Linear and Logistic Regression

AIM:

To implement linear and logistic regression using R.

Linear Regression:

PROGRAM:

```
# 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)
```

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```r
# 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:

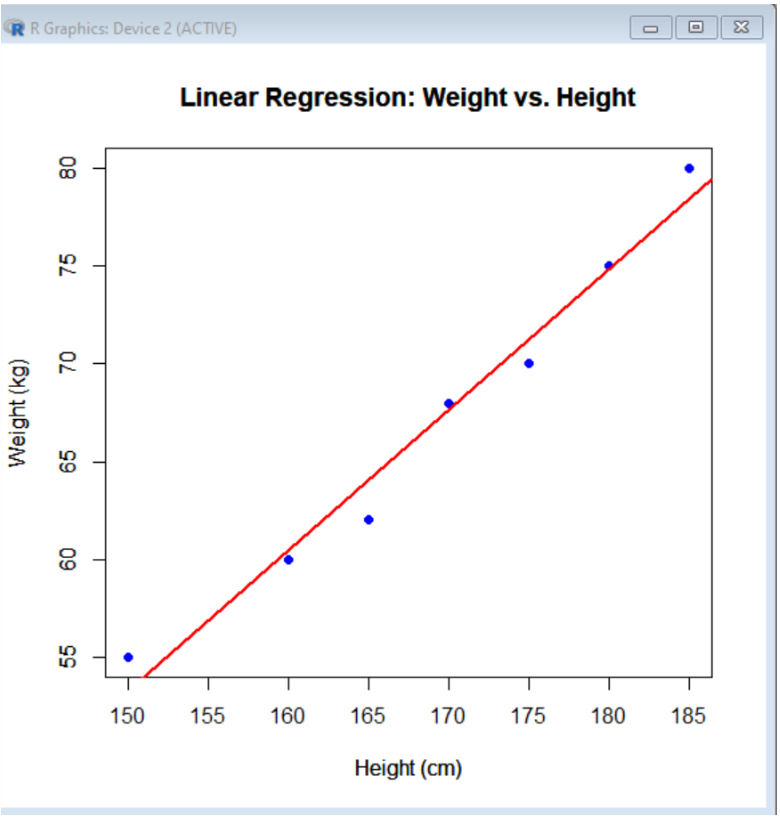
```
> source('C:/Semester7/DataAnalytics/Lab/Ex7/Linearregression.R')

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
```



Logistic Regression:

PROGRAM:

```
# 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)
```

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```r
# Load the dataset
data(mtcars)

# Convert 'am' to a factor (categorical variable)
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# Fit a logistic regression model
logistic_model <- glm(am ~ mpg, data = mtcars, family = binomial)

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print(summary(logistic_model))

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

# Display the predicted probabilities
print(predicted_probs)

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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)
```
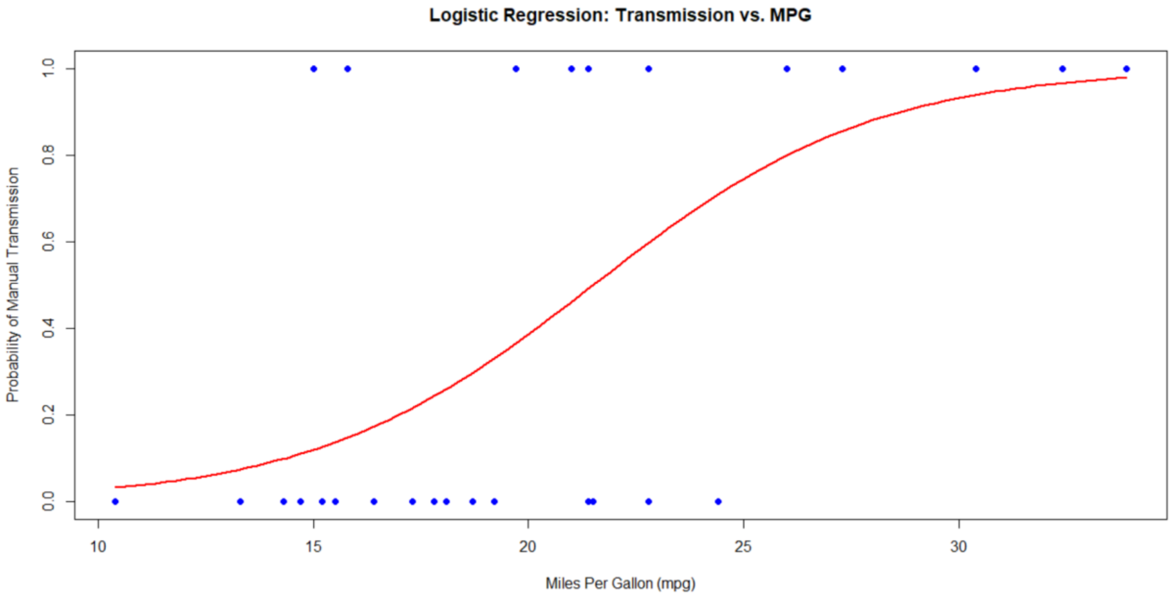

OUTPUT:

```
> source("C:/Semester7/DataAnalytics/Lab/Ex7/LogisticRegression.R")

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

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



RESULT:

Thus, linear regression and logistic regression are implemented successfully using R.