$$na_0 + \sum x_i a_1 + \sum x_i^2 a_2 + \sum x_i^3 a_3 + \sum x_i^1 a_4 = \sum y_i$$

$$\sum x_i a_0 + \sum x_i^2 a_1 + \sum x_i^3 a_2 + \sum x_i^4 a_3 + \sum x_i^5 a_4 = \sum x_i y_i$$

$$\sum x_i^2 a_0 + \sum x_i^3 a_1 + \sum x_i^4 a_2 + \sum x_i^5 a_3 + \sum x_i^6 a_4 = \sum x_i^2 y_i$$

$$\sum x_i^3 a_0 + \sum x_i^4 a_1 + \sum x_i^5 a_2 + \sum x_i^6 a_3 + \sum x_i^7 a_4 = \sum x_i^3 y_i$$

$$\sum x_i^4 a_0 + \sum x_i^5 a_1 + \sum x_i^6 a_2 + \sum x_i^7 a_3 + \sum x_i^8 a_4 = \sum x_i^4 y_i$$

```
x=[-10.1 -4.6 -1.8 2.4 3.9 6.3 8.6 10.7 12.6 17.7]
```

```
x = 1×10
  -10.1000   -4.6000   -1.8000    2.4000    3.9000    6.3000    8.6000   10.7000 ···
```

```
y=[3 1.5 3.8 4.1 2.1 -1.1 -1.6 -0.8 3.7 2.5]
```

```
y = 1×10
    3.0000    1.5000    3.8000    4.1000    2.1000   -1.1000   -1.6000   -0.8000 ···
```

```
plot(x,y,'*')
N=length(x)
```

```
N = 10
```

```
Sx=sum(x)
```

```
Sx = 45.7000
```

```
Sx2=sum(x.^2)
```

```
Sx2 = 847.5700
```

```
Sx3=sum(x.^3)
```

```
Sx3 = 8.5964e+03
```

```
Sx4=sum(x.^4)
```

```
Sx4 = 1.5464e+05
```

```
Sx5=sum(x.^5)
```

```
Sx5 = 2.1459e+06
```

```
Sx6=sum(x.^6)
```

```
Sx6 = 3.7794e+07
```

```
Sx7=sum(x.^7)
```

```
Sx7 = 6.0387e+08
```

```
Sx8=sum(x.^8)
```

```
Sx8 = 1.0582e+10
```

```
Sy=sum(y)
```

Sy = 17.2000

```
Sxy=sum(x.*y)
```

Sxy = 35.6100

```
Sx2y=sum(x.^2.*y)
```

Sx2y = 1.5227e+03

```
Sx3y=sum(x.^3.*y)
```

Sx3y = 1.5914e+04

```
Sx4y=sum(x.^4.*y)
```

Sx4y = 3.5021e+05

```
A=[N Sx Sx2 Sx3 Sx4 Sy;
   Sx Sx2 Sx3 Sx4 Sx5 Sxy;
   Sx2 Sx3 Sx4 Sx5 Sx6 Sx2y;
   Sx3 Sx4 Sx5 Sx6 Sx7 Sx3y;
   Sx4 Sx5 Sx6 Sx7 Sx8 Sx4y]
```

A = 5×6

10^{10} ×

```
    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000
    0.0000    0.0000    0.0000    0.0000    0.0002    0.0000
    0.0000    0.0000    0.0000    0.0002    0.0038    0.0000
    0.0000    0.0000    0.0002    0.0038    0.0604    0.0000
    0.0000    0.0002    0.0038    0.0604    1.0582    0.0000
```

10   45.7000   847.5700   8.5964e+03   1.5464e+05

```
aux=A(1,:);
A(1,:)=A(5,:);
A(5,:)=aux
```

A = 5×6

10^{10} ×

```
    0.0000    0.0002    0.0038    0.0604    1.0582    0.0000
    0.0000    0.0000    0.0000    0.0000    0.0002    0.0000
    0.0000    0.0000    0.0000    0.0002    0.0038    0.0000
    0.0000    0.0000    0.0002    0.0038    0.0604    0.0000
    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000
```

```
A(1,:)=A(1,:)/A(1,1);
A(2,:)=A(2,:)-A(1,:)*A(2,1);
A(3,:)=A(3,:)-A(1,:)*A(3,1);
A(4,:)=A(4,:)-A(1,:)*A(4,1);
A(5,:)=A(5,:)-A(1,:)*A(5,1)
```

A = 5×6

10^7 ×

```
    0.0000    0.0000    0.0000    0.0004    0.0068    0.0000
         0    0.0000   -0.0003   -0.0024   -0.0981   -0.0000
```

2

```
     0   -0.0003   -0.0053   -0.1164   -2.0204   -0.0000
     0    0.0035    0.0045    0.4224    1.5628   -0.0004
     0   -0.0000   -0.0002   -0.0030   -0.0530   -0.0000
```

```
aux=A(2,:);
A(2,:)=A(4,:);
A(4,:)=aux;
A(2,:)=A(2,:)/A(2,2);
A(3,:)=A(3,:)-A(2,:)*A(3,2);
A(4,:)=A(4,:)-A(2,:)*A(4,2);
A(5,:)=A(5,:)-A(2,:)*A(5,2);
A(1,:)=A(1,:)-A(2,:)*A(1,2)
```

A = 5×6

$10^7 \times$

```
 0.0000        0   0.0000   0.0002   0.0062   0.0000
      0   0.0000   0.0000   0.0000   0.0000  -0.0000
      0        0  -0.0048  -0.0786  -1.8805  -0.0001
      0        0  -0.0003  -0.0049  -0.1076  -0.0000
      0        0  -0.0001  -0.0019  -0.0488  -0.0000
```

```
A(3,:)=A(3,:)/A(3,3);
A(4,:)=A(4,:)-A(3,:)*A(4,3);
A(5,:)=A(5,:)-A(3,:)*A(5,3);
A(2,:)=A(2,:)-A(3,:)*A(2,3);
A(1,:)=A(1,:)-A(3,:)*A(1,3)
```

A = 5×6

$10^4 \times$

```
 0.0001        0        0  -0.1428  -2.5652   0.0000
      0   0.0001        0   0.0099  -0.0050  -0.0000
      0        0   0.0001   0.0016   0.0388   0.0000
      0        0        0  -0.3250   2.7151  -0.0004
      0        0        0   0.4620   8.4773   0.0007
```

```
aux=A(4,:);
A(4,:)=A(5,:);
A(5,:)=aux;
A(4,:)=A(4,:)/A(4,4);
A(5,:)=A(5,:)-A(4,:)*A(5,4);
A(3,:)=A(3,:)-A(4,:)*A(3,4);
A(2,:)=A(2,:)-A(4,:)*A(2,4);
A(1,:)=A(1,:)-A(4,:)*A(1,4)
```

A = 5×6

$10^4 \times$

```
 0.0001        0        0        0   0.0546   0.0002
      0   0.0001        0        0  -0.1866  -0.0000
      0        0   0.0001        0   0.0090  -0.0000
      0        0        0   0.0001   0.0018   0.0000
      0        0        0        0   8.6784   0.0000
```

```
A(5,:)=A(5,:)/A(5,5);
A(4,:)=A(4,:)-A(5,:)*A(4,5);
A(3,:)=A(3,:)-A(5,:)*A(3,5);
A(2,:)=A(2,:)-A(5,:)*A(2,5);
A(1,:)=A(1,:)-A(5,:)*A(1,5)
```

```
A = 5×6
    1.0000         0         0         0         0    2.4746
         0    1.0000         0         0         0   -0.2598
         0         0    1.0000         0         0   -0.0102
         0         0         0    1.0000         0    0.0014
         0         0         0         0    1.0000    0.0000
```

```
a0=A(1,6)
```

```
a0 = 2.4746
```

```
a1=A(2,6)
```

```
a1 = -0.2598
```

```
a2=A(3,6)
```

```
a2 = -0.0102
```

```
a3=A(4,6)
```

```
a3 = 0.0014
```

```
a4=A(5,6)
```

```
a4 = 4.9971e-06
```

$$y = a_0 + a_1 X + a_2 X^2 + a_3 X^3 + a_4 X^4$$

```
f=@(X) a0+a1*X+a2*X.^2+a3*X.^3+a4*X.^4
```

```
f = function_handle with value:
    @(X)a0+a1*X+a2*X.^2+a3*X.^3+a4*X.^4
```
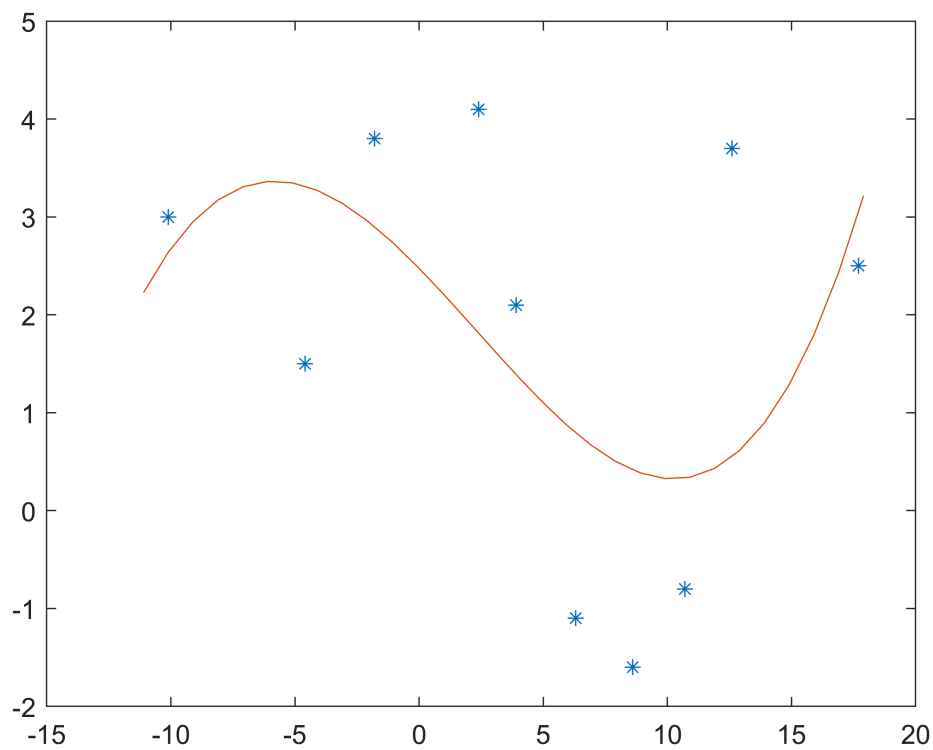
```
X=min(x)-1:max(x)+1
```

```
X = 1×30
  -11.1000  -10.1000   -9.1000   -8.1000   -7.1000   -6.1000   -5.1000   -4.1000 ···
```

```
Y=f(X)
```

```
Y = 1×30
    2.2276    2.6407    2.9533    3.1728    3.3066    3.3624    3.3479    3.2709 ···
```

```
hold on
plot(X,Y)
```

$$r = \sqrt{\frac{St - Sr}{St}}$$

$$S_r = \frac{\sum_{i=1}^{n} \left(y_{modelo} - y_{medidos}\right)^2}{n}$$

$$S_t = \frac{\sum_{i=1}^{n} \left(y_{medidos} - \bar{y}_{medidos}\right)^2}{n}$$

n=10

n = 10

ymedido=y

```
ymedido = 1×10
    3.0000    1.5000    3.8000    4.1000    2.1000   -1.1000   -1.6000   -0.8000 ···
```

ymodelo=f(x)

```
ymodelo = 1×10
    2.6407    3.3167    2.9007    1.8121    1.3914    0.7954    0.4157    0.3313 ···
```

mediaymedido=mean(ymedido)

```
mediaymedido = 1.7200
```

```
Sr=sum((ymodelo-ymedido).^2)/n
```

```
Sr = 2.9147
```

```
St=sum((ymedido-mediaymedido).^2)/n
```

```
St = 4.1676
```

```
r=sqrt((St-Sr)/St)
```

```
r = 0.5483
```