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Simple Linear Regression

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```
close all;clear;clc
```

2a)

Load the data set

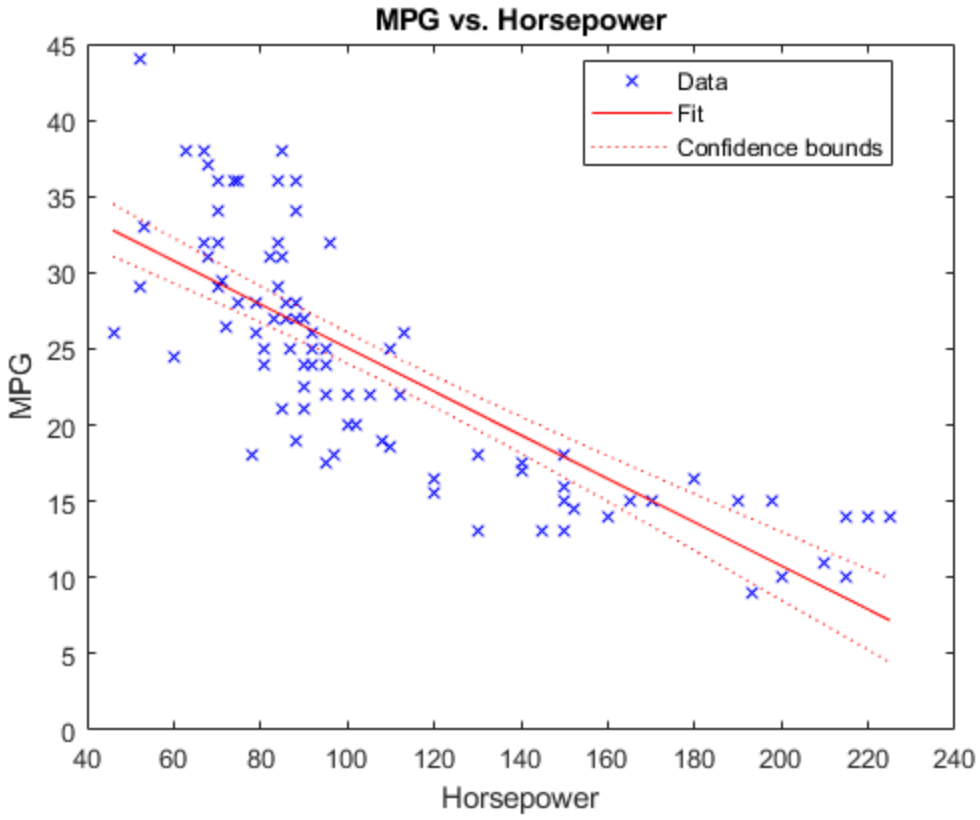
```
load carsmall
ds = table(Horsepower,MPG,'VariableNames',{'Horsepower','MPG'});

% Fit the simple lineare model
lin_mod = fitlm(ds);

% Display the results of the estimation
disp(lin_mod)

% Prediction for Horsepower = 98 with confidence and prediction interval
[pred,predCI] = lin_mod.predict(98);
[~,predPI] = lin_mod.predict(98,'Prediction','observation');
```

```
Linear regression model:
    MPG ~ 1 + Horsepower

Estimated Coefficients:
                   Estimate       SE        tStat       pValue
                   ________    ________    ________    __________

    (Intercept)     39.362       1.3169     29.889    7.7492e-49
    Horsepower      -0.143     0.011134    -12.844    3.7813e-22


Number of observations: 93, Error degrees of freedom: 91
Root Mean Squared Error: 4.84
R-squared: 0.644,  Adjusted R-Squared: 0.641
F-statistic vs. constant model: 165, p-value = 3.78e-22
```

2b)

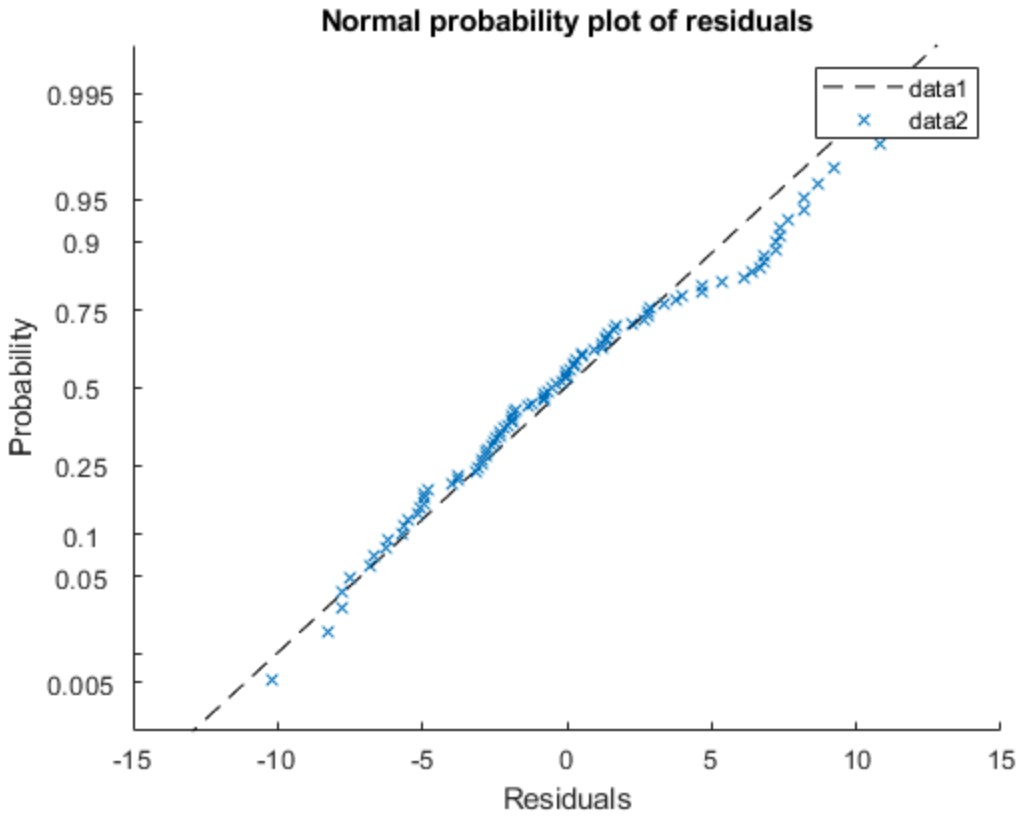
```
%Plot the training data and the regression model with confidence bounds
```

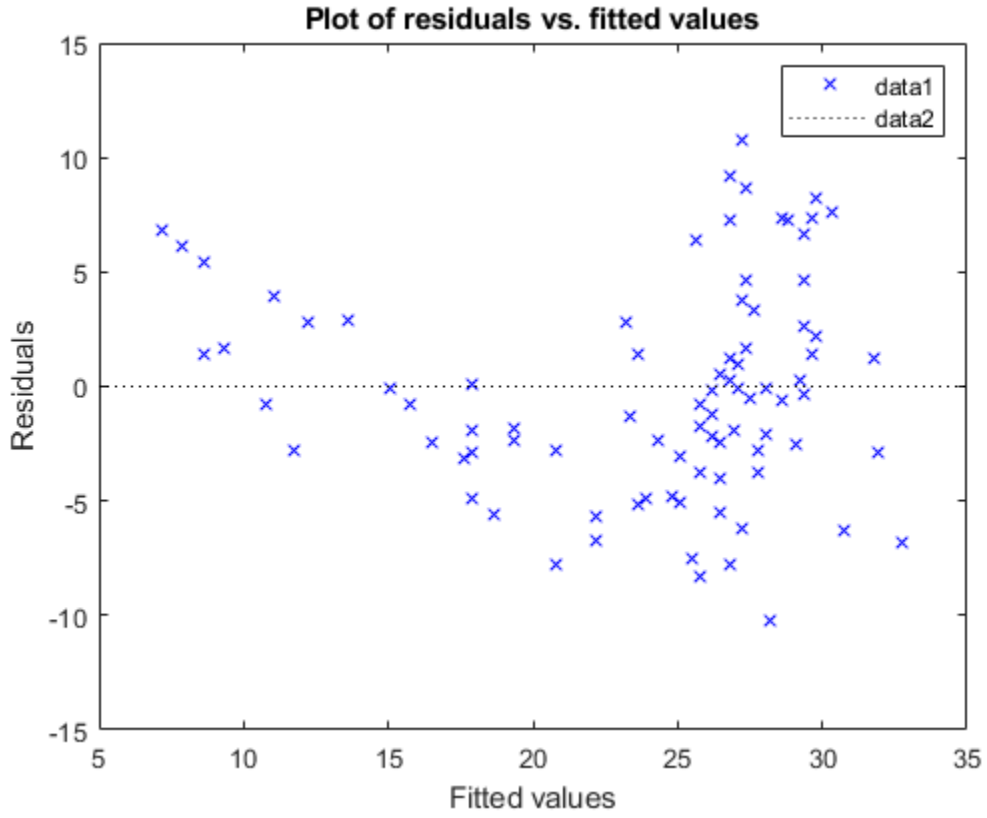
```
figure(1)
plot(lin_mod)
```

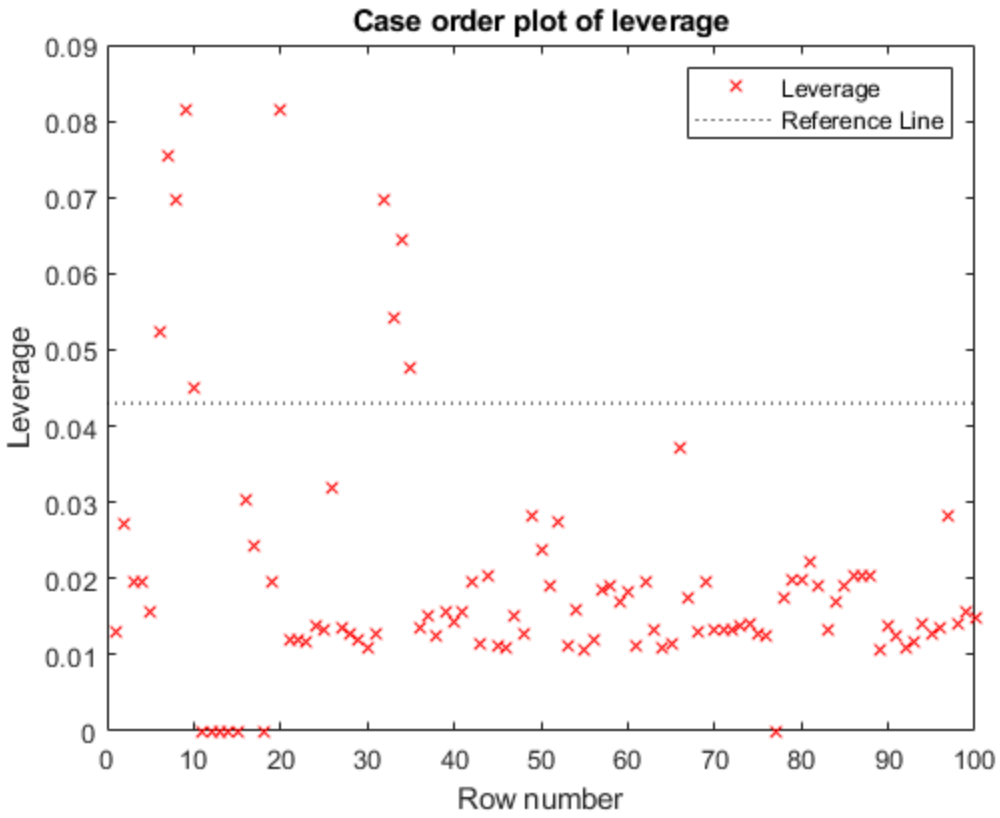


2c)

```
% Diagnostic plots
figure(2)
plotResiduals(lin_mod,'probability')
legend('show')
figure(3)
plotResiduals(lin_mod,'fitted')
legend('show')
figure(4)
plotDiagnostics(lin_mod)
legend('show')
```


Normal probability plot of residuals
data1
data2
0.995
0.95
0.9
0.75
0.5
0.25
0.1
0.05
0.005
Probability
-15
-10
-5
0
5
10
15
Residuals


Plot of residuals vs. fitted values
data1
data2
15
10
5
0
-5
-10
-15
Residuals
5
10
15
20
25
30
35
Fitted values



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