```
%generate 25 radom points of x, x belongs to 0~3
random_x = rand(1,25)*3
```

```
random_x =
    2.0603    0.5505    1.1055    1.8769    2.3407    0.2434    2.7882    2.3271 ···
```

```
%get y from the parabola y = 1 + (x-1)^2
for i = 1:25
y(i) = 1 + (random_x(i))^2;
%add the noise to each y
y(i)=y(i)+0.05*randn ;
end
```

```
% for y = a + b * x + c * x^2
% let Y = [ y1, y2 .... y25]
% let A = [ 1 , x1 , x1^2 ; 1 , x2 , x2^2 ; ... ; 1 , x25 , x25^2]
% let X = [ a , b , c ]'
% Then A * x = Y
for i = 1:25
    A(i,:) = [1 random_x(i) random_x(i)^2 ];
end
Y = y'
```

```
Y =
    5.2580
    1.2560
    2.2139
    4.5153
    6.4522
    1.1433
    8.7300
    6.3914
    3.0971
    2.6510
     ⋮
```

```
% use MGS to generate QR
[Q,R] = MGS(A)
```

```
Q =
    0.2000    0.0967   -0.1165
    0.2000   -0.3496    0.2936
    0.2000   -0.1856   -0.0637
    0.2000    0.0424   -0.1615
    0.2000    0.1796    0.0030
    0.2000   -0.4404    0.5945
    0.2000    0.3118    0.3206
    0.2000    0.1755   -0.0042
    0.2000   -0.0807   -0.1663
    0.2000   -0.1258   -0.1341
     ⋮
```

```
R =
    5.0000    8.6664   17.3101
         0    3.3829   11.1894
         0         0    2.5657
```

```
% back - substitution
% Let R*x = Q'Y
% First solve r33 * x3 = q3 * Y, then back substitution to get x2 and x3
x = [0 0 0]
```

```
x =
     0     0     0
```

```
x(3) = (Q(:,3)' * Y ) / R(3,3)
```

```
x =
         0         0    1.0044
```

```
x(2) = ((Q(:,2)' * Y ) - R(2,3)*x(3))/R(2,2)
```

```
x =
         0   -0.0240    1.0044
```

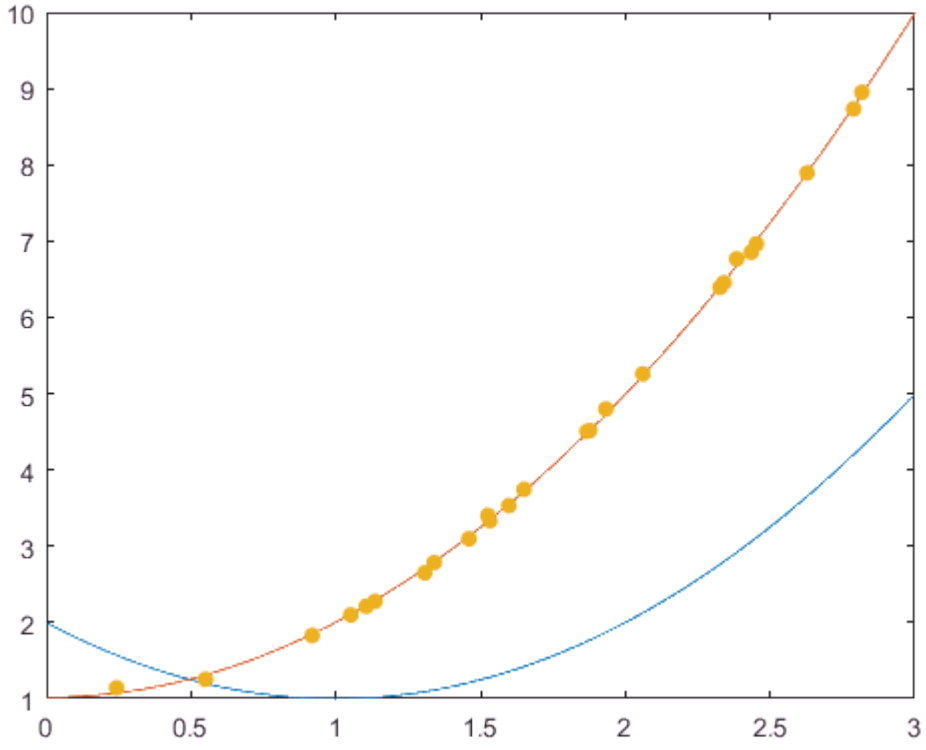
```
x(1) = ((Q(:,1)' * Y ) - R(1,3)*x(3) - R(1,2)*x(2))/R(1,1)
```

```
x =
    1.0225   -0.0240    1.0044
```

```
% Plot
n = (0:900)/300
```

```
n =
         0    0.0033    0.0067    0.0100    0.0133    0.0167    0.0200    0.0233 ···
```

```
plot(n,(1+power((n-1),2)),n,(x(1)+x(2)*n+x(3)*power(n,2)))
hold on
scatter(random_x,Y,'filled')
```


10
9
8
7
6
5
4
3
2
1
0
0.5
1
1.5
2
2.5
3