INSTITUTO POLITECNICO NACIONAL

Unidad Profesional Interdisciplinaria de Biotecnología

Métodos Numéricos

TAREA No. 2-SEGUNDO PARCIAL

REGRESION LINEAL

Grupo: 4MV3

Integrante del equipo 7:

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PROFESORES

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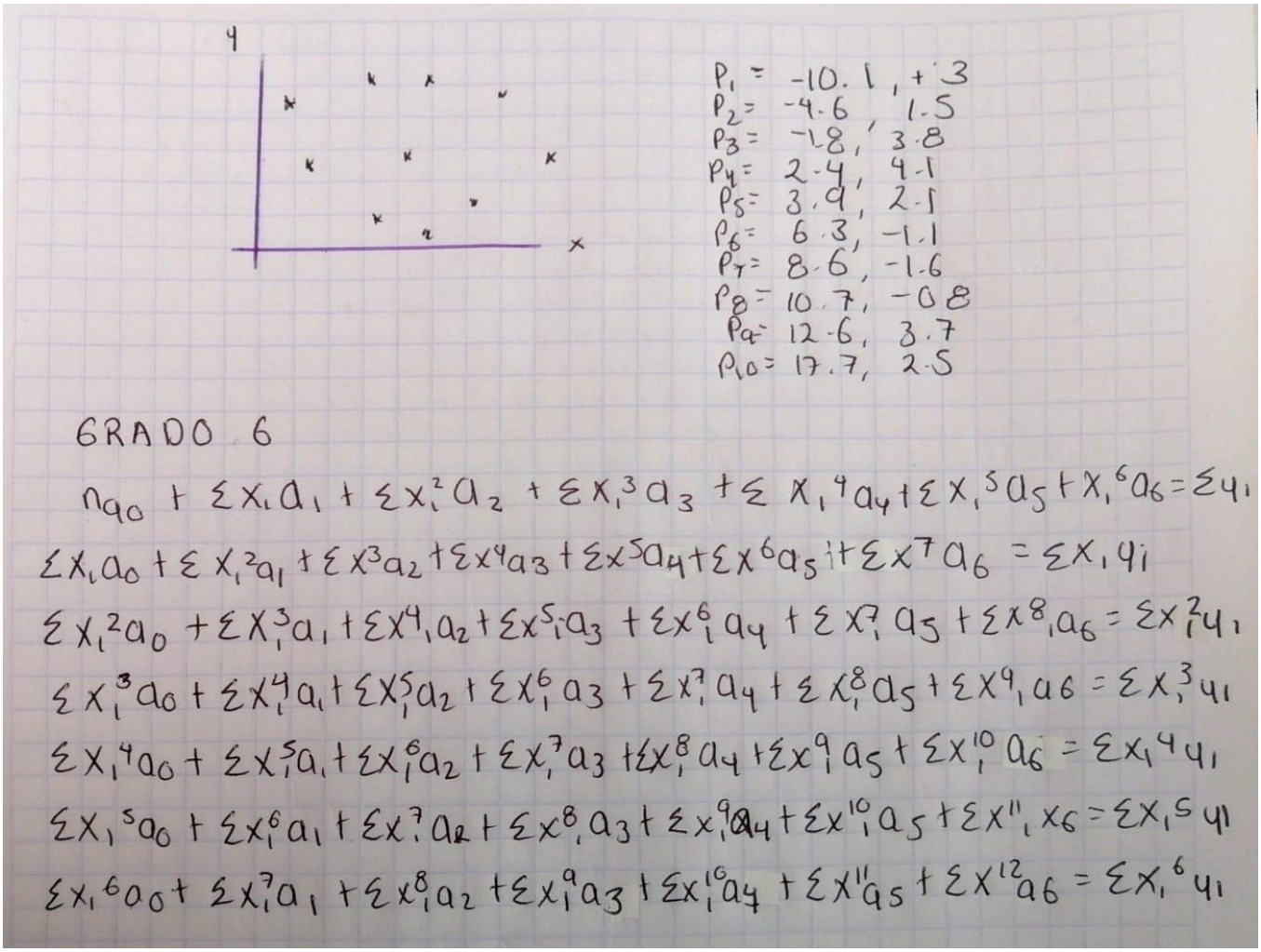
Fecha de entrega: 07 de octubre de2021

EJERCICIO



CODIGO

```
x=[-10.1 -4.6 -1.8 2.4 3.9 6.3 8.6 10.7 12.6 17.7]
y=[3 1.5 3.8 4.1 2.1 -1.1 -1.6 -0.8 3.7 2.5]


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


%sumatoria de grado 6
Sx=sum(x)
Sx2=sum(x.^2)
Sx3=sum(x.^3)
Sx4=sum(x.^4)
Sx5=sum(x.^5)
Sx6=sum(x.^6)
Sx7=sum(x.^7)
```

```
Sx8=sum(x.^8)
Sx9=sum(x.^9)
Sx10=sum(x.^10)
Sx11=sum(x.^11)
Sx12=sum(x.^12)


Sy=sum(y)
Sxy=sum(x.*y)
Sx2y=sum(x.^2.*y)
Sx3y=sum(x.^3.*y)
Sx4y=sum(x.^4.*y)
Sx5y=sum(x.^5.*y)
Sx6y=sum(x.^6.*y)
A=[N Sx Sx2 Sx3 Sx4 Sx5 Sx6 Sy;
    Sx Sx2 Sx3 Sx4 Sx5 Sx6 Sx7 Sxy;
    Sx2 Sx3 Sx4 Sx5 Sx6 Sx7 Sx8 Sx2y;
    Sx3 Sx4 Sx5 Sx6 Sx7 Sx8 Sx9 Sx3y;
    Sx4 Sx5 Sx6 Sx7 Sx8 Sx9 Sx10 Sx4y;
    Sx5 Sx6 Sx7 Sx8 Sx9 Sx10 Sx11 Sx5y;
    Sx6 Sx7 Sx8 Sx9 Sx10 Sx11 Sx12 Sx6y]




  %  0.0000    0.0006    0.0106    0.1795    3.1520    0.0001


%Pasar la fila 7 a la 1
aux=A(1,:);
A(1,:)=A(7,:);
A(7,:)=aux
%CONVERTIR 1,1 em uno y los valores debajo de esta en 0
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(6,:)=A(6,:)-A(1,:)*A(6,1);
A(7,:)=A(7,:)-A(1,:)*A(7,1)


%fila 5 se va a la 2
aux=A(2,:);
A(2,:)=A(5,:);
A(5,:)=aux
%convertir el primer valor en uno y por abajo y arriba en cero
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);
```

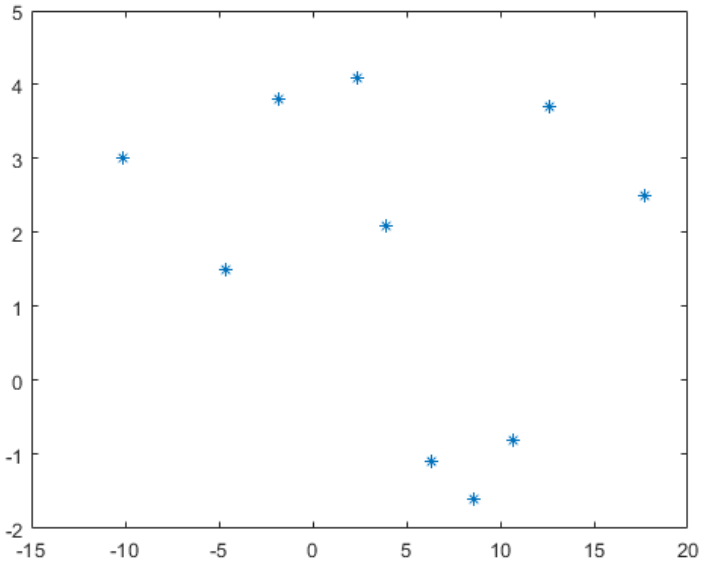
```
A(5,:)=A(5,:)-A(2,:)*A(5,2);
A(6,:)=A(6,:)-A(2,:)*A(6,2);
A(7,:)=A(7,:)-A(2,:)*A(7,2);
A(1,:)=A(1,:)-A(2,:)*A(1,2)


%fila 6 se va a la 3
aux=A(3,:);
A(3,:)=A(6,:);
A(6,:)=aux
%convertir el primer valor en uno y por abajo y arriba en cero
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(6,:)=A(6,:)-A(3,:)*A(6,3);
A(7,:)=A(7,:)-A(3,:)*A(7,3);
A(2,:)=A(2,:)-A(3,:)*A(2,3);
A(1,:)=A(1,:)-A(3,:)*A(1,3)


%fila 6 se va a la 4
aux=A(4,:);
A(4,:)=A(6,:);
A(6,:)=aux
%convertir el primer valor en uno y por abajo y arriba en cero
A(4,:)=A(4,:)/A(4,4);
A(5,:)=A(5,:)-A(4,:)*A(5,4);
A(6,:)=A(6,:)-A(4,:)*A(6,4);
A(7,:)=A(7,:)-A(4,:)*A(7,4);
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)


%fila 6 se va a la 5
aux=A(5,:);
A(5,:)=A(6,:);
A(6,:)=aux
%convertir el primer valor en uno y por abajo y arriba en cero
A(5,:)=A(5,:)/A(5,5);
A(6,:)=A(6,:)-A(5,:)*A(6,5);
A(7,:)=A(7,:)-A(5,:)*A(7,5);
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)


%convertir el primer valor en uno y por abajo y arriba en cero
A(6,:)=A(6,:)/A(6,6);
```

```
A(7,:)=A(7,:)-A(6,:)*A(7,6);
A(5,:)=A(5,:)-A(6,:)*A(5,6);
A(4,:)=A(4,:)-A(6,:)*A(4,6);
A(3,:)=A(3,:)-A(6,:)*A(3,6);
A(2,:)=A(2,:)-A(6,:)*A(2,6);
A(1,:)=A(1,:)-A(6,:)*A(1,6)


%convertir el primer valor en uno y por abajo y arriba en cero
A(7,:)=A(7,:)/A(7,7);
A(1,:)=A(1,:)-A(7,:)*A(1,7);
A(2,:)=A(2,:)-A(7,:)*A(2,7);
A(3,:)=A(3,:)-A(7,:)*A(3,7);
A(4,:)=A(4,:)-A(7,:)*A(4,7);
A(5,:)=A(5,:)-A(7,:)*A(5,7);
A(6,:)=A(6,:)-A(7,:)*A(6,7)







a0=A(1,8)
a1=A(2,8)
a2=A(3,8)
a3=A(4,8)
a4=A(5,8)
a5=A(6,8)
a6=A(7,8)


f=@(X) a0+a1*X+a2*X.^2+a3*X.^3+a4*X.^4+a5*X.^5+a6*X.^6
X=min(x)-1:max(x)+1
Y=f(X)


hold on
plot(X,Y)


N=length(x)
ymedido=y
ymodelo=f(x)
mediaymedidoss=mean(ymedido)


Sr=sum((ymodelo-ymedido).^2)/N
St=sum((ymedido-mediaymedidoss).^2)/N
```

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

RESULTADOS

```
x = 1×10
  -10.1000   -4.6000   -1.8000    2.4000    3.9000    6.3000    8.6000
10.7000   12.6000   17.7000
y = 1×10
    3.0000    1.5000    3.8000    4.1000    2.1000   -1.1000   -1.6000
-0.8000    3.7000    2.5000
```




```
N = 10
Sx = 45.7000
Sx2 = 847.5700
Sx3 = 8.5964e+03
Sx4 = 1.5464e+05
Sx5 = 2.1459e+06
Sx6 = 3.7794e+07
Sx7 = 6.0387e+08
Sx8 = 1.0582e+10
Sx9 = 1.7954e+11
Sx10 = 3.1520e+12
Sx11 = 5.4810e+13
Sx12 = 9.6510e+14
Sy = 17.2000
Sxy = 35.6100
Sx2y = 1.5227e+03
Sx3y = 1.5914e+04
Sx4y = 3.5021e+05
Sx5y = 5.0036e+06
Sx6y = 9.2970e+07
A = 7×8
10^14 ×
```

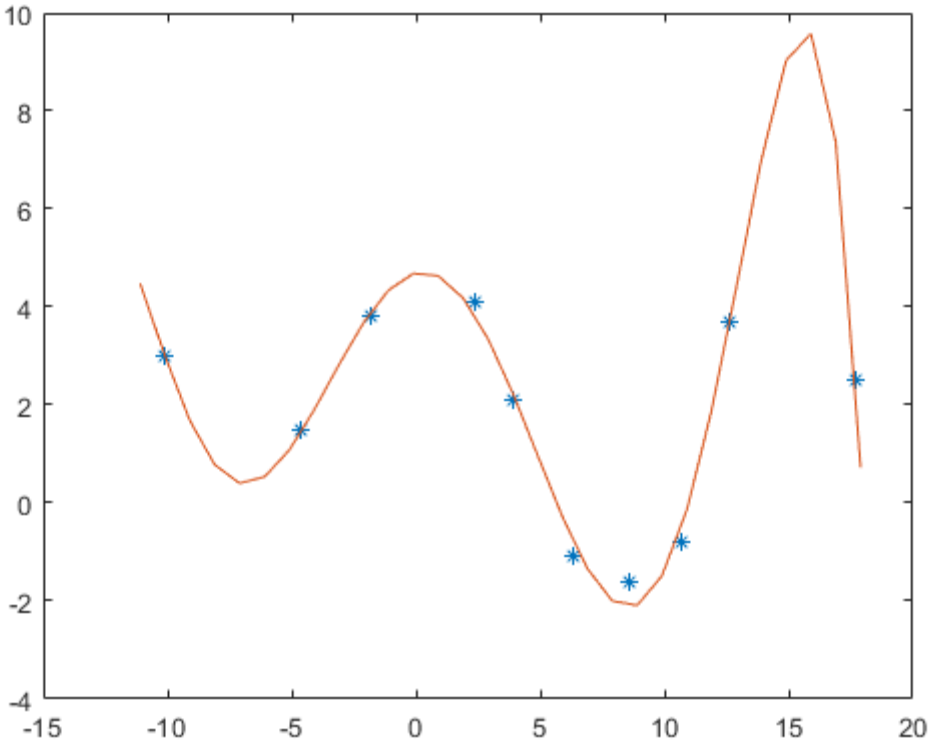
```
    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000
0.0000
    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000
0.0000
    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0001
0.0000
    0.0000    0.0000    0.0000    0.0000    0.0000    0.0001    0.0018
0.0000
    0.0000    0.0000    0.0000    0.0000    0.0001    0.0018    0.0315
0.0000
    0.0000    0.0000    0.0000    0.0001    0.0018    0.0315    0.5481
0.0000
    0.0000    0.0000    0.0001    0.0018    0.0315    0.5481    9.6510
0.0000
A = 7×8
10^14 ×
    0.0000    0.0000    0.0001    0.0018    0.0315    0.5481    9.6510
0.0000
    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000
0.0000
    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0001
0.0000
    0.0000    0.0000    0.0000    0.0000    0.0000    0.0001    0.0018
0.0000
    0.0000    0.0000    0.0000    0.0000    0.0001    0.0018    0.0315
0.0000
    0.0000    0.0000    0.0000    0.0001    0.0018    0.0315    0.5481
0.0000
    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000
0.0000
A = 7×8
10^13 ×
    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000
0.0000
    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0001
0.0000
    0.0000    0.0000    0.0000    0.0000    0.0000    0.0001    0.0011
0.0000
    0.0000    0.0000    0.0000    0.0000    0.0001    0.0011    0.0180
0.0000
    0.0000    0.0000    0.0000    0.0001    0.0011    0.0180    0.3152
0.0000
    0.0000    0.0000    0.0001    0.0011    0.0180    0.3152    5.4810
0.0000
    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000
0.0000
A = 7×8
10^11 ×
    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0003
0.0000
         0    0.0000   -0.0000   -0.0000   -0.0000   -0.0003   -0.0056
-0.0000
         0   -0.0000   -0.0000   -0.0000   -0.0003   -0.0063   -0.1106
-0.0000
         0    0.0000   -0.0000   -0.0000   -0.0011   -0.0189   -0.3998
-0.0000
```

```
         0   -0.0000   -0.0001   -0.0013   -0.0232   -0.4473   -7.9683
-0.0000
         0    0.0000    0.0000    0.0039    0.0057    0.3997    0.1277
-0.0000
         0   -0.0000   -0.0000   -0.0000   -0.0000   -0.0001   -0.0022
-0.0000
A = 7×8
10^11 ×
    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000    0.0003
0.0000
         0   -0.0000   -0.0001   -0.0013   -0.0232   -0.4473   -7.9683
-0.0000
         0   -0.0000   -0.0000   -0.0000   -0.0003   -0.0063   -0.1106
-0.0000
         0    0.0000   -0.0000   -0.0000   -0.0011   -0.0189   -0.3998
-0.0000
         0    0.0000   -0.0000   -0.0000   -0.0000   -0.0003   -0.0056
-0.0000
         0    0.0000    0.0000    0.0039    0.0057    0.3997    0.1277
-0.0000
         0   -0.0000   -0.0000   -0.0000   -0.0000   -0.0001   -0.0022
-0.0000
A = 7×8
10^12 ×
    0.0000         0    0.0000   -0.0000   -0.0000   -0.0000   -0.0000
0.0000
         0    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000
0.0000
         0         0    0.0000    0.0000    0.0000    0.0001    0.0011
-0.0000
         0         0   -0.0000   -0.0000   -0.0002   -0.0043   -0.0824
-0.0000
         0         0   -0.0000   -0.0000   -0.0000   -0.0000   -0.0009
-0.0000
         0         0   -0.0001   -0.0010   -0.0244   -0.4427   -8.5875
-0.0000
         0         0   -0.0000    0.0000    0.0000    0.0000    0.0001
0.0000
A = 7×8
10^12 ×
    0.0000         0    0.0000   -0.0000   -0.0000   -0.0000   -0.0000
0.0000
         0    0.0000    0.0000    0.0000    0.0000    0.0000    0.0000
0.0000
         0         0   -0.0001   -0.0010   -0.0244   -0.4427   -8.5875
-0.0000
         0         0   -0.0000   -0.0000   -0.0002   -0.0043   -0.0824
-0.0000
         0         0   -0.0000   -0.0000   -0.0000   -0.0000   -0.0009
-0.0000
         0         0    0.0000    0.0000    0.0000    0.0001    0.0011
-0.0000
         0         0   -0.0000    0.0000    0.0000    0.0000    0.0001
0.0000
A = 7×8
10^9 ×
```

```
    0.0000         0         0   -0.0000   -0.0000   -0.0008   -0.0151
0.0000
         0    0.0000         0    0.0000   -0.0000    0.0000   -0.0001
-0.0000
         0         0    0.0000    0.0000    0.0000    0.0000    0.0002
0.0000
         0         0         0    0.0001    0.0038    0.0878    2.0435
-0.0000
         0         0         0    0.0000    0.0002    0.0040    0.0922
-0.0000
         0         0         0    0.0001    0.0019    0.0470    0.9017
-0.0000
         0         0         0    0.0000    0.0001    0.0035    0.0653
0.0000
A = 7×8
10^9 ×
    0.0000         0         0   -0.0000   -0.0000   -0.0008   -0.0151
0.0000
         0    0.0000         0    0.0000   -0.0000    0.0000   -0.0001
-0.0000
         0         0    0.0000    0.0000    0.0000    0.0000    0.0002
0.0000
         0         0         0    0.0001    0.0019    0.0470    0.9017
-0.0000
         0         0         0    0.0000    0.0002    0.0040    0.0922
-0.0000
         0         0         0    0.0001    0.0038    0.0878    2.0435
-0.0000
         0         0         0    0.0000    0.0001    0.0035    0.0653
0.0000
A = 7×8
10^9 ×
    0.0000         0         0         0    0.0000    0.0001    0.0035
-0.0000
         0    0.0000         0         0   -0.0000   -0.0000   -0.0011
0.0000
         0         0    0.0000         0    0.0000   -0.0000   -0.0000
0.0000
         0         0         0    0.0000    0.0000    0.0000    0.0000
-0.0000
         0         0         0         0    0.0001    0.0026    0.0652
-0.0000
         0         0         0         0    0.0025    0.0563    1.4395
-0.0000
         0         0         0         0   -0.0000   -0.0003   -0.0087
0.0000
A = 7×8
10^9 ×
    0.0000         0         0         0    0.0000    0.0001    0.0035
-0.0000
         0    0.0000         0         0   -0.0000   -0.0000   -0.0011
0.0000
         0         0    0.0000         0    0.0000   -0.0000   -0.0000
0.0000
         0         0         0    0.0000    0.0000    0.0000    0.0000
-0.0000
```

```
         0         0         0         0    0.0025    0.0563    1.4395
-0.0000
         0         0         0         0    0.0001    0.0026    0.0652
-0.0000
         0         0         0         0   -0.0000   -0.0003   -0.0087
0.0000
A = 7×8
10^6 ×
    0.0000         0         0         0         0    0.0525    1.1462
-0.0000
         0    0.0000         0         0         0    0.0038    0.1661
-0.0000
         0         0    0.0000         0         0   -0.0028   -0.0605
0.0000
         0         0         0    0.0000         0    0.0001   -0.0018
0.0000
         0         0         0         0    0.0000    0.0000    0.0006
-0.0000
         0         0         0         0         0   -0.1665   -5.0880
0.0000
         0         0         0         0         0   -0.0874   -2.0696
0.0000
A = 7×8
10^5 ×
    0.0000         0         0         0         0         0   -4.5892
0.0001
         0    0.0000         0         0         0         0    0.5127
-0.0000
         0         0    0.0000         0         0         0    0.2616
-0.0000
         0         0         0    0.0000         0         0   -0.0362
0.0000
         0         0         0         0    0.0000         0   -0.0011
0.0000
         0         0         0         0         0    0.0000    0.0003
-0.0000
         0         0         0         0         0         0    6.0103
-0.0000
A = 7×8
    1.0000         0         0         0         0         0         0
4.6976
         0    1.0000         0         0         0         0         0
0.1137
         0         0    1.0000         0         0         0         0
-0.1985
         0         0         0    1.0000         0         0         0
-0.0066
         0         0         0         0    1.0000         0         0
0.0022
         0         0         0         0         0    1.0000         0
0.0000
         0         0         0         0         0         0    1.0000
-0.0000
a0 = 4.6976
a1 = 0.1137
a2 = -0.1985
a3 = -0.0066
```

```
a4 = 0.0022
a5 = 3.3488e-05
a6 = -5.7056e-06
f = function_handle with value:
    @(X)a0+a1*X+a2*X.^2+a3*X.^3+a4*X.^4+a5*X.^5+a6*X.^6
X = 1×30
  -11.1000  -10.1000   -9.1000   -8.1000   -7.1000   -6.1000   -5.1000
-4.1000   -3.1000   -2.1000   -1.1000   -0.1000    0.9000    1.9000
2.9000    3.9000    4.9000    5.9000    6.9000    7.9000    8.9000
9.9000   10.9000   11.9000   12.9000   13.9000   14.9000   15.9000
16.9000   17.9000
Y = 1×30
    4.4787    3.0017    1.6831    0.7820    0.4025    0.5320    1.0773
1.8952    2.8197    3.6851    4.3443    4.6842    4.6357    4.1805
3.3532    2.2399    0.9722   -0.2827   -1.3363   -1.9965   -2.0904   -
1.4903   -0.1443    1.8891    4.4023    6.9958    9.0310    9.5798
7.3688    0.7206
```




```
N = 10
ymedido = 1×10
    3.0000    1.5000    3.8000    4.1000    2.1000   -1.1000   -1.6000
-0.8000    3.7000    2.5000
ymodelo = 1×10
    3.0017    1.4623    3.9104    3.8091    2.2399   -0.7392   -2.1305
-0.4723    3.6176    2.5009
mediaymedidoss = 1.7200
Sr = 0.0644
St = 4.1676
r = 0.9922
```