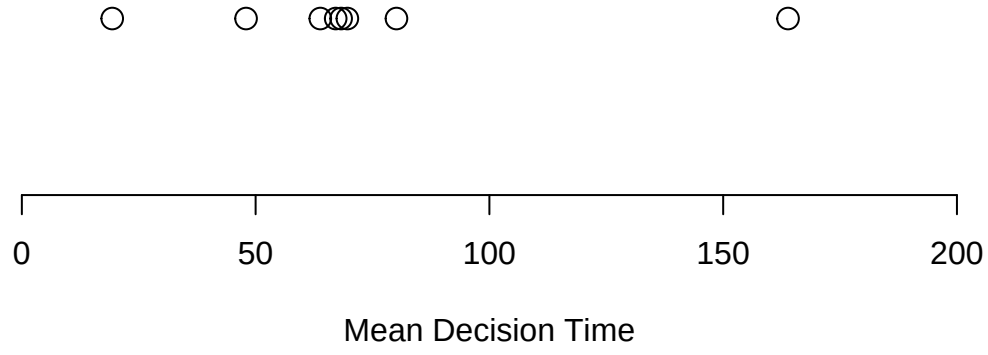
```
pairs(Fitted.Model, adjust='none')    # the estimate is the mean difference between groups
```

```
##  contrast estimate   SE  df t.ratio p.value
##  AR - BK     20.33 17.7 184   1.148  0.2526
##  AR - DJ     -1.33 17.7 184  -0.075  0.9401
##  AR - DR    -11.83 17.7 184  -0.668  0.5050
##  AR - JW    -95.58 17.7 184  -5.395  <.0001
##  AR - MF      4.46 17.7 184   0.252  0.8016
##  AR - RL      1.17 17.7 184   0.066  0.9476
##  AR - TS     48.96 17.7 184   2.763  0.0063
##  BK - DJ    -21.67 17.7 184  -1.223  0.2229
##  BK - DR    -32.17 17.7 184  -1.816  0.0711
##  BK - JW   -115.92 17.7 184  -6.542  <.0001
##  BK - MF    -15.88 17.7 184  -0.896  0.3714
##  BK - RL    -19.17 17.7 184  -1.082  0.2808
##  BK - TS     28.62 17.7 184   1.616  0.1079
##  DJ - DR    -10.50 17.7 184  -0.593  0.5542
##  DJ - JW    -94.25 17.7 184  -5.320  <.0001
##  DJ - MF      5.79 17.7 184   0.327  0.7441
##  DJ - RL      2.50 17.7 184   0.141  0.8879
##  DJ - TS     50.29 17.7 184   2.839  0.0050
##  DR - JW    -83.75 17.7 184  -4.727  <.0001
##  DR - MF     16.29 17.7 184   0.920  0.3590
##  DR - RL     13.00 17.7 184   0.734  0.4640
##  DR - TS     60.79 17.7 184   3.431  0.0007
##  JW - MF    100.04 17.7 184   5.646  <.0001
##  JW - RL     96.75 17.7 184   5.461  <.0001
##  JW - TS    144.54 17.7 184   8.158  <.0001
##  MF - RL     -3.29 17.7 184  -0.186  0.8528
##  MF - TS     44.50 17.7 184   2.512  0.0129
##  RL - TS     47.79 17.7 184   2.697  0.0076
```

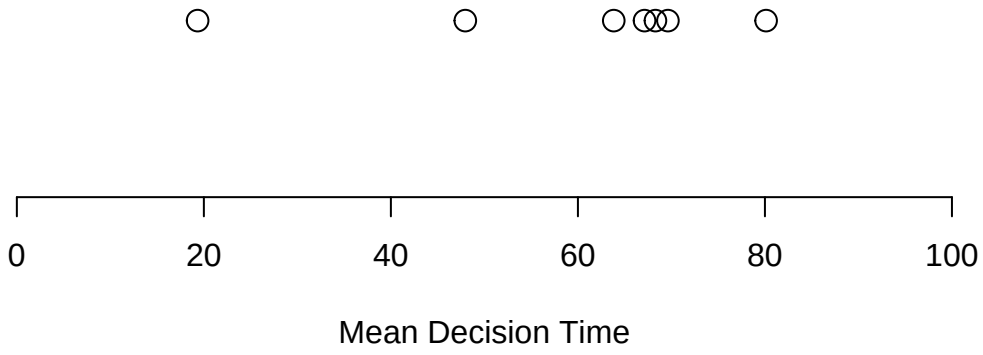
```
FFStats=favstats(Time ~ factor(Person))

tstar=qt(0.975,selectTime$df.residual)
MSE=summary(selectTime)[[1]]$"Mean Sq"[2]    #gets the MSE from aov summary
ni=FFStats$n[1]
LSD=tstar*sqrt(MSE)*sqrt(1/ni+1/ni)
round(LSD,2)
```

```
## [1] 34.96
```

```
y=rep(2,8)
plot(FFStats$mean,y, xlim=c(0,200), ylim=c(1,4), yaxt="n",ylab="", bty = "n", xlab="Mean Decision Time"
```




```
plot(FFStats$mean,y, xlim=c(0,100), ylim=c(1,4), yaxt="n",ylab="", bty = "n", xlab="Mean Decision Time"
```




```
#rest below is labeling the points and showing LSD
FFMean=FFStats$mean
```

a) The boxplots reveal that the selection times for most of the participants are roughly similar apart for occasional outliers. The only participants that are noticeably different from rest are JW and TS. JW has a higher median selection time and wider ranges of values than the others. TS has the lowest median and extremely narrow ranges of values with a few outliers. JW took the longest and TS took the shortest time to make their decisions.

b) The test statistic is the F-value which is 10.89. The p-value is 1.79e-11 which is less than the alpha, so we reject the null hypothesis. This indicates that there is a difference among the participants in terms of their selection times.

c) Fisher's LSD value was calculated to be 34.956. Thus, we are looking for the pairwise differences that are greater than 34.956 to declare those differences as significant. The participants whose average selection times differ significantly from which others is provided in pairs: AR - JW, AR - TS, BK - JW, DJ - JW, DJ - TS, DR - JW, DR - TS, JW - MR, JW - RL, JW - TS, MF - TS, AND RL - TS. Overall, JW and TS were differed significantly from the others other than possibly BK and TS. Everyone else was similar.