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REG NO – 20BRS1262

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MATHS STATS LAB – 9

QUESTION 1

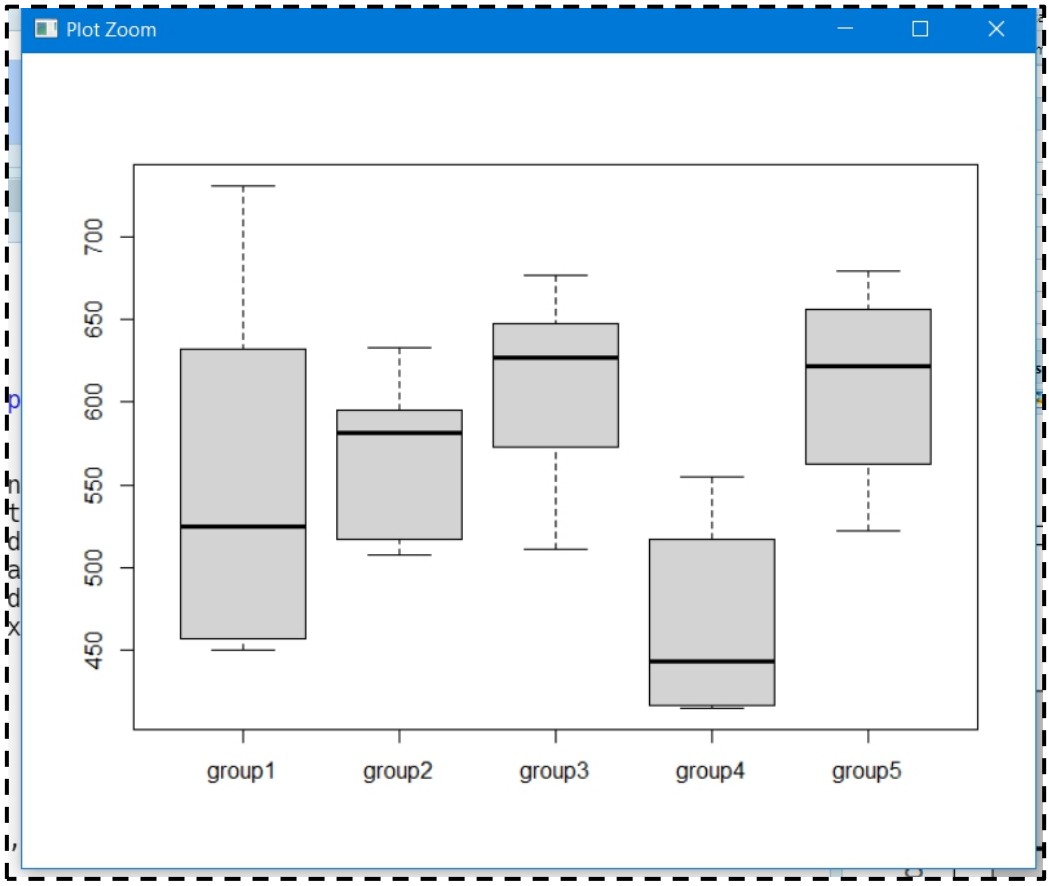
To find the ANOVA using CRD to test the null hypothesis (H0) against alternative hypothesis(H1) with level of significance, alpha=0.05.

Console Terminal Jobs

~/

```
> group1<-c(551,457,450,731,499,632)
> group2<-c(595,580,508,583,633,517)
> group3<-c(639,615,511,573,648,677)
> group4<-c(417,449,517,438,415,555)
> group5<-c(563,631,522,613,656,679)
> group<-data.frame(cbind(group1,group2,group3,group4,group5))
> summary(group)
     group1          group2          group3          group4          group5
 Min.   :450.0   Min.   :508.0   Min.   :511.0   Min.   :415.0   Min.   :522.0
 1st Qu.:467.5   1st Qu.:532.8   1st Qu.:583.5   1st Qu.:422.2   1st Qu.:575.5
 Median :525.0   Median :581.5   Median :627.0   Median :443.5   Median :622.0
 Mean   :553.3   Mean   :569.3   Mean   :610.5   Mean   :465.2   Mean   :610.7
 3rd Qu.:611.8   3rd Qu.:592.0   3rd Qu.:645.8   3rd Qu.:500.0   3rd Qu.:649.8
 Max.   :731.0   Max.   :633.0   Max.   :677.0   Max.   :555.0   Max.   :679.0
> stgr<-stack(group)
> crd<-aov(values~ind,data=stgr)
> summary(crd)
            Df Sum Sq Mean Sq F value  Pr(>F)
ind          4  85356   21339   4.302 0.00875 **
Residuals   25 124020    4961
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
> boxplot(group)
>
```

GRAPH

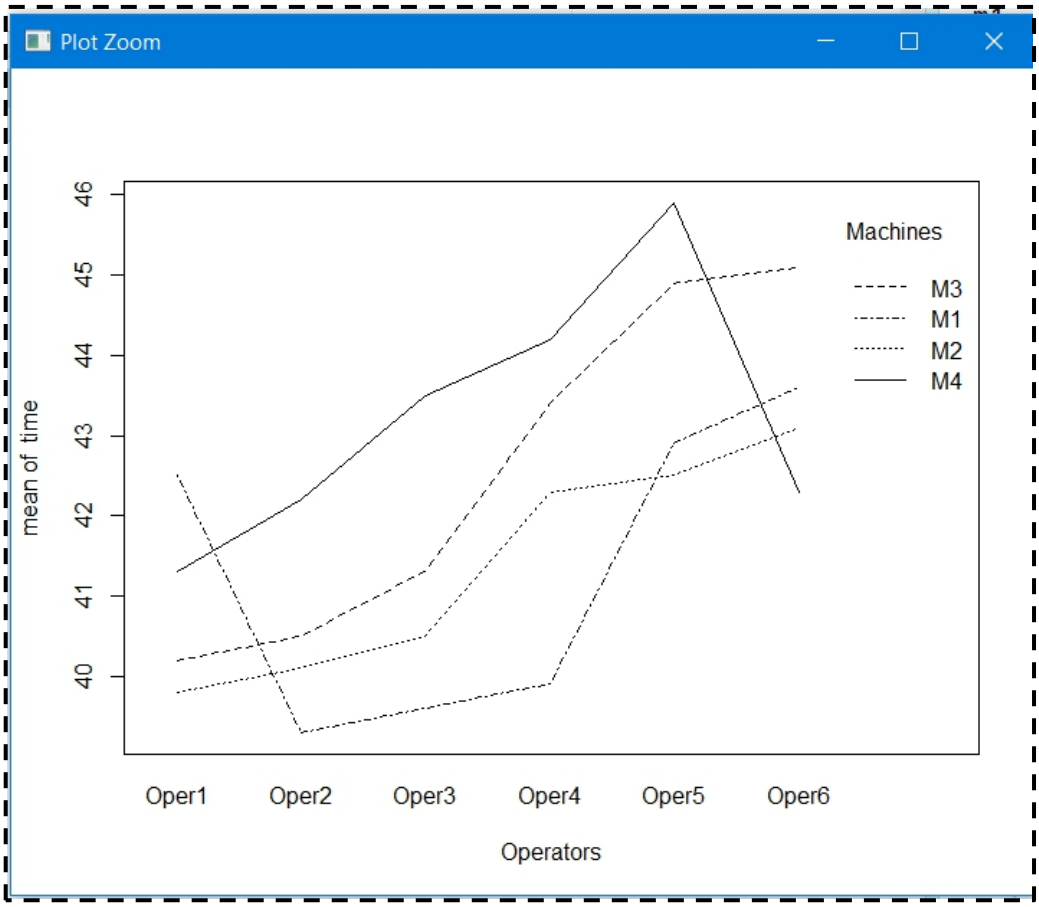


QUESTION 2

To find the ANOVA using RBD to test the null hypotheses against alternative hypotheses with level of significance, alpha=0.05.

```
Console   Terminal   Jobs
~/
> # Question 2
> #Two way anova
> m1<-c(42.5,39.3,39.6,39.9,42.9,43.6)
> m2<-c(39.8,40.1,40.5,42.3,42.5,43.1)
> m3<-c(40.2,40.5,41.3,43.4,44.9,45.1)
> m4<-c(41.3,42.2,43.5,44.2,45.9,42.3)
> data<-data.frame(m1,m2,m3,m4)
> data=t(data)
> #data<-read.table(file.choose(),header=TRUE)
> time=c(t(as.matrix(data)))
> f=c("Oper1","Oper2","Oper3","Oper4","Oper5","Oper6")
> g=c("M1","M2","M3","M4")
> k=ncol(data)
> n=nrow(data)
> Operators=gl(k,1,n*k,factor(f))  #Generate Factor Levels
> Machines=gl(n,k,n*k,factor(g))
> anova=aov(time ~ Machines + Operators)
> summary(anova)
            Df Sum Sq Mean Sq F value  Pr(>F)
Machines     3  15.92   5.308   3.339 0.04790 *
Operators    5  42.09   8.417   5.294 0.00533 **
Residuals   15  23.85   1.590
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
> interaction.plot(Operators,Machines,time)
>
```

GRAPH


Plot Zoom
mean of time
40
41
42
43
44
45
46
Machines
M3
M1
M2
M4
Oper1
Oper2
Oper3
Oper4
Oper5
Oper6
Operators