

MAT5007 – Applied Statistical Methods

Embedded Lab – *R* Statistical Software

FALL SEMESTER –
20222023L25+L26
SLOT

E-RECORD

Experiment No.: 10

Submitted By

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SITE



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Note: The codes are done in “repl it” environment because I was facing errors in Rstudio due to my laptop data being corrupted. Thank You for the considerations.

1. A company appoints 4 salesman (A, B, C & D) and observes their sales in 3 seasons (Summer, Winter & Monsoon). The figures (Rs. in Lakhs) are given in the following table.

	Treatments			
Seasons	A	B	C	D
Summer	36	36	21	35
Winter	28	29	31	32
Monsoon	26	28	29	29

Write down the R programming code to perform an analysis of variance at 5% level of significance.

The screenshot shows an R environment with a script editor on the left and a console on the right. The script editor contains the following R code:

```

1 w=c(36,28,26)
2 e=c(36,29,28)
3 r=c(21,31,29)
4 t=c(35,32,29)
5 df = data.frame(w,e,r,t)
6 print(df)
7
8 n=c(t(as.matrix(df)))
9 print(n)
10
11 fac = c('A', 'B', 'C', 'D')
12 jk = gl(4,1,4*3,factor(fac))
13 print(jk)
14
15 summary(aov(n~jk))

```

The console shows the output of the code, including the data frame, the matrix, the factor levels, and the ANOVA summary table:

```

> R -s -f main.r
w e r t
1 36 36 21 35
2 28 29 31 32
3 26 28 29 29
[1] 36 36 21 35 28 29 31 32 26 28 29
[1] A B C D A B C D A B C D
Levels: A B C D
Df Sum Sq Mean Sq F value
Pr(>F)
jk      3      42      14    0.667
  0.596
Residuals  8     168      21
> 

```

The p-value is 0.596(>0.05). So, at 5% significance level, we fail to reject the null hypothesis that the treatment effects are alike.

2. The following data resulted from an experiment to compare three burners (B1, B2 & B3). A Latin square design was used as the tests were made on 3 engines and were spread over 3 days.

	Engines		
Days	Engine 1	Engine 2	Engine 3
Day 1	B1 – 16	B2 – 17	B3 – 20
Day 2	B2 – 16	B3 – 21	B1 – 15
Day 3	B3 – 15	B1 – 12	B2 – 13

Write down the R programming code to test the hypothesis that there is no difference between (i). days, (ii). engines and (iii). burners at 5% level of significance.

```

R PRACTICE
rajatsingh1999

main.r x +
main.r
1 e1 = c(16,16,15)
2 e2 = c(17, 21, 12)
3 e3 = c(20,15,13)
4 df = data.frame(e1, e2, e3)
5 print(df)
6
7 v=c(t(as.matrix(df)))
8 print(v)
9
10 fac=c('eng1', 'eng2', 'eng3')
11 jk = gl(3,1,3*3,factor(fac))
12 print(jk)
13
14 km = gl(3,3,3*3)
15 print(km)
16
17 summary(aov(v~jk+km))

```

```

> R -s -f main.r
e1 e2 e3
1 16 17 20
2 16 21 15
3 15 12 13
[1] 16 17 20 16 21 15 15 12 13
[1] eng1 eng2 eng3 eng1 eng2 eng3 eng1 eng2 eng3
Levels: eng1 eng2 eng3
[1] 1 1 1 2 2 2 3 3 3
Levels: 1 2 3
          Df Sum Sq Mean Sq F value Pr(>F)
jk          2    1.56    0.778   0.096  0.911
km          2   34.89   17.444   2.151  0.232
Residuals    4   32.44    8.111
> 

```

The p-value is 0.911(>0.05). Hence, at 5% significance level, we fail to reject the null hypothesis that there is no significant difference between the engines.

The p-value is 0.232(0.05). Hence, at 5% significance level, we fail to reject the null hypothesis that there is no significant difference between the days