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.

SOURCE CODE:

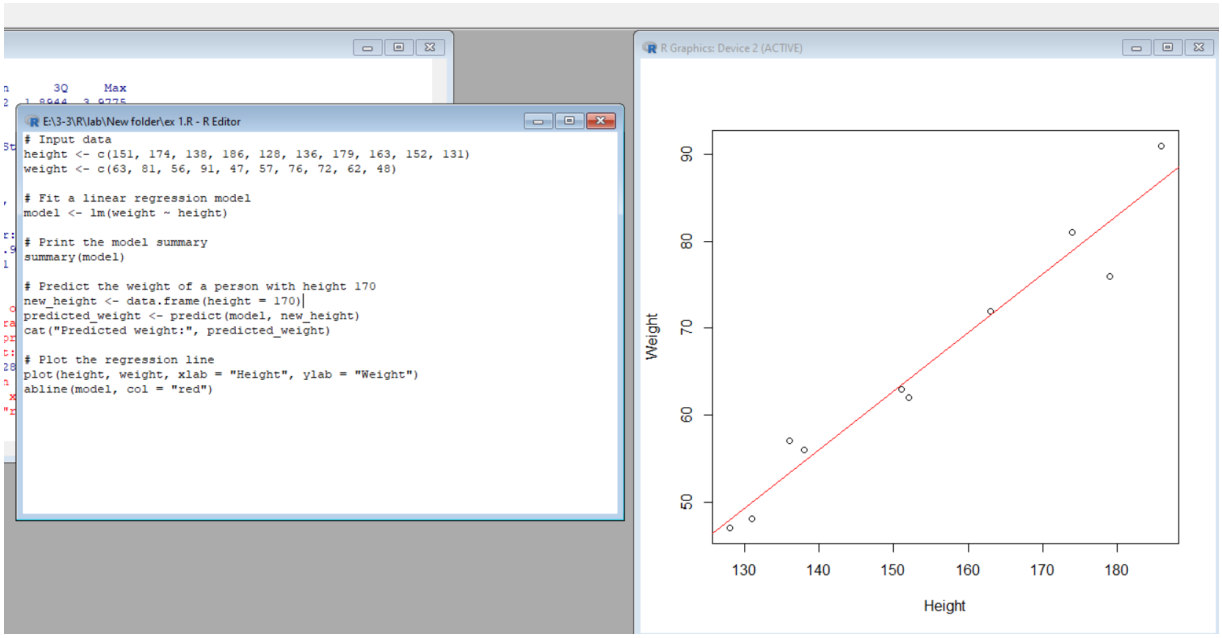
```
# Input data
height <- c(151, 174, 138, 186, 128, 136, 179, 163, 152, 131)
weight <- c(63, 81, 56, 91, 47, 57, 76, 72, 62, 48)

# Fit a linear regression model
model <- lm(weight ~ height)

# Print the model summary
summary(model)
```

```
# Predict the weight of a person with height 170
new_height <- data.frame(height = 170)
predicted_weight <- predict(model, new_height)
cat("Predicted weight:", predicted_weight)

# Plot the regression line
plot(height, weight, xlab = "Height", ylab = "Weight")
abline(model, col = "red")
```



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.

SOURCE CODE:

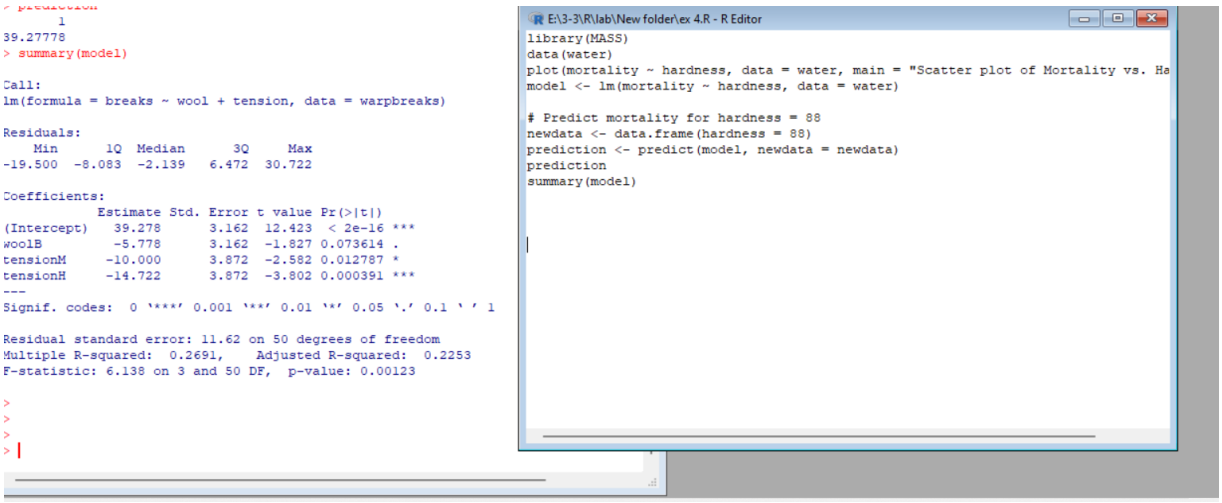
```
library(MASS)
data(water)
plot(mortality ~ hardness, data = water, main = "Scatter plot of Mortality vs. Hardness")
model <- lm(mortality ~ hardness, data = water)

# Predict mortality for hardness = 88
newdata <- data.frame(hardness = 88)
```

prediction <- predict(model, newdata = newdata)

prediction

summary(model)



MULTIPLE REGRESSION ANALYSIS IN R

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.

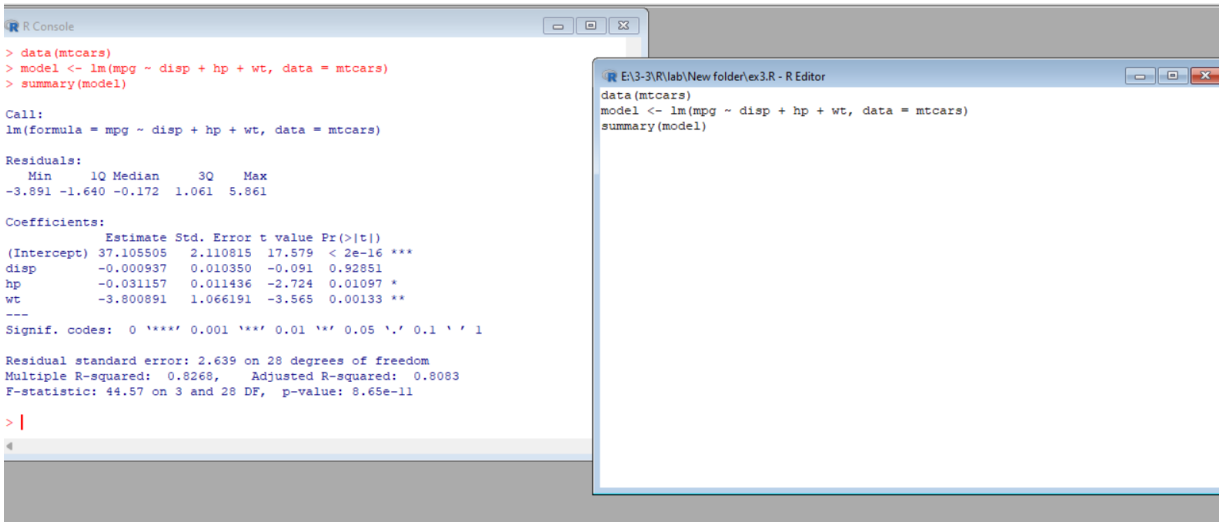
Establish the relationship between "mpg" as a response variable with "disp","hp" and "wt" as predictor variables. Predict the mileage of the car with dsp=221,hp=102 and wt=2.91.

SOURCE CODE:

data(mtcars)

model <- lm(mpg ~ disp + hp + wt, data = mtcars)

summary(model)



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

SOURCE CODE:

```
# Load the "delivery" dataset
data(delivery)

# Fit the linear regression model
model <- lm(breaks ~ wool + tension, data = warpbreaks)

# Predict breaks for wool = A and tension = low
newdata <- data.frame(wool = "A", tension = "L")
prediction <- predict(model, newdata = newdata)

# Print the predicted breaks
prediction

summary(model)
```

```
>
> # Fit the linear regression model
> model <- lm(breaks ~ wool + tension, data = warpbreaks)
>
> # Predict breaks for wool = A and tension = low
> newdata <- data.frame(wool = "A", tension = "L")
> prediction <- predict(model, newdata = newdata)
>
> # Print the predicted breaks
> prediction
       1
39.27778
>
> summary(model)

Call:
lm(formula = breaks ~ wool + tension, data = warpbreaks)

Residuals:
    Min      1Q  Median      3Q     Max
-19.500  -8.083  -2.139   6.472  30.722

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)   39.278      3.162  12.423  < 2e-16 ***
woolB         -5.778      3.162  -1.827 0.073614 .
tensionM     -10.000      3.872  -2.582 0.012787 *
tensionH     -14.722      3.872  -3.802 0.000391 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 11.62 on 50 degrees of freedom
Multiple R-squared:  0.2691,    Adjusted R-squared:  0.2253
F-statistic: 6.138 on 3 and 50 DF,  p-value: 0.00123

>
```

E:\3-3\R\lab\New folder\ex 4.R - R Editor

```
# Load the "delivery" dataset
data(delivery)

# Fit the linear regression model
model <- lm(breaks ~ wool + tension, data = warpbreaks)

# Predict breaks for wool = A and tension = low
newdata <- data.frame(wool = "A", tension = "L")
prediction <- predict(model, newdata = newdata)

# Print the predicted breaks
prediction

summary(model)
```