Laxmi Charitable Trust's
Sheth L.U.J College of Arts & Sir M.V. College of Science and Commerce Department of Information Technology (B.Sc.I.T Semester IV) Data Analysis with SAS/SPSS/R

Module II

Practical – VII

Roll No.: S001	Name: Soham Acharekar
Class: SYIT	Batch: 1
Date of Assignment: 17-01-2026	Date/Time of Submission: 17-01-2026

AIM: 7 Performing one-way ANOVA using aov() (R).

CODE:

```
# Load library
library(readxl)

StudentsMarks <- read_excel("StudentsMarks.xlsx")
View(StudentsMarks)

# Convert to factor
StudentsMarks$Teaching_Method <- as.factor(StudentsMarks$Teaching_Method)

# One-way ANOVA
anova1 <- aov(Marks ~ Teaching_Method, data =StudentsMarks)

# Result
summary(anova1)
```

OUTPUT:

Console | Terminal | Background Jobs

R 4.5.2 · C:/Users/info/Downloads/

```
> # Load library
> library(readxl)
> StudentsMarks <- read_excel("StudentsMarks.xlsx")
> View(StudentsMarks)
> # Convert to factor
> StudentsMarks$Teaching_Method <- as.factor(StudentsMarks$Teaching_Method)
> # One-way ANOVA
> anova1 <- aov(Marks ~ Teaching_Method, data =StudentsMarks)
> # Result
> summary(anova1)
                Df Sum Sq Mean Sq F value Pr(>F)
Teaching_Method  3    652   217.3    2.14 0.0953 .
Residuals       296  30062   101.6
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

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Module II

Practical – VIII

Roll No.: S001	Name: Soham Acharekar
Class: SYIT	Batch: 1
Date of Assignment: 17-01-2026	Date/Time of Submission: 17-01-2026

AIM: 8 Performing two-way ANOVA using aov() (R).
CODE:

```
# Load the readxl package to import Excel files
library(readxl)

# Read the Excel file
PlantsInfo <- read_excel("PlantsInfo.xlsx")
View(PlantsInfo)

# Convert categorical variables into factors (important for ANOVA)
PlantsInfo$Fertilizer <- as.factor(PlantsInfo$Fertilizer)
PlantsInfo$Water_Level <- as.factor(PlantsInfo$Water_Level)
PlantsInfo$Sunlight <- as.factor(PlantsInfo$Sunlight)

# Perform a three-way ANOVA:
anova2 <- aov(Growth_cm ~ Fertilizer * Water_Level * Sunlight, data = PlantsInfo)

# Display the ANOVA summary table
summary(anova2)
```

OUTPUT:

Console | Terminal | Background Jobs

R 4.5.2 · C:/Users/info/Downloads/

```
> # Load the readxl package to import Excel files
> library(readxl)
> # Read the Excel file
> PlantsInfo <- read_excel("PlantsInfo.xlsx")
> View(PlantsInfo)
> # Convert categorical variables into factors (important for ANOVA)
> PlantsInfo$Fertilizer <- as.factor(PlantsInfo$Fertilizer)
> PlantsInfo$Water_Level <- as.factor(PlantsInfo$Water_Level)
> PlantsInfo$Sunlight <- as.factor(PlantsInfo$Sunlight)
> # Perform a three-way ANOVA:
> anova2 <- aov(Growth_cm ~ Fertilizer * Water_Level * Sunlight, data = PlantsInfo)
> # Display the ANOVA summary table
> summary(anova2)
                               Df Sum Sq Mean Sq F value   Pr(>F)
Fertilizer                      2    239   119.6  12.631 4.88e-06 ***
Water_Level                     2    901   450.7  47.596  < 2e-16 ***
Sunlight                        1    420   419.7  44.325 9.69e-11 ***
Fertilizer:Water_Level          4     32     8.1   0.853    0.492
Fertilizer:Sunlight             2      5     2.5   0.260    0.771
Water_Level:Sunlight            2     13     6.3   0.665    0.515
Fertilizer:Water_Level:Sunlight 4     58    14.5   1.528    0.193
Residuals                     382   3617     9.5
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1
```

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Sheth L.U.J College of Arts & Sir M.V. College of Science and Commerce Department of Information Technology (B.Sc.I.T Semester IV) Data Analysis with SAS/SPSS/R

Module II

Practical – IX

Roll No.: S001	Name: Soham Acharekar
Class: SYIT	Batch: 1
Date of Assignment: 17-01-2026	Date/Time of Submission: 17-01-2026

AIM: 9 Conducting Chi-square tests using chisq.test() (R)

CODE:

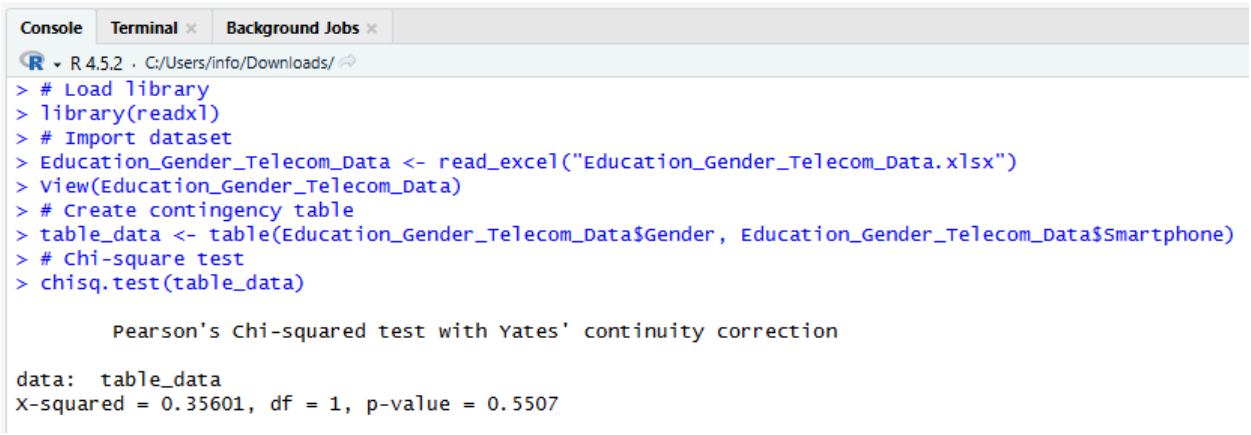
```
# Load library
library(readxl)

# Import dataset
Education_Gender_Telecom_Data <- read_excel("Education_Gender_Telecom_Data.xlsx")
View(Education_Gender_Telecom_Data)


# Create contingency table
table_data <- table(Education_Gender_Telecom_Data$Gender,
Education_Gender_Telecom_Data$Smartphone)

# Chi-square test
chisq.test(table_data)
```

OUTPUT:


Console
Terminal
Background Jobs
R 4.5.2 · C:/Users/info/Downloads/
> # Load library
> library(readxl)
> # Import dataset
> Education_Gender_Telecom_Data <- read_excel("Education_Gender_Telecom_Data.xlsx")
> View(Education_Gender_Telecom_Data)
> # Create contingency table
> table_data <- table(Education_Gender_Telecom_Data$Gender, Education_Gender_Telecom_Data$Smartphone)
> # Chi-square test
> chisq.test(table_data)
Pearson's Chi-squared test with Yates' continuity correction
data: table_data
X-squared = 0.35601, df = 1, p-value = 0.5507