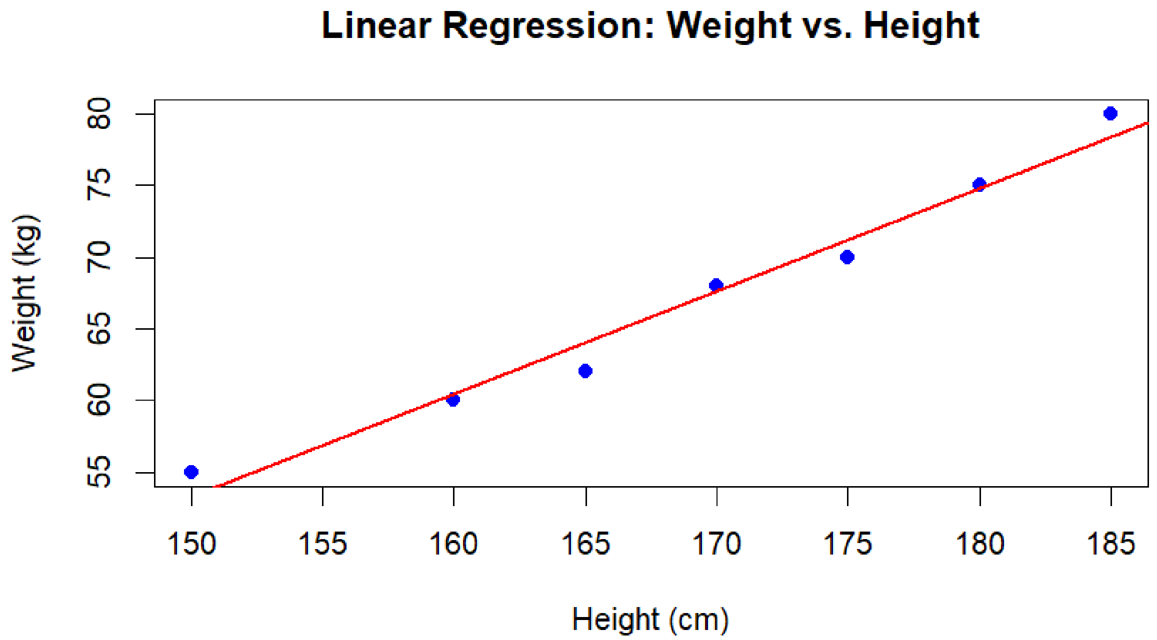
Exp:7

Implement Linear and Logistic Regression

a) <u>Linear regression</u>

```
# 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)
```

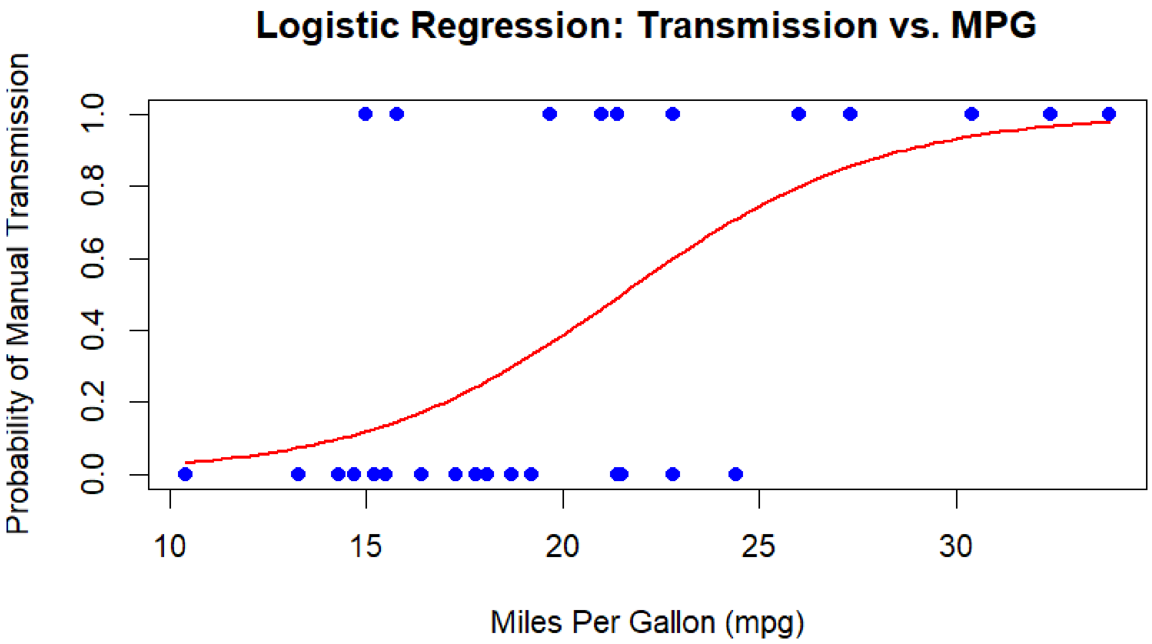
```
> # Sample data
> heights <- c(150, 160, 165, 170, 175, 180, 185)
> weights <- c(55, 60, 62, 68, 70, 75, 80)
> # Create a data frame
> data <- data.frame(heights, weights)
> # Fit a linear regression model
> linear_model <- lm(weights ~ heights, data = data)
> # Print the summary of the model
> print(summary(linear_model))

Call:
lm(formula = weights ~ heights, data = data)

Residuals:
      1       2       3       4       5       6       7 
 1.7049 -0.4754 -2.0656  0.3443 -1.2459  0.1639  1.5738 

Coefficients:
             Estimate Std. Error t value Pr(>|t|)    
(Intercept) -54.40984    8.74376  -6.223  0.00157 ** 
heights       0.71803    0.05154  13.932 3.42e-05 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 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
```


Linear Regression: Weight vs. Height
Weight (kg)
55
60
65
70
75
80
150
155
160
165
170
175
180
185
Height (cm)

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)
```

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


Logistic Regression: Transmission vs. MPG
Probability of Manual Transmission
0.0
0.2
0.4
0.6
0.8
1.0
10
15
20
25
30
Miles Per Gallon (mpg)