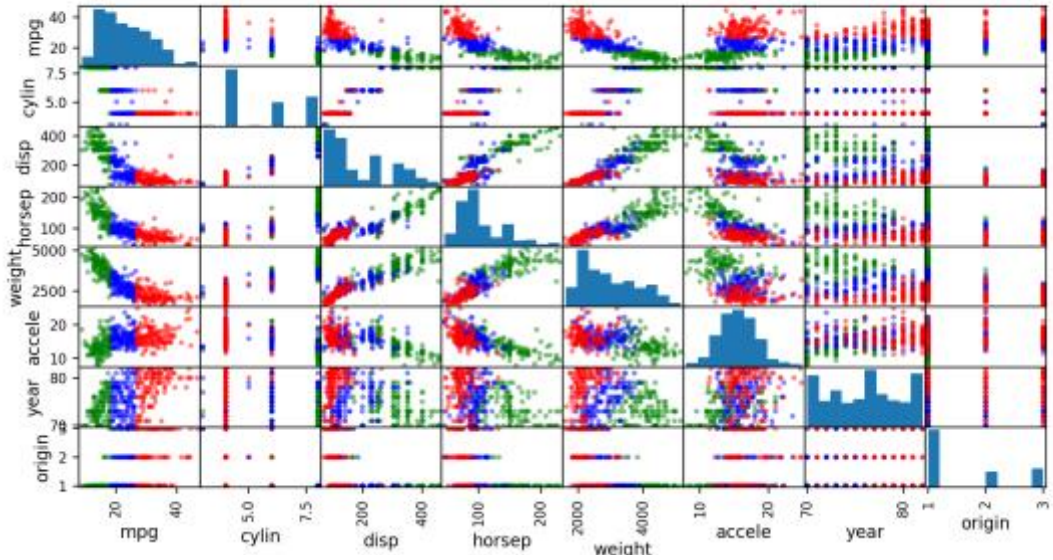
Fall 2017
ECS171 HW1
Gabriel Yin
999885129

Problem 1

The dataset (392 samples) can be divided into three sets so that low has 130 elements, medium has 131 elements and high has 131 elements. Threshold for low to medium is 18.6 and from medium to high is 26.8.

Problem 2

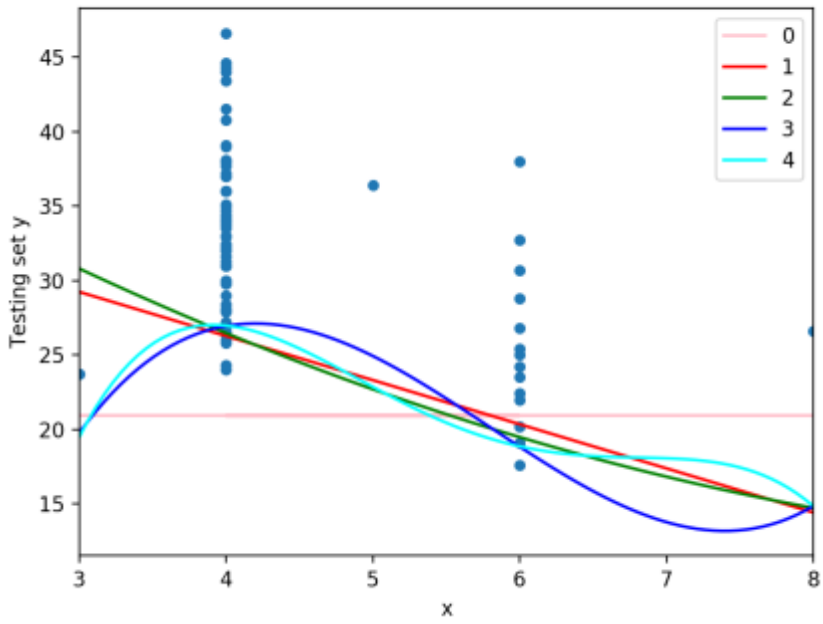


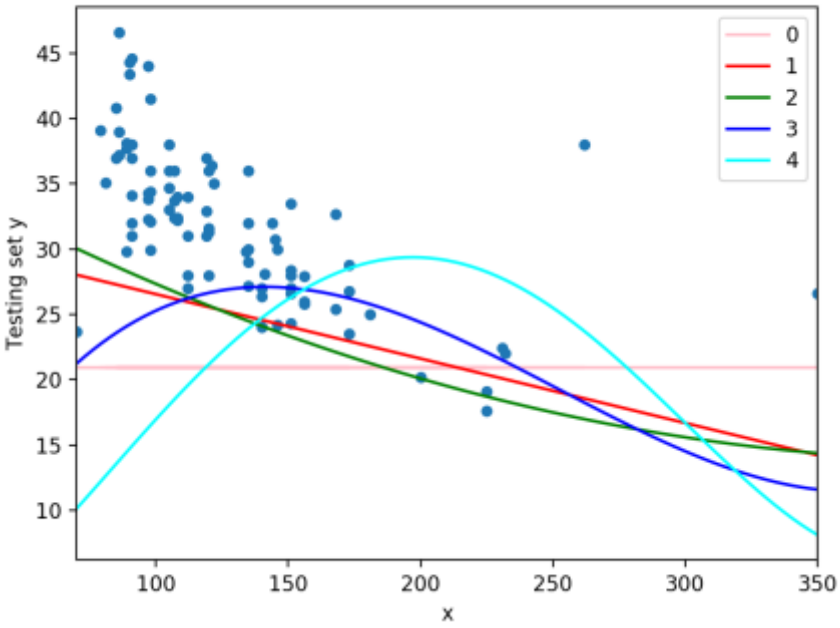
From the chart above, we can see that displacement and horsepower and weight and accelerations and year are the informative ones. Among them, horsepower is the most informative one.

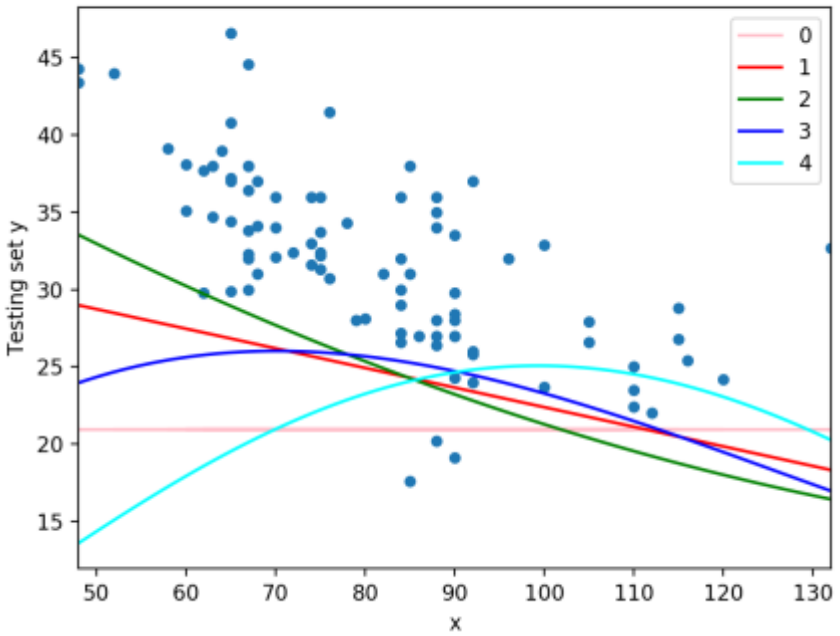
Problem 3

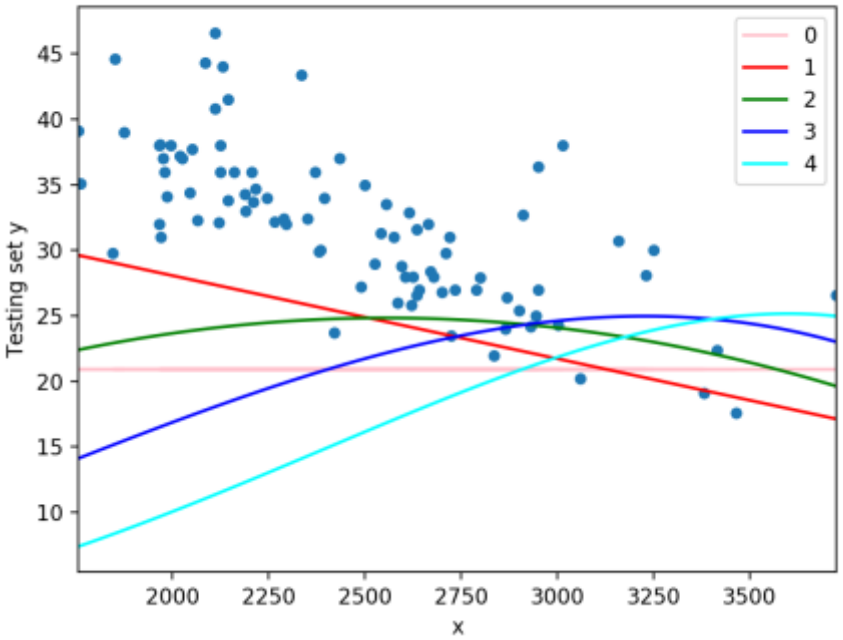
Please see function OLS.

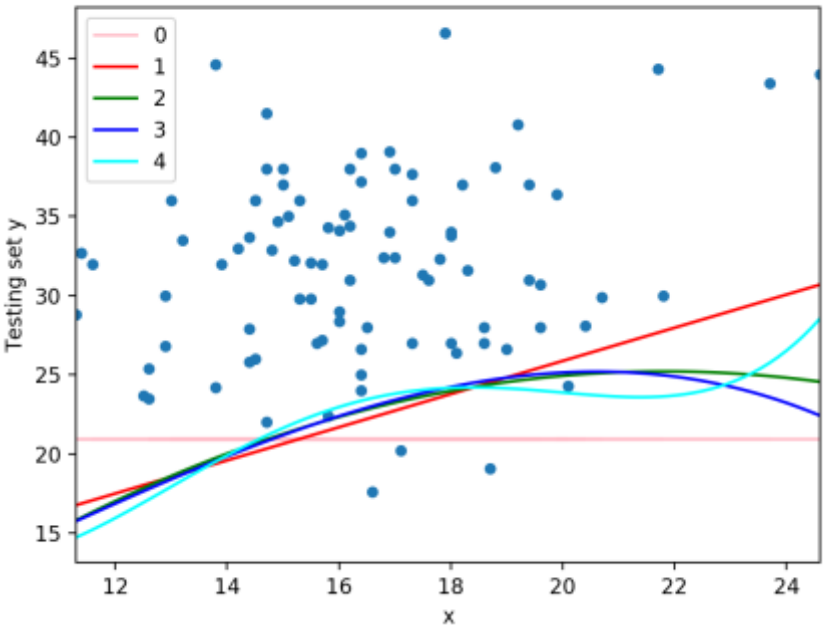
Problem 4

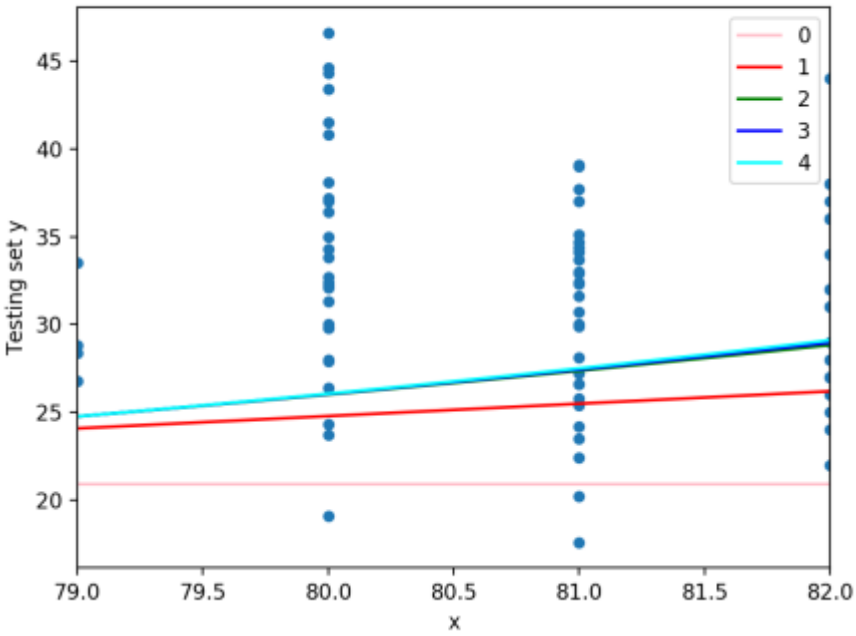


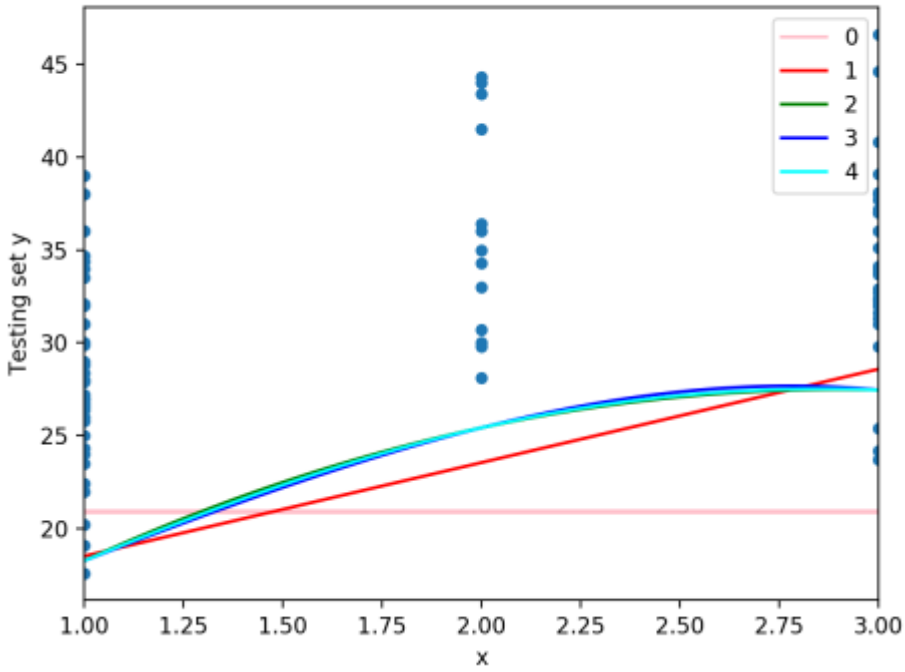

0
1
2
3
4
Testing set y
x
45
40
35
30
25
20
15
10
100
150
200
250
300
350


0
1
2
3
4
Testing set y
x
45
40
35
30
25
20
15
50
60
70
80
90
100
110
120
130


0
1
2
3
4
Testing set y
x
45
40
35
30
25
20
15
10
2000
2250
2500
2750
3000
3250
3500


0
1
2
3
4
Testing set y
x
45
40
35
30
25
20
15
12
14
16
18
20
22
24


0
1
2
3
4
Testing set y
x
45
40
35
30
25
20
79.0
79.5
80.0
80.5
81.0
81.5
82.0


0
1
2
3
4
Testing set y
x
45
40
35
30
25
20
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
3.00

Training set:

	Feature 1	Feature 2	Feature 3	Feature 4	Feature 5	Feature 6	Feature 7
order 0	39.944320	39.944320	39.944320	39.944320	39.944320	39.944320	39.944320
order 1	13.438208	11.567149	14.341899	9.132138	31.749618	36.459844	26.101315
order 2	13.208958	9.745080	10.839424	24.425573	30.827367	36.383530	25.180145
order 3	11.805271	21.767361	17.111176	66.706473	30.761634	36.389330	25.180145
order 4	11.777384	85.804350	43.162070	132.121721	30.065167	36.394886	25.180145

Testing set:

	Feature 1	Feature 2	Feature 3	Feature 4	Feature 5	Feature 6	Feature 7
order 0	157.598451	157.598451	157.598451	157.598451	157.598451	157.598451	157.598451
order 1	74.158646	70.079284	73.838483	66.549022	132.633286	81.820398	110.108850
order 2	73.662864	64.459316	60.532497	97.781496	132.126069	66.428297	111.582986
order 3	68.684244	86.866043	81.018185	197.766618	133.311640	66.237755	111.582986
order 4	68.942570	238.677029	161.980681	369.995159	129.969456	66.161300	111.582986

From the MSE table above, we can see that 2nd order is the best and the horsepower feature is the most informative one.

Problem 5

	Training MSE	Testing MSE
Order 0:	39.944320	157.598451
Order 1:	7.126725	33.358956
Order 2:	4.906403	28.345249

Problem 6

Training Precision: 85.333%
Testing Precision: 64.130%

Problem 7

It will fall into the low category.

Problem 8

This car has a MPG of 0 since it has no engine and cow does not consume gasoline.