

Exp. No : 7

Implementing Linear and Logistic Regression

a) Linear Regression

```
# Sample data
```

```
heights <- c(150, 160, 165, 170, 175, 180, 185)
```

```
weights <- c(55, 60, 62, 68, 70, 75, 80)
```

```
# Create a data frame
```

```
data <- data.frame(heights, weights)
```

```
# Fit a linear regression model
```

```
linear_model <- lm(weights ~ heights, data = data)
```

```
# Print the summary of the model
```

```
print(summary(linear_model))
```

```
# Plotting the data and regression line
```

```
plot(data$heights, data$weights,
```

```
    main = "Linear Regression: Weight vs. Height",
```

```
    xlab = "Height (cm)",
```

```
    ylab = "Weight (kg)",
```

```
    pch = 19, col = "blue")
```

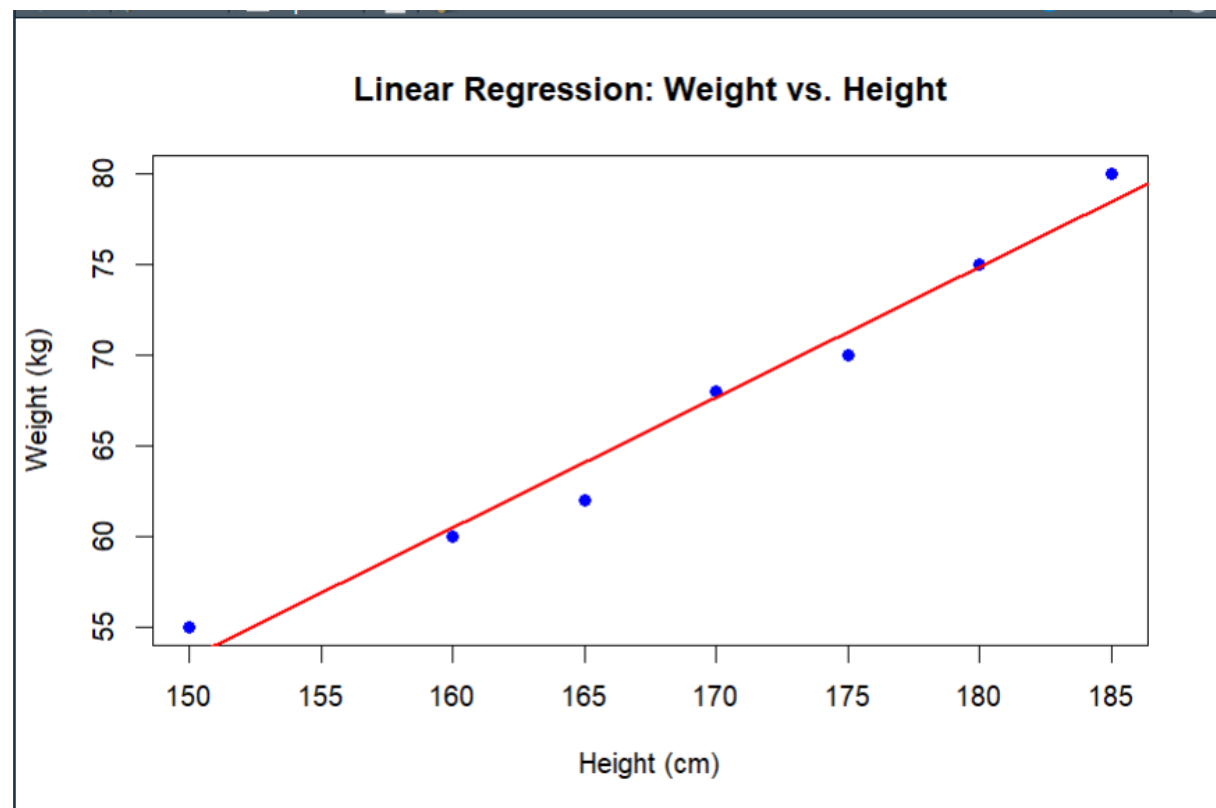
```
# Add regression line
```

```
abline(linear_model, col = "red", lwd = 2)
```

Output:

```
Console Terminal x Background Jobs x
R 4.4.1 · ~/
Residual standard error: 1.521 on 5 degrees of freedom
Multiple R-squared: 0.9749, Adjusted R-squared: 0.9699
F-statistic: 194.1 on 1 and 5 DF, p-value: 3.424e-05

> # Plotting the data and regression line
> plot(data$heights, data$weights,
+      main = "Linear Regression: Weight vs. Height",
+      xlab = "Height (cm)",
+      ylab = "Weight (kg)",
+      pch = 19, col = "blue")
> # Add regression line
> abline(linear_model, col = "red", lwd = 2)
>
```



b) Logistic Regression

```
# Load the dataset
data(mtcars)

# Convert 'am' to a factor (categorical variable)
mtcars$am <- factor(mtcars$am, levels = c(0, 1), labels = c("Automatic",
"Manual"))

# Fit a logistic regression model
logistic_model <- glm(am ~ mpg, data = mtcars, family = binomial)

# Print the summary of the model
print(summary(logistic_model))

# Predict probabilities for the logistic model
predicted_probs <- predict(logistic_model, type = "response")

# Display the predicted probabilities
print(predicted_probs)

# Plotting the data and logistic regression curve
plot(mtcars$mpg, as.numeric(mtcars$am) - 1,
main = "Logistic Regression: Transmission vs. MPG",
xlab = "Miles Per Gallon (mpg)",
ylab = "Probability of Manual Transmission",
pch = 19, col = "blue")

# Add the logistic regression curve
curve(predict(logistic_model, data.frame(mpg = x), type = "response"),
add = TRUE, col = "red", lwd = 2)
```

Output:

Residual deviance: 29.675 on 50 degrees of freedom
 AIC: 33.675

Number of Fisher Scoring iterations: 5

Mazda RX4	Mazda RX4 Wag	Datsun 710
0.46109512	0.46109512	0.59789839
Hornet 4 Drive	Hornet Sportabout	Valiant
0.49171990	0.29690087	0.25993307
Duster 360	Merc 240D	Merc 230
0.09858705	0.70846924	0.59789839
Merc 280	Merc 280C	Merc 450SE
0.32991148	0.24260966	0.17246396
Merc 450SL	Merc 450SLC	Cadillac Fleetwood
0.21552479	0.12601104	0.03197098
Lincoln Continental	Chrysler Imperial	Fiat 128
0.03197098	0.11005178	0.96591395
Honda Civic	Toyota Corolla	Toyota Corona
0.93878132	0.97821971	0.49939484
Dodge Challenger	AMC Javelin	Camaro Z28
0.13650937	0.12601104	0.07446438
Pontiac Firebird	Fiat X1-9	Porsche 914-2
0.32991148	0.85549212	0.79886349
Lotus Europa	Ford Pantera L	Ferrari Dino
0.93878132	0.14773451	0.36468861
Maserati Bora	Volvo 142E	
0.11940215	0.49171990	

