Exp. No : 7

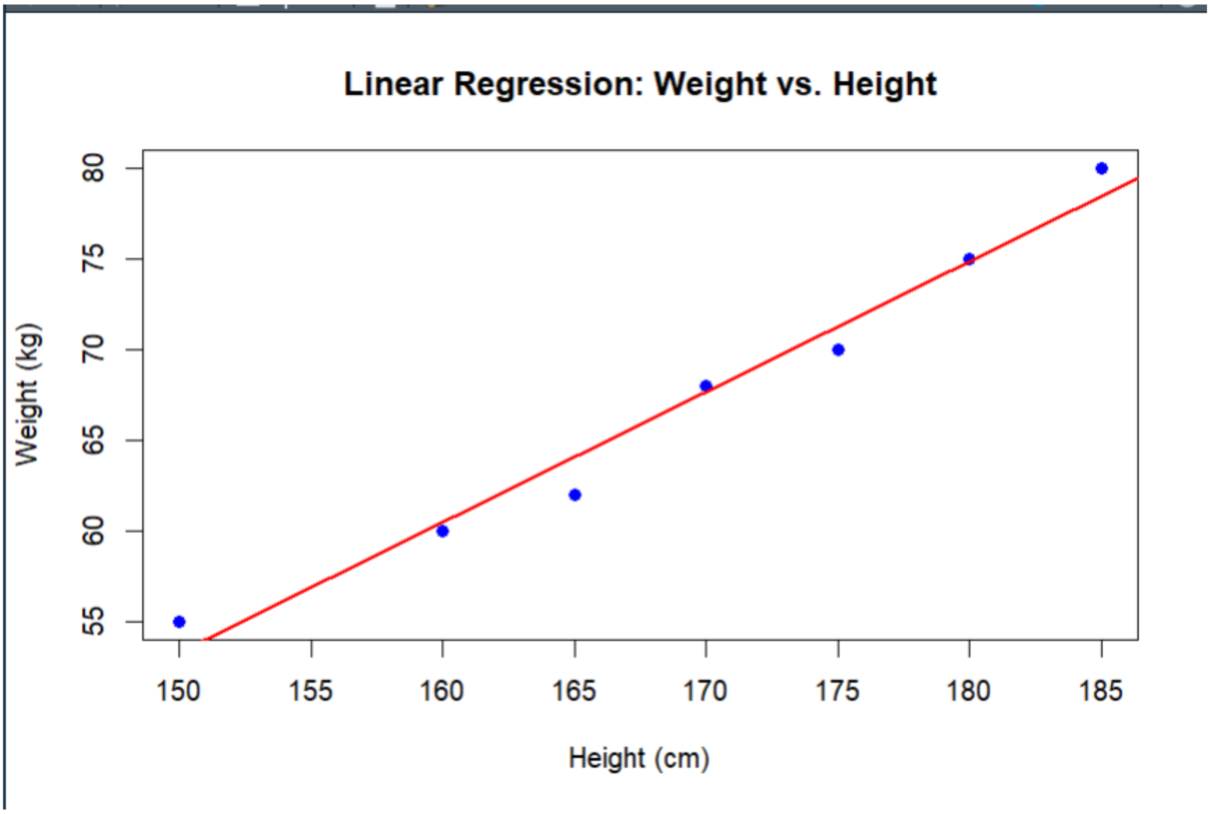
Implementing Linear and Logistic Regression

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:

```
> data(mtcars)
> mtcars$am <- factor(mtcars$am, levels = c(0, 1), labels = c("Automatic", "Manual"))
> logistic_model <- glm(am ~ mpg, data = mtcars, family = binomial)
> print(summary(logistic_model))

Call:
glm(formula = am ~ mpg, family = binomial, data = mtcars)

Coefficients:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)  -6.6035     2.3514  -2.808  0.00498 **
mpg           0.3070     0.1148   2.673  0.00751 **
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 43.230  on 31  degrees of freedom
Residual deviance: 29.675  on 30  degrees of freedom
AIC: 33.675

Number of Fisher Scoring iterations: 5

> predicted_probs <- predict(logistic_model, type = "response")
> 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
>
```



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:

```
RStudio
File  Edit  Code  View  Plots  Session  Build  Debug  Profile  Tools  Help
Go to file/function    Addins
Console   Terminal   Background Jobs
R 4.4.1 · ~/
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mpg           0.3070     0.1148   2.673  0.00751 **
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> |
```