Logistic Regression

```
# Load the dataset and select specific columns
input <- mtcars[, c("mpg", "disp", "hp", "wt")]

# Create a binary variable for fuel efficiency
input$fuel_efficient <- ifelse(input$mpg > 20, 1, 0)

# Perform logistic regression
logistic_model <- glm(fuel_efficient ~ disp + hp + wt, data = input, family = binomial)

# Show the model summary
summary(logistic_model)

# Get the predicted probabilities
predicted_prob <- predict(logistic_model, type = "response")

# Create a confusion matrix to evaluate the model
predicted_class <- ifelse(predicted_prob > 0.5, 1, 0)
table(Predicted = predicted_class, Actual = input$fuel_efficient)

# Plotting the actual vs predicted probabilities
plot(input$fuel_efficient, predicted_prob, col="red", main="Actual vs Predicted Probabilities",
     cex=1.3, pch=16, xlab="Actual Fuel Efficiency", ylab="Predicted Probability")

# Add a horizontal line at 0.5 to indicate the threshold
abline(h=0.5, col="blue")
```

```
    data = input)

Coefficients:
             Estimate Std. Error z value Pr(>|z|)
(Intercept)  6.223e+02  3.581e+05   0.002    0.999
disp         2.644e-01  3.526e+02   0.001    0.999
hp          -1.329e+00  8.554e+02  -0.002    0.999
wt          -1.627e+02  1.029e+05  -0.002    0.999

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 4.3860e+01  on 31  degrees of freedom
Residual deviance: 5.4187e-09  on 28  degrees of freedom
AIC: 8

Number of Fisher Scoring iterations: 25
```

```
> # Create a confusion matrix to evaluate the model
> predicted_class <- ifelse(predicted_prob > 0.5, 1, 0)
> table(Predicted = predicted_class, Actual = input$fuel_efficient)
         Actual
Predicted  0  1
        0 18  0
        1  0 14

> # Plotting the actual vs predicted probabilities
> plot(input$fuel_efficient, predicted_prob, col="red", main="Actual vs Predicted
Probabilities",
+      cex=1.3, pch=16, xlab="Actual Fuel Efficiency", ylab="Predicted Probabilit
y")

> # Add a horizontal line at 0.5 to indicate the threshold
> abline(h=0.5, col="blue")
```