STAT 43000/STAT 53001 Applied Statistics Spring 2023

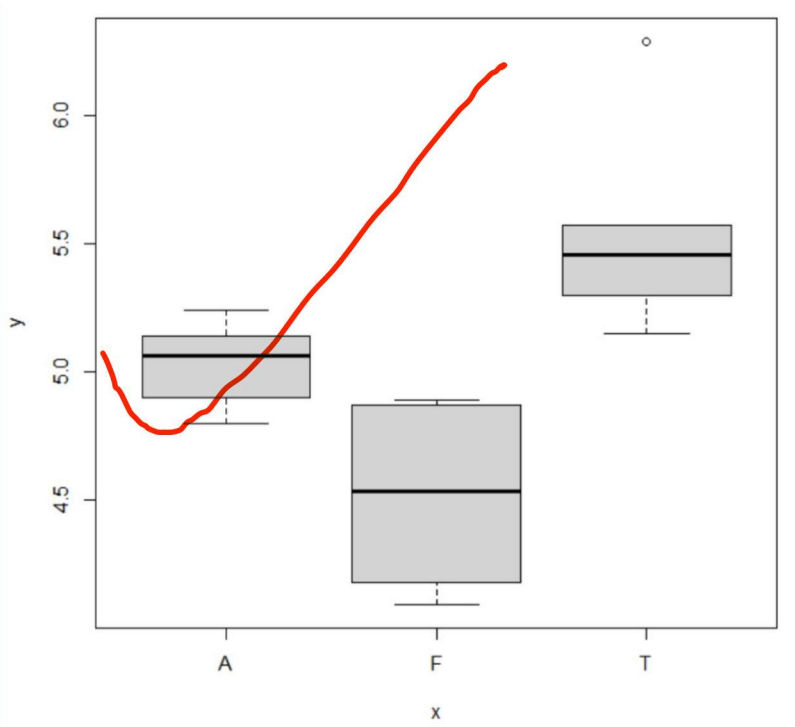
Lab -8

1. An environmentalist wanted to determine if the mean acidity of rain differed among Alaska, Florida, and Texas. He randomly selected six rain dates at each site obtained the following data:

Alaska	Florida	Texas
5.11	4.87	5.46
5.01	4.18	6.29
4.90	4.40	5.57
5.14	4.67	5.15
4.80	4.89	5.45
5.24	4.09	5.30

Perform appropriate test to see whether there is a difference in the acidity of rain by state.

```
1: 5.46
2: 6.29
3: 5.57
4: 5.15
5: 5.45
6: 5.30
7:
Read 6 items
> y=c(A,F,T)
> y
 [1] 5.11 5.01 4.90 5.14 4.80 5.24 4.87 4.18
[16] 5.15 5.45 5.30
> x=c(rep("A",6),rep("F",6),rep("T",6))
Error: unexpected input in "x=c(rep(""
> x=c(rep("A",6),rep("F",6),rep("T",6))
> x
 [1] "A" "A" "A" "A" "A" "A" "F" "F" "F" "F"
> x=as.factor(x)
> data=data.frame(y,x)
> boxplot(y~x)
>
```



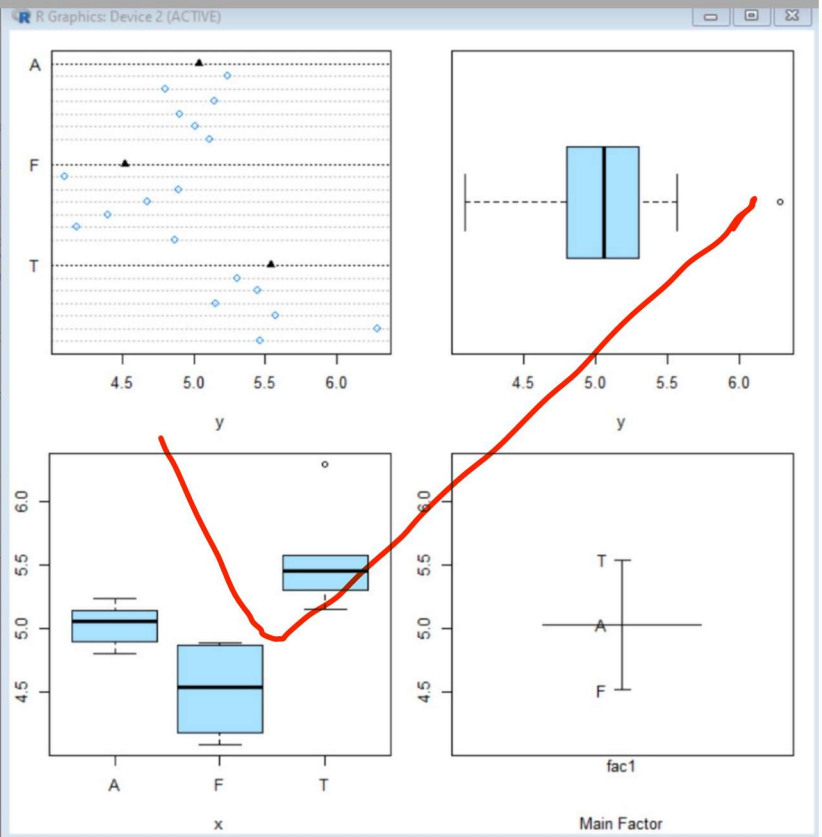
R Console

```
> x=as.factor(x)
> data=data.frame(y,x)
> boxplot(y~x)
> install.packages("PASWR")
Error: unexpected input in "install.packages
> install.packages("PASWR")
Error: unexpected input in "install.packages
> install.packages("PASWR")
Installing package into 'C:/Users/Zhang/AppD
(as 'lib' is unspecified)
--- Please select a CRAN mirror for use in t
trying URL 'https://cloud.r-project.org/bin/
Content type 'application/zip' length 387897
downloaded 378 KB

package 'PASWR' successfully unpacked and MD

The downloaded binary packages are in
        C:\Users\Zhang\AppData\Local\Temp\Rt
> library(PASWR)
Loading required package: lattice
Warning message:
package 'PASWR' was built under R version 4.
> oneway.plots(y,x)
>
```

R Graphics: Device 2 (ACTIVE)



```
> aov(y~x)
Call:
   aov(formula = y ~ x)

Terms:
                        x Residuals
Sum of Squares  3.121378  1.517000
Deg. of Freedom        2        15

Residual standard error: 0.3180147
Estimated effects may be unbalanced
> summary(aov(y~x))
            Df Sum Sq Mean Sq F value    Pr(>F)
x            2  3.121  1.5607   15.43 0.000229 ***
Residuals   15  1.517  0.1011
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
>
```

0.000229 is much smaller than 0.001, it has enough confidence to say there is a big difference.

2. A drug company tested three formulations of a pain relief medicine for migraine headache sufferers. For the experiment 27 volunteers were selected and 9 were randomly assigned to one of three drug formulations. The subjects were instructed to take the drug during their next migraine headache episode and to report their pain on a scale of 1 to 10 (10 being most pain).

Drug A: 4 5 4 3 2 4 3 4 4

Drug B: 6 8 4 5 4 6 5 8 6

Drug C: 6 7 6 6 7 5 6 5 5

Is there a significant difference among the drug types?

```
19 6 C
20 7 C
21 6 C
22 6 C
23 7 C
24 5 C
25 6 C
26 5 C
27 5 C
> summary(aov(y~x))
            Df Sum Sq Mean Sq F value   Pr(>F)
x            2  28.22  14.111   11.91 0.000256 ***
Residuals   24  28.44   1.185
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
>
```

There isn't a significant difference