

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.

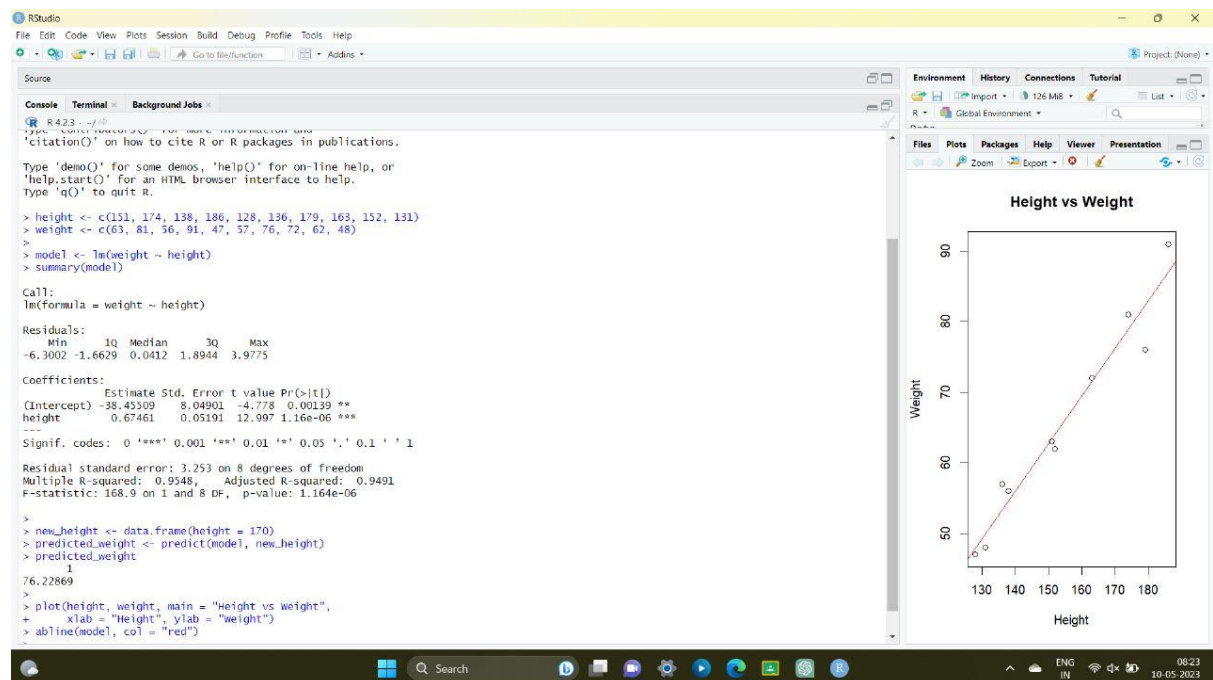
Values of height

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

Values of weight.

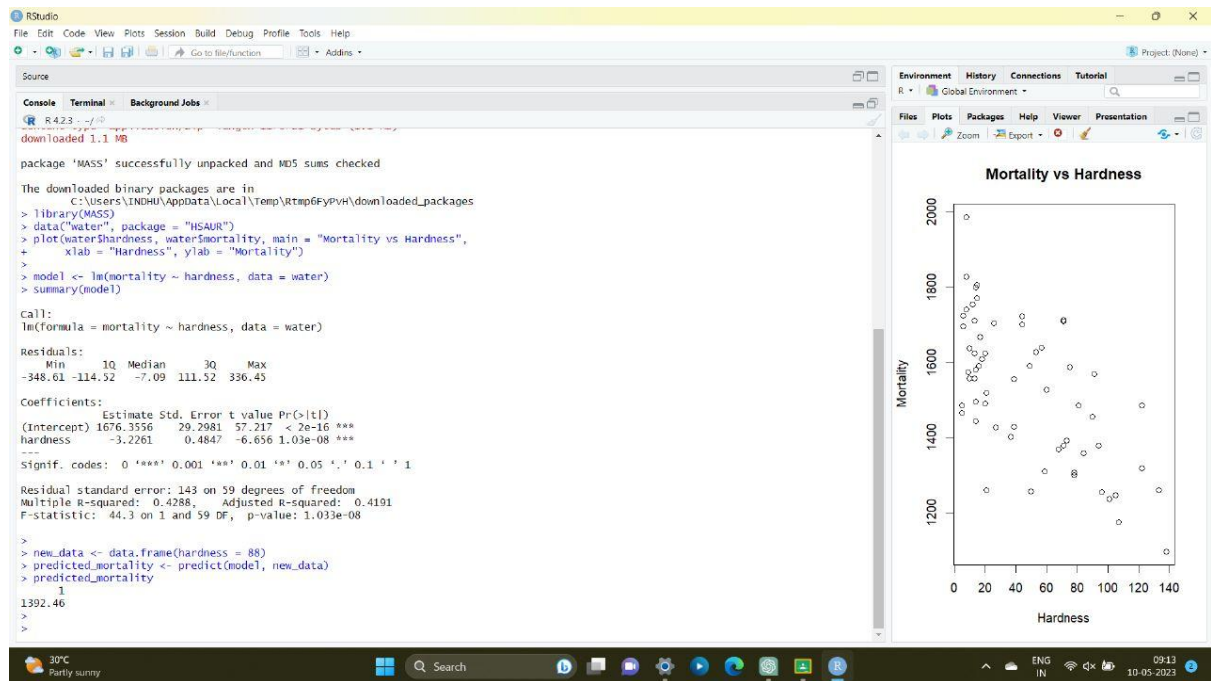
63, 81, 56, 91, 47, 57, 76, 72, 62, 48

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



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



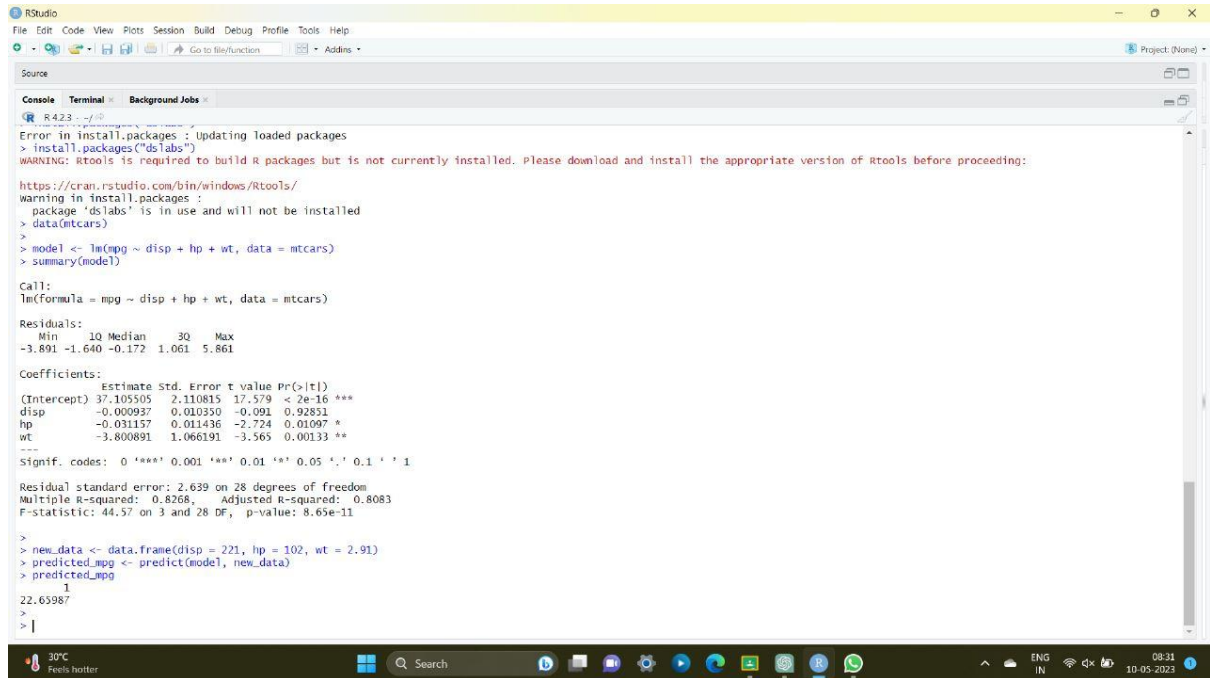
MULTIPLE REGRESSION ANALYSIS IN R

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`.



```
R 4.2.3 ~ /
File Edit Code View Plots Session Build Debug Profile Tools Help
Source
Console Terminal Background Jobs
> install.packages("ds1labs")
Error in install.packages : Updating loaded packages
Warning in install.packages :
  package 'ds1labs' is in use and will not be installed
WARNING: Rtools is required to build R packages but is not currently installed. Please download and install the appropriate version of Rtools before proceeding:
https://cran.rstudio.com/bin/windows/Rtools/
> data(mtcars)
> model <- lm(mpg ~ disp + hp + wt, data = mtcars)
> summary(model)

Call:
lm(formula = mpg ~ disp + hp + wt, data = mtcars)

Residuals:
    Min       1Q   Median       3Q      Max
-3.891 -1.640 -0.172  1.061  5.861

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept)  37.105505   2.110815  17.579  < 2e-16 ***
disp         -0.000937   0.010350  -0.091  0.92851
hp           -0.031157   0.011436  -2.724  0.01097 *
wt          -3.800891   1.066191  -3.565  0.00133 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 2.639 on 28 degrees of freedom
Multiple R-squared:  0.8268, Adjusted R-squared:  0.8083
F-statistic: 44.57 on 3 and 28 DF, p-value: 8.65e-11

> new_data <- data.frame(disp = 221, hp = 102, wt = 2.91)
> predicted_mpg <- predict(model, new_data)
> predicted_mpg
[1]
22.63987
>
> |
```

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

```
RStudio
File Edit Code View Plots Session Build Debug Profile Tools Help
Go to file/function Addins Project: (None)

Source
Console Terminal Background Jobs

R 4.2.3 ~ /

Call:
lm(formula = mortality ~ hardness, data = water)

Residuals:
    Min       1Q   Median       3Q      Max
-348.61 -114.52  -7.09   111.52   336.45

Coefficients:
            Estimate Std. Error t value Pr(>|t|)
(Intercept) 1676.3556     29.2981   57.217  < 2e-16 ***
hardness     -3.2261       0.4847   -6.656 1.03e-08 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 143 on 59 degrees of freedom
Multiple R-squared:  0.4288,    Adjusted R-squared:  0.4191
F-statistic: 44.3 on 1 and 59 DF,  p-value: 1.033e-08

>
> new_data <- data.frame(hardness = 88)
> predicted_mortality <- predict(model, new_data)
> predicted_mortality
      1
1392.46
>
> data(delivery)
Warning message:
In data(delivery) : data set 'delivery' not found
>
> model <- lm(delTime ~ n.prod + distance, data = delivery)
Error in ls.data.frame(data) : object 'delivery' not found
> data(delivery)

model <- lm(delTime ~ n.prod + distance, data = delivery)
summary(model)

new_data <- data.frame(n.prod = 9, distance = 450)
predicted_delTime <- predict(model, new_data)
predicted_delTime
|
```