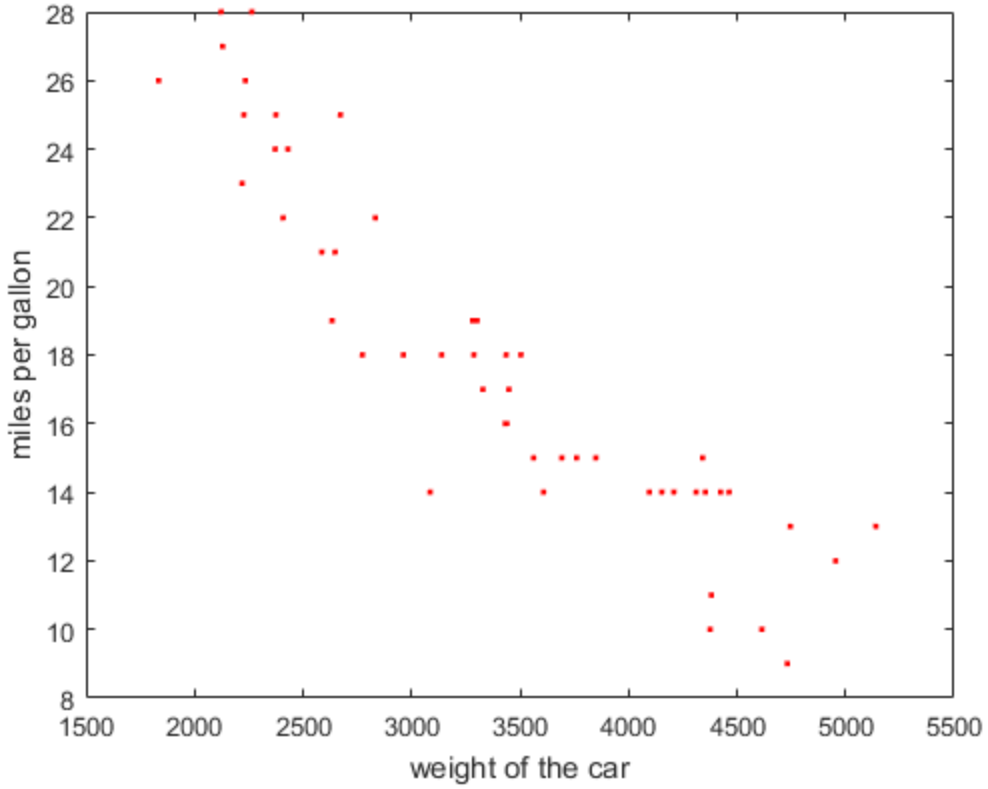
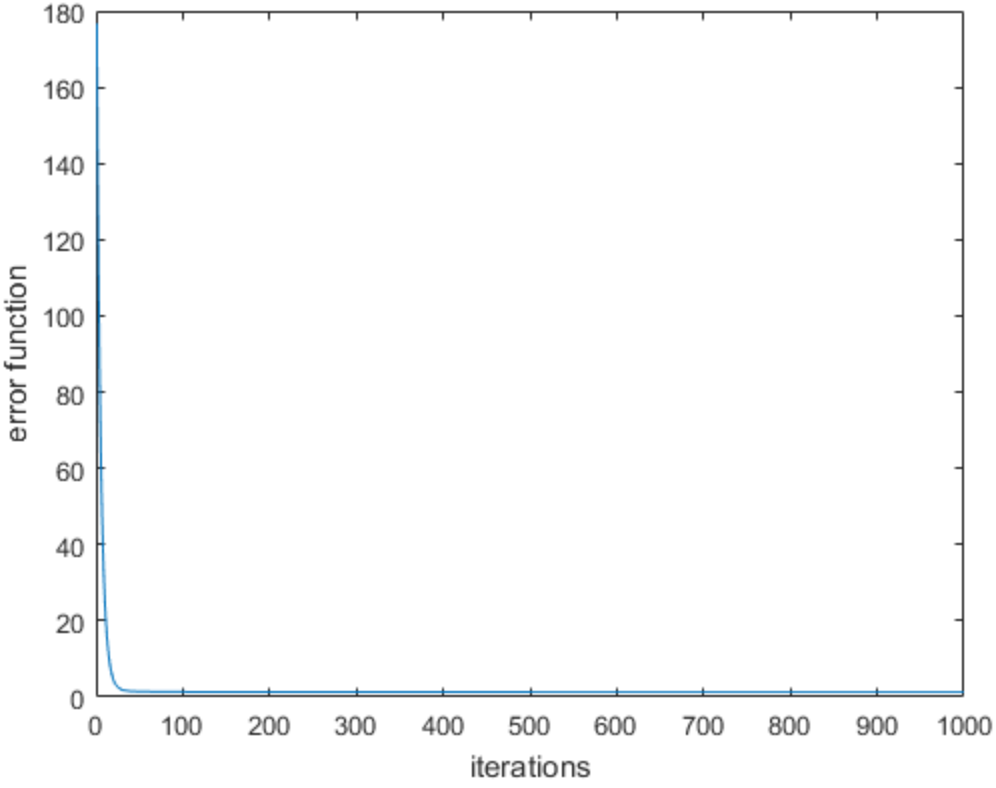
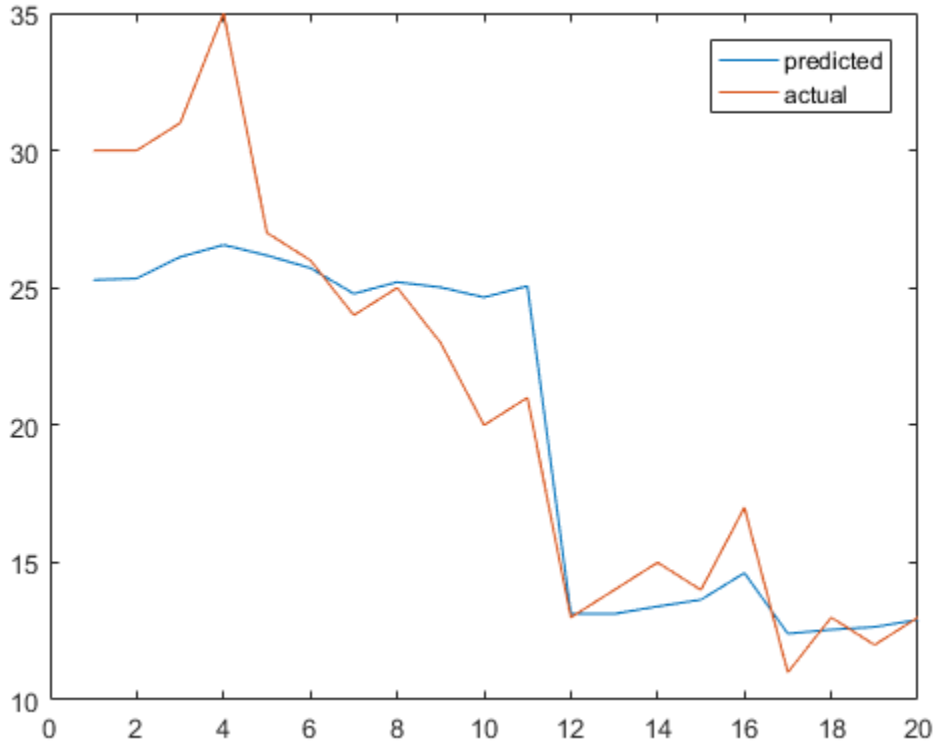
```
A = xlsread('AutoData_HW1(1)');
x=A(:,1:4);
y=A(:,6);
m=length(y);
close all;
plot(x(:,4),y,'r.');
xlabel('weight of the car')
ylabel('miles per gallon')
figure()
b=mean(x);
c=std(x);
%feature normalization
for j=1:4;
    for i=1:m;
x(i,j)=(x(i,j)-b(1,j))./c(1,j);
    end
end
a=ones(m,1);
x=[a x];
alpha=0.1;
theta=[0 0 0 0 0]';
theta_not=0;
theta_one=0;
theta_two=0;
theta_three=0;
theta_four=0;
for k=1:1000
h=x*theta;
theta_not=theta_not-(alpha)*(1/m)*((h-y)'*a);
theta_one=theta_one-(alpha)*(1/m)*((h-y)'*x(:,2));
theta_two=theta_two-(alpha)*(1/m)*((h-y)'*x(:,3));
theta_three=theta_three-(alpha)*(1/m)*((h-y)'*x(:,4));
theta_four=theta_four-(alpha)*(1/m)*((h-y)'*x(:,5));
theta=[theta_not theta_one theta_two theta_three theta_four ]';
Cost=(0.5/m)*((h-y)'*(h-y));
j(k)=Cost;
end
min_j=min(j)
plot(1:1000,j);
xlabel('iterations')
ylabel('error function')
A=xlsread('AutoData_HW1_Validation (1)');
x=A(:,1:4);
y=A(:,6);
m=length(y);
for j=1:4;
    for i=1:m;
x(i,j)=(x(i,j)-b(1,j))./c(1,j);
    end
end
a=ones(m,1);
x=[a x];
```

```
h=x*theta;
error=h-y;
z=[h y error];
disp('this the table comparing predicted,actual and error for each set
 of data')
disp(z)
figure()
plot(1:20,h)

hold on
plot(1:20,y)
legend('predicted','actual')
disp('theta values are')
disp(theta)
disp('minimum of the error function is')
disp(min_j)
```

```
min_j =

    1.2793

this the table comparing predicted,actual and error for each set of
 data
   25.2857   30.0000   -4.7143
   25.3381   30.0000   -4.6619
   26.1223   31.0000   -4.8777
   26.5606   35.0000   -8.4394
   26.1794   27.0000   -0.8206
   25.7177   26.0000   -0.2823
   24.7854   24.0000    0.7854
   25.2076   25.0000    0.2076
   25.0175   23.0000    2.0175
   24.6524   20.0000    4.6524
   25.0652   21.0000    4.0652
   13.1391   13.0000    0.1391
   13.1308   14.0000   -0.8692
   13.3989   15.0000   -1.6011
   13.6456   14.0000   -0.3544
   14.6195   17.0000   -2.3805
   12.4109   11.0000    1.4109
   12.5552   13.0000   -0.4448
   12.6523   12.0000    0.6523
   12.9206   13.0000   -0.0794

theta values are
   18.0800
   -3.0638
    0.8778
   -0.3416
   -2.5761

minimum of the error function is
    1.2793
```


miles per gallon
weight of the car
28
26
24
22
20
18
16
14
12
10
8
1500
2000
2500
3000
3500
4000
4500
5000
5500


error function
iterations
0
20
40
60
80
100
120
140
160
180
0
100
200
300
400
500
600
700
800
900
1000


predicted
actual
10
15
20
25
30
35
0
2
4
6
8
10
12
14
16
18
20

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