

**SAVEETHA SCHOOL OF ENGINEERING**  
**SAVEETHA INSTITUTE OF MEDICAL AND TECHNICAL SCIENCES**  
**ITA 0443 - STATISTICS WITH R PROGRAMMING FOR REAL TIME PROBLEM**

**DAY 4– LAB MANUAL**

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**LINEAR REGRESSION ANALYSIS IN R**

**Exercise**

1. Using linear regression analysis establish a relationship between height and weight of a person using the input vector given below.

# Values of height

151, 174, 138, 186, 128, 136, 179, 163, 152, 131

# Values of weight.

63, 81, 56, 91, 47, 57, 76, 72, 62, 48

Predict the weight of a person with height 170. Visualize the regression graphically.

Code: height <- c(151, 174, 138, 186, 128, 136, 179, 163, 152, 131)

weight <- c(63, 81, 56, 91, 47, 57, 76, 72, 62, 48) data <-

data.frame(height, weight) model <- lm(weight ~ height, data = data)

new\_data <- data.frame(height = 170) predicted\_weight <-

predict(model, newdata = new\_data) cat("Predicted weight for a person

with height 170:", predicted\_weight)

plot(weight ~ height, data = data, main = "Linear Regression - Height vs. Weight", xlab = "Height", ylab = "Weight")

abline(model, col = "red") Output:

2. Download the Dataset "water" From Rdataset Link. Find out whether there is a linear relation between attributes "mortality" and "hardness" by plot function. Fit the Data into the Linear Regression model. Predict the mortality for the hardness=88

### **MULTIPLE REGRESSION ANALYSIS IN R**

Code:

```
data <- read.csv("https://vincentarelbundock.github.io/Rdatasets/csv/datasets/water.csv")  
  
head(data) ggplot(data, aes(x = hardness, y = mortality)) + geom_point() + labs(x =  
"Hardness", y = "Mortality") + ggtitle("Scatter Plot - Mortality vs. Hardness") model <-  
lm(mortality ~ hardness, data = data) new_data <- data.frame(hardness = 88)  
  
predicted_mortality <- predict(model, newdata = new_data) cat("Predicted mortality for  
hardness = 88:", predicted_mortality)
```

Output:

### **Exercise:**

3. Generate a multiple regression model using the built in dataset mtcars. It gives a comparison between different car models in terms of mileage per gallon (mpg), cylinder displacement("disp"), horse power("hp"), weight of the car("wt") and some more parameters.

Establish the relationship between "mpg" as a response variable with "disp", "hp" and "wt" as predictor variables. Predict the mileage of the car with dsp=221, hp=102 and wt=2.91.

Code:

```
data(mtcars)  
  
model <- lm(mpg ~ disp + hp + wt, data = mtcars) summary(model) new_data <-  
data.frame(disp = 221, hp = 102, wt = 2.91) predicted_mpg <- predict(model,
```

```
newdata = new_data) cat("Predicted mileage for disp = 221, hp = 102, and wt =  
2.91:", predicted_mpg) Output:
```

4. Consider the data set "delivery" available in the R environment. It gives a deliverytime ("delTime") of production materials (number of productions "n.prod") with the given distance ("distance") to reach the destination place.

a) Create the model to establish the relationship between "delTime" as a response variable with "n.prod" and "distance" as predictor variables.

b) Predict the delTime for the given number of  
production ("n.prod")=9 and distance ("distance")=450

Code:

```
data(mtcars) model <- lm(mpg ~ disp + hp + wt, data = mtcars) summary(model)  
new_data <- data.frame(disp = 221, hp = 102, wt = 2.91) predicted_mpg <-  
predict(model, newdata = new_data) cat("Predicted mileage for disp = 221, hp =  
102, and wt = 2.91:", predicted_mpg)
```

Output:

