

```

disp('Nicolas Cedillo')
Nicolas Cedillo
disp('NRC: 7543')
NRC: 7543
disp('Correccion Examen 2P')
Correccion Examen 2P

```

```

disp('EJERCICIO 1')
EJERCICIO 1

```

Problema 1.

Dado el sistema lineal:

$$\begin{aligned}
 0,098 X_1 + 1,002 X_2 + X_3 &= 2 \\
 2,002 X_1 + 3,001 X_2 - 1,001 X_3 &= 2 \\
 3,002 X_1 + 4 X_2 &= K
 \end{aligned}$$

a) Determinar el valor de "K" de manera que el sistema sea compatible y dar el conjunto de soluciones para dicho valor de "K".

$$\left(\begin{array}{ccc|c} 0,098 & 1,002 & 1 & 2 \\ 2,002 & 3,001 & -1,001 & 2 \\ 3,002 & 4 & 0 & K \end{array} \right) \begin{array}{l} F_2 - \left(\frac{142}{7}\right)F_1 \\ F_3 - \left(\frac{1501}{44}\right)F_1 \end{array} \sim \left(\begin{array}{ccc|c} 0,098 & 1,002 & 1 & 2 \\ 0 & -17,4684 & -21,4296 & -38,8571 \\ 0 & -26,6931 & -30,6327 & K-61,2653 \end{array} \right)$$

$$F_3 - \left(\frac{1308002}{855953}\right)F_2 \sim \left(\begin{array}{ccc|c} 0,098 & 1,002 & 1 & 2 \\ 0 & -17,4684 & -21,4296 & -38,8571 \\ 0 & 0 & 2,1144 & K-1,8867 \end{array} \right)$$

$$\Rightarrow \left. \begin{aligned} 0,098 X_1 + 1,002 X_2 + X_3 &= 2 \\ -17,4684 X_2 - 21,4296 X_3 &= -38,8571 \\ 2,1144 X_3 &= K - 1,8867 \end{aligned} \right\} \begin{array}{l} \textcircled{1} \\ \textcircled{2} \\ \textcircled{3} \end{array}$$

* Para X_3 en ec. $\textcircled{3}$

$$X_3 = \frac{K - 1,8867}{2,1144}$$

$$X_3 = 0,4729 K - 0,8923 \quad //$$

* Para X_2 en ec. $\textcircled{2}$

$$-17,4684 X_2 - 21,4296 X_3 = -38,8571$$

Reemplazando X_3

$$X_2 = \frac{-38,8571 + 21,4296 (0,4729 K - 0,8923)}{-17,4684}$$

$$X_2 = -0,5801 K + 3,3190 \quad //$$

* Para X_1 en ec. $\textcircled{1}$

$$0,098 X_1 + 1,002 X_2 + X_3 = 2$$

$$X_1 = \frac{2 - 1,002 (-0,5801 K + 3,3190) - (0,4729 K - 0,8923)}{0,098}$$

$$X_1 = 1,1061 K - 4,4214 \quad //$$

$$\text{Solución: } X = \begin{pmatrix} 1,1061 K - 4,4214 \\ -0,5801 K + 3,3190 \\ 0,4729 K - 0,8923 \end{pmatrix}$$

\Rightarrow Se concluye que $K \in \mathbb{R}$ para que el sistema sea compatible.

b) Luego, resolver el sistema de ecuaciones por el método de Gauss y Matriz inversa, considere $x_3 = 3$.

* Método de Gauss

$$\left(\begin{array}{ccc|c} 0,098 & 1,002 & 1 & 2 \\ 2,002 & 3,001 & -1,001 & 2 \\ 3,002 & 4 & 0 & K \end{array} \right) \begin{array}{l} F_2 - \left(\frac{143}{7}\right) F_1 \\ F_3 - \left(\frac{1501}{49}\right) F_1 \end{array}$$

$$\left(\begin{array}{ccc|c} 0,098 & 1,002 & 1 & 2 \\ 0 & -17,4684 & -21,4296 & -38,8571 \\ 0 & -26,6939 & -30,6327 & K - 61,2653 \end{array} \right) F_3 - \left(\frac{1308002}{855953}\right) F_2$$

$$\left(\begin{array}{ccc|c} 0,098 & 1,002 & 1 & 2 \\ 0 & -17,4684 & -21,4296 & -38,8571 \\ 0 & 0 & 2,1144 & K - 1,8867 \end{array} \right)$$

$$\Rightarrow \begin{cases} 0,098 X_1 + 1,002 X_2 + X_3 = 2 & (1) \\ -17,4684 X_2 - 21,4296 X_3 = -38,8571 & (2) \\ 2,1144 X_3 = K - 1,8867 & (3) \end{cases}$$

Sea: $X_3 = 3$

Reemplazo X_3 en ec. (3)

$$2,1144 (3) = K - 1,8867$$

$$K = 6,3432 + 1,8867$$

$$K = 8,2299 //$$

Reemplazo X_3 en ec. (2)

$$-17,4684 X_2 - 21,4296 (3) = -38,8571$$

$$X_2 = \frac{21,4296 (3) - 38,8571}{-17,4684}$$

$$X_2 = -1,4559 //$$

Reemplazo X_3, X_2 en ec. (1)

$$0,098 X_1 + 1,002 (-1,4559) + (3) = 2$$

$$X_1 = \frac{2 - 3 - 1,002 (-1,4559)}{0,098}$$

$$X_1 = 4,6818 //$$

$$\text{Soluciones } \begin{cases} X_1 = 4,6813 \\ X_2 = -1,4559 \\ K = 8,2299 \end{cases} //$$

$$\Rightarrow \begin{cases} X_1 = 1,1062 K - 4,4226 & \textcircled{1} \\ X_2 = -0,5802 K + 3,3191 & \textcircled{2} \\ X_3 = 0,4730 K - 0,8924 & \textcircled{3} \end{cases}$$

Sea: $X_3 = 3$

Reemplazo X_3 en ec. $\textcircled{3}$

$$0,4730 K - 0,8924 = 3$$

$$K = 8,2292 //$$

Reemplazo K en ec. $\textcircled{2}$

$$X_2 = -0,5802 (8,2292) + 3,3191$$

$$X_2 = -1,4555 //$$

Reemplazo K en ec. $\textcircled{1}$

$$X_1 = 1,1062 (8,2292) - 4,4226$$

$$X_1 = 4,6805 //$$

$$\text{Soluciones} \begin{cases} X_1 = 4,6805 \\ X_2 = -1,4555 \\ K = 8,2292 \end{cases} \quad \checkmark$$

$$0,098X_1 + 1,002X_2 + X_3 = 2$$

$$2,002X_1 + 3,001X_2 - 1,001X_3 = 2$$

$$3,002X_1 + 4X_2 = k$$

$$L = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

$$U = \begin{pmatrix} 0,098 & 1,002 & 1 & 2 \\ 2,002 & 3,001 & -1,001 & 2 \\ 3,002 & 4 & 0 & k \end{pmatrix} \quad F_2 = F_2 - 20,4286 F_1$$

$$U = \begin{pmatrix} 0,098 & 1,002 & 1 & 2 \\ 0 & -17,4684 & -21,4296 & -38,8571 \\ 1,002 & 4 & 0 & k \end{pmatrix} \quad F_3 = F_3 - 30,6327 F_1$$

$$U = \begin{pmatrix} 0,098 & 1,002 & 1 & 2 \\ 0 & -17,4684 & -21,4296 & -38,8571 \\ 0 & -26,6939 & -30,6327 & k - 61,2653 \end{pmatrix} \quad F_3 = F_3 - 1,5281 F_2$$

$$U = \begin{pmatrix} 0,098 & 1,002 & 1 & 2 \\ 0 & -17,4684 & -21,4296 & -38,8571 \\ 0 & 0 & 2,1149 & k - 1,8868 \end{pmatrix}$$

$$L = \begin{pmatrix} 1 & 0 & 0 \\ 20,4286 & 1 & 0 \\ 30,6327 & 1,5281 & 1 \end{pmatrix}$$

$$LU = \begin{pmatrix} 0,098 & 1,002 & 1 & 2 \\ 0 & -17,4684 & -21,4296 & -38,8571 \\ 0 & 0 & 2,1149 & k - 1,8868 \end{pmatrix}$$

$$\begin{cases} 0,098X_1 + 1,002X_2 + X_3 = 2 & (1) \\ -17,4684X_2 - 21,4796X_3 = -38,8571 & (2) \\ 2,1144X_3 = 4 - 1,8868 & (3) \end{cases}$$

Si $X_3 = 0$

Trabajando la (3) Trabajando la (2) Trabajando la (1)

$$4 - 1,8868 = 0 \quad -17,4684X_2 = -38,8571 \quad 0,098X_1 + 1,002(2,2244) = 2$$

$$4 = 1,8868 \quad X_2 = 2,2244 \quad X_1 = -2,3354$$

```
disp('Cuando X3=3')
Cuando X3=0
```

```
A = [0.098 1.002 1; 2.002 3.001 -1.001; 3.002 4 0]
```

```
A =
```

```
0.0980    1.0020    1.0000
2.0020    3.0010   -1.0010
3.0020    4.0000         0
```

```
B = [2; 2; 8.229999]
```

```
B =
```

```
2.0000
2.0000
8.2300
```

```
disp('Calculo por GAUUS')
```

```
Calculo por GAUUS
```

```
fmsl(A,B,0,0)
```

```
fmsl(A,B,m,f)
```

```
<strong>format short
```

```
</strong><strong>Gauss</strong><strong>
```

```
Tabla Gauss
```

```
</strong> <strong>xi</strong> <strong>vt</strong>
```

```
<strong>ve</strong> <strong>Ea</strong> <strong>Er</strong>
```

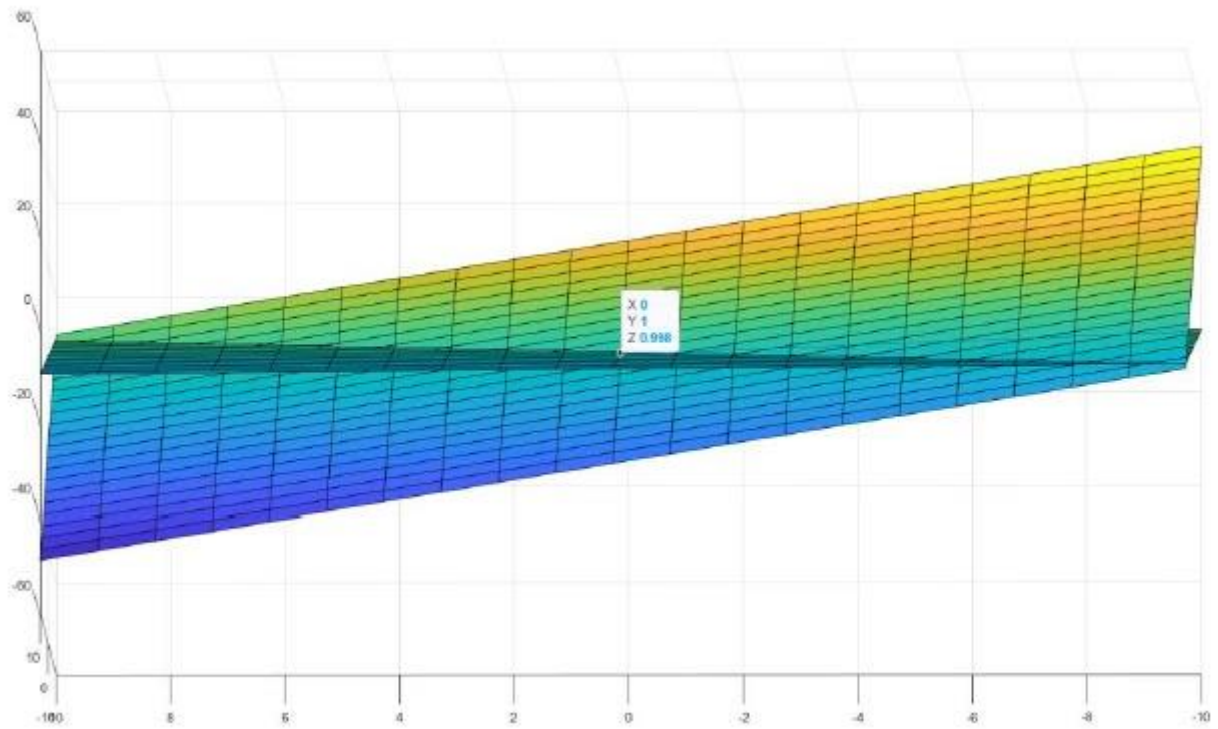
```
<strong>__</strong> <strong>__</strong>
```

```
<strong>__</strong> <strong>__</strong> <strong>__</strong>
```

```
x1    4.6814    4.6814    0    0
x2   -1.4559   -1.4559    0    0
x3     3         3         0    0
```

```
disp('Figura 1')
```

```
Figura 1
```



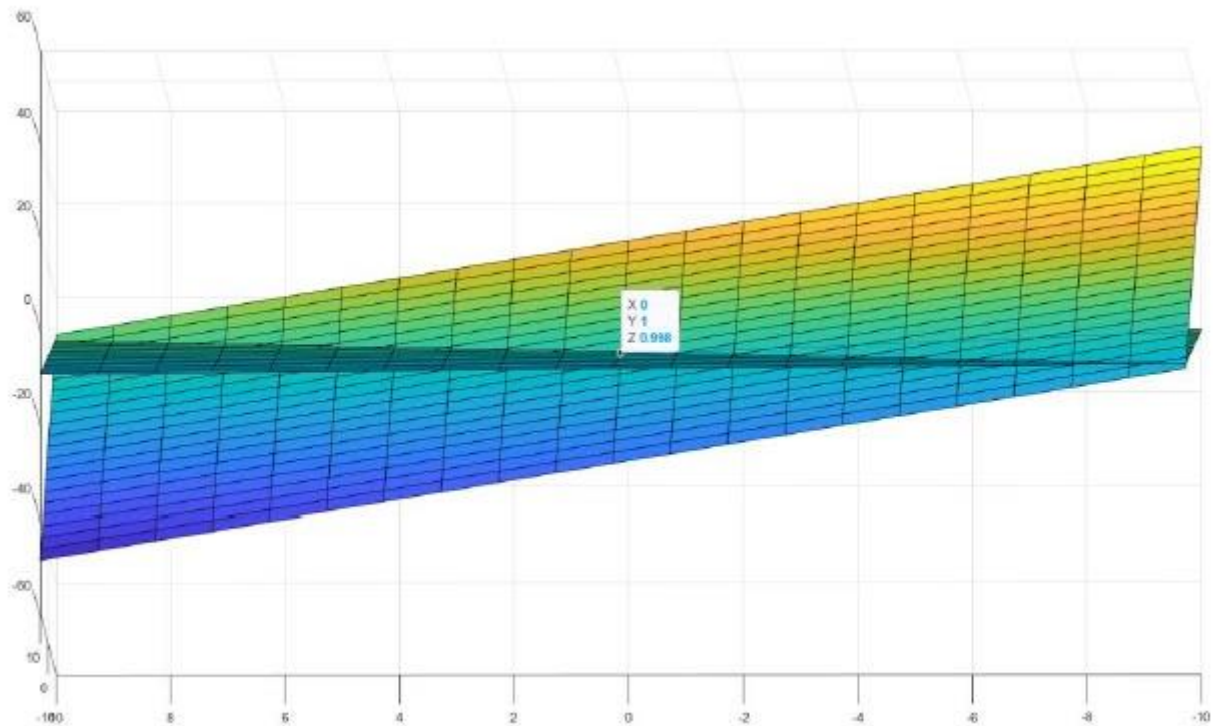
```
disp('Calculo por MATRIZ INVERSA')
Calculo por MATRIZ INVERSA
fmsl(A,B,4,0)
fmsl(A,B,m,f)
<strong>format short
</strong><strong>Matriz Inversa</strong>
matrizInv =
```

```
-1.1062    -1.1051     1.1062
 0.8302     0.8294    -0.5802
 0.2765    -0.7227     0.4730
```

X =

```
4.6814
-1.4559
3.0000
```

```
disp('Figura 2')
Figura 2
```

```
disp('Cuando X3=0')
```

```
Cuando X3=0
```

```
A
```

```
A =
```

```

0.0980    1.0020    1.0000
2.0020    3.0010   -1.0010
3.0020    4.0000         0

```

```
B = [2;2;1.8868]
```

```
B =
```

```

2.0000
2.0000
1.8868

```

```
disp('Calculo por DESCOMPOSICION LU')
```

```
Calculo por DESCOMPOSICION LU
```

```
fmsl(A,B,3,0)
```

```
fmsl(A,B,m,f)
```

```
<strong>format short
```

```
</strong><strong>Descomposicion LU
```

```
</strong>L
```

```

1.0000         0         0
30.6327    1.0000         0
20.4286    0.6544    1.0000

```

```
U
```

```

0.0980    1.0020    1.0000
0   -26.6939   -30.6327
0         0   -1.3836

```

```
x
-2.3354
 2.2244
 0.0000
```

```
disp('Calculo por GAUSS SEIDEL')
Calculo por GAUSS SEIDEL
linsolve(A,B)
```

```
ans =
-2.3354
 2.2244
 0.0000
```

```
disp('Ejercicio 2')
Ejercicio 2
```


Considerar Z número de horas utilizado móviles, considere la variable lógica Y como niñas (F) niños (V) y la edad X . Observe el vector (X, Y, Z) con valores (x, y, z)

Z : 2.1, 2.6, 3, 3.5, 3.8, 3.8, 4.4, 4, 4.2, 4.2, 4.3, 4.3, 4.4, 4.4, 4.5, 4.6, 4.6, 4.7, 4.9, 5

Y : V, V, F, F, V, V, V, V, V, F, V, F, F, F, F, F, F, V, F

X : 13, 6, 5, 5, 8, 9, 12, 8, 8, 7, 6, 7, 7, 8, 7, 7, 7, 6, 8, 10

a) Encuentre la ecuación de predicción de mínimos cuadrados para los datos registrados

b) Estime las horas utilizadas frente a las tecnologías de información de una niña de 11 años

c) Efectúe el análisis comparativo con los resultados tabulados y gráficas de su algoritmo

Niños

X	Y	X^2	X^3	X^4	XY	X^2Y
13	2.1	169	2197	2861	27.3	355
6	2.6	36	216	1296	15.6	94
8	3.8	64	512	4096	30.40	243
9	3.8	81	729	6561	36.00	324
12	4	144	1728	20736	48.00	576
8	4	64	512	4096	32.00	256
8	4	64	512	4096	32.00	256
6	4.2	36	216	1296	25.20	151
8	4.9	64	512	4096	39.20	314
78	5.6	722	7134	74834	285.7	2569

Real

```
disp('niño')
niño
```

$$\sum_{i=1}^n \{ a_0 + x_i a_1 + x_i^2 a_2 = y_i \}$$

$$9a_0 + 78a_1 + 722a_2 = 3306 \quad (1)$$

$$\sum_{i=1}^n \{ x_i a_0 + x_i^2 a_1 + x_i^3 a_2 = x_i y_i \}$$

$$78a_0 + 722a_1 + 7134a_2 = 285.7 \quad (2)$$

$$\sum_{i=1}^n \{ x_i^2 a_0 + x_i^3 a_1 + x_i^4 a_2 = x_i^2 y_i \}$$

$$722a_0 + 7134a_1 + 74834a_2 = 2569 \quad (3)$$

$$a_0 = -3.9109 \quad a_1 = 1.824 \quad a_2 = -0.102$$

$$y = -0.102 x^2 + 1.824 x - 3.9109$$

x = [13 6 8 9 12 8 8 6 8]

x =


```

13      6      8      9      12      8      8      6      8
y = [2.1 2.6 3.8 3.8 4 4 4 4.2 4.9]
y =
Columns 1 through 6
    2.1000    2.6000    3.8000    3.8000    4.0000    4.0000
Columns 7 through 9
    4.0000    4.2000    4.9000
M = [x' y']
M =
    13.0000    2.1000
     6.0000    2.6000
     8.0000    3.8000
     9.0000    3.8000
    12.0000    4.0000
     8.0000    4.0000
     8.0000    4.0000
     6.0000    4.2000
     8.0000    4.9000

help fac
<strong>fac</strong> Resuelve el ajuste de curvas
<strong>Modos de entrada</strong>
[X,Y,r] = <strong>fac</strong>(M)
[X,Y,r,Ec,Ea,Er] = <strong>fac</strong>(M,m)
[X,Y,r,Ec,Ea,Er,y] = <strong>fac</strong>(M,m,x)

<strong>Valores de entrada</strong>
<strong>M:</strong> Matriz de pares ordenados [xi;yi]
<strong>m:</strong> Tipo de ajuste:
    0 - Lineal
    1 - Cuadratico
    2 - Cubico
    3 - Exponencial
<strong>x:</strong> Valor a comprobar dentro del ajuste ya efectuado

<strong>Valores de Salida</strong>
<strong>X:</strong> Lista de puntos en x
<strong>Y:</strong> Lista de puntos en y
<strong>r:</strong> Coeficiente de correlacion -1 < r < 1
<strong>Ec:</strong> Ecuacion nde regresion
<strong>Ea:</strong> Error absoluto
<strong>Er:</strong> Error relativo
<strong>y:</strong> Valor de Ec evaluado en x

fac(M,1)
    -0.3423

fac(M,m)
Ajuste cuadratico

```

- 0.10207*x^2 + 1.8242*x - 3.9104

[Warning: fplot will not accept character vector or string inputs in a future release. Use

fplot(@(x)+-0.10207.*x.^2+1.8242.*x.^1+-3.9104.*x.^0) instead.]

[> In <a

href="matlab:matlab.internal.language.introspective.errorDocCallback('fplot', 'C:\Program

Files\Polyspace\R2020a\toolbox\matlab\graphics\function\fplot.m', 110)"

style="font-weight:bold">fplot (<a href="matlab:

opentoline('C:\Program

Files\Polyspace\R2020a\toolbox\matlab\graphics\function\fplot.m',110,0)"> line 110)

In <a

href="matlab:matlab.internal.language.introspective.errorDocCallback('fac/cuadratico', 'C:\Users\ismae\OneDrive\Documentos\MATLAB\Met.

Numericos\Grupal\Ajuste de Curvas\fac.m', 124)" style="font-

weight:bold">fac/cuadratico (<a href="matlab:

opentoline('C:\Users\ismae\OneDrive\Documentos\MATLAB\Met.

Numericos\Grupal\Ajuste de Curvas\fac.m',124,0)">line 124)

In <a

href="matlab:matlab.internal.language.introspective.errorDocCallback('fac', 'C:\Users\ismae\OneDrive\Documentos\MATLAB\Met.

Numericos\Grupal\Ajuste de Curvas\fac.m', 42)" style="font-

weight:bold">fac (<a href="matlab:

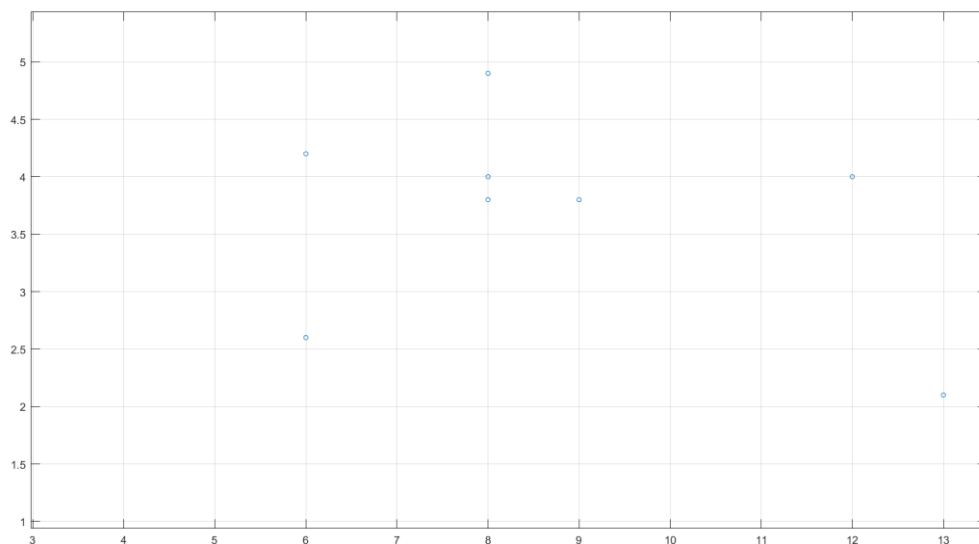
opentoline('C:\Users\ismae\OneDrive\Documentos\MATLAB\Met.

Numericos\Grupal\Ajuste de Curvas\fac.m',42,0)">line 42)]

Elapsed time is 0.245839 seconds.

fac(M)

-0.3423



fac(M)

-0.3423

Elapsed time is 0.106871 seconds.

fac(M,1)

-0.3423


```

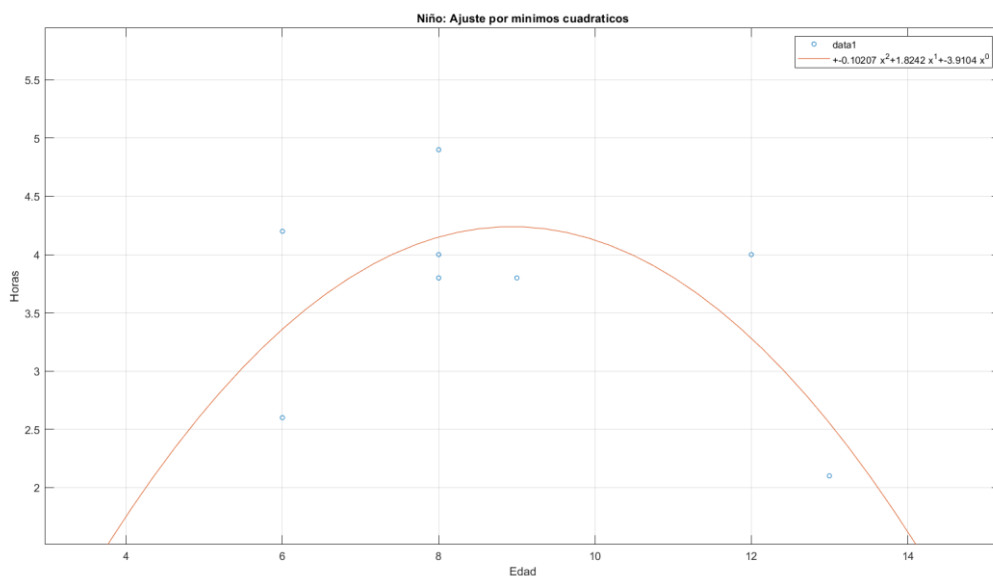
fac(M,m)
Ajuste cuadratico
- 0.10207*x^2 + 1.8242*x - 3.9104

```

```

[ Warning: fplot will not accept character vector or string
inputs in a future release. Use
fplot(@(x)+-0.10207.*x.^2+1.8242.*x.^1+-3.9104.*x.^0) instead.]
[ > In <a
href="matlab:matlab.internal.language.introspective.errorDocCallback('fplot', 'C:\Program
Files\Polyspace\R2020a\toolbox\matlab\graphics\function\fplot.m', 110)"
style="font-weight:bold">fplot</a> (<a href="matlab:
opentoline('C:\Program
Files\Polyspace\R2020a\toolbox\matlab\graphics\function\fplot.m',110,0)">
line 110</a>)
In <a
href="matlab:matlab.internal.language.introspective.errorDocCallback('fac
/cuadratico', 'C:\Users\ismae\OneDrive\Documentos\MATLAB\Met.
Numericos\Grupal\Ajuste de Curvas\fac.m', 124)" style="font-
weight:bold">fac/cuadratico</a> (<a href="matlab:
opentoline('C:\Users\ismae\OneDrive\Documentos\MATLAB\Met.
Numericos\Grupal\Ajuste de Curvas\fac.m',124,0)">line 124</a>)
In <a
href="matlab:matlab.internal.language.introspective.errorDocCallback('fac
', 'C:\Users\ismae\OneDrive\Documentos\MATLAB\Met.
Numericos\Grupal\Ajuste de Curvas\fac.m', 42)" style="font-
weight:bold">fac</a> (<a href="matlab:
opentoline('C:\Users\ismae\OneDrive\Documentos\MATLAB\Met.
Numericos\Grupal\Ajuste de Curvas\fac.m',42,0)">line 42</a>)]
Elapsed time is 0.247652 seconds.
legend
xlabel('Edad')
ylabel('Horas')
title('Niño: Ajuste por minimos cuadraticos')
disp('Aqui va la fig 6')
Aqui va la fig 6

```



```

disp('Niña')
Niña

```

```
x1 = [5 5 7 7 7 8 7 7 7 6 10]
```

```
x1 =
```

```
Columns 1 through 10
```

```
5      5      7      7      7      8      7      7      7      6
```

```
Column 11
```

```
10
```

```
y1 = [3 3.5 4.2 4.3 4.3 4.4 4.5 4.6 4.6 4.7 5]
```

```
y1 =
```

```
Columns 1 through 6
```

```
3.0000    3.5000    4.2000    4.3000    4.3000    4.4000
```

```
Columns 7 through 11
```

```
4.5000    4.6000    4.6000    4.7000    5.0000
```

```
M1 = [x1' y1']
```

```
M1 =
```

```
5.0000    3.0000
5.0000    3.5000
7.0000    4.2000
7.0000    4.3000
7.0000    4.3000
8.0000    4.4000
7.0000    4.5000
7.0000    4.6000
7.0000    4.6000
6.0000    4.7000
10.0000    5.0000
```

```
fac(M1)
```

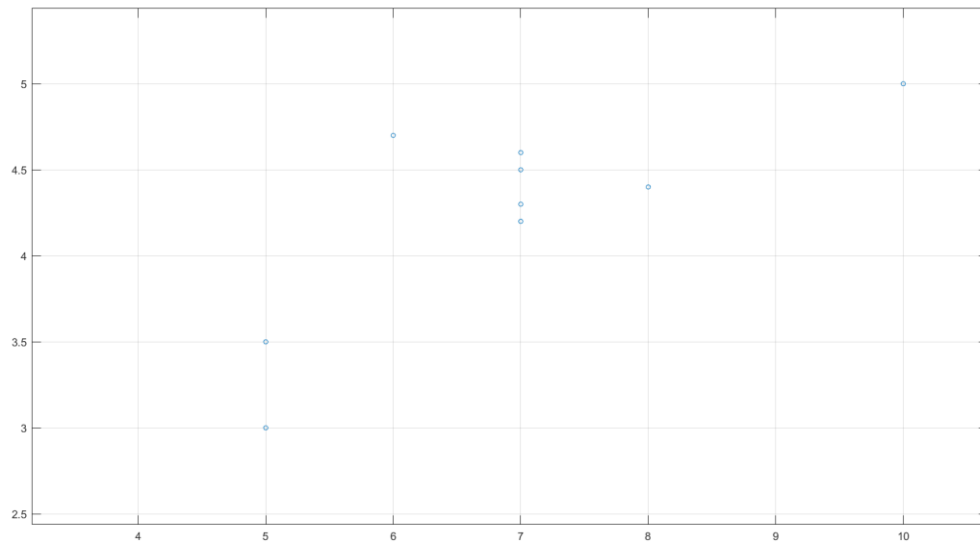
```
0.7670
```

```
fac(M)
```

```
0.7670
```

```
Elapsed time is 0.108183 seconds.
```

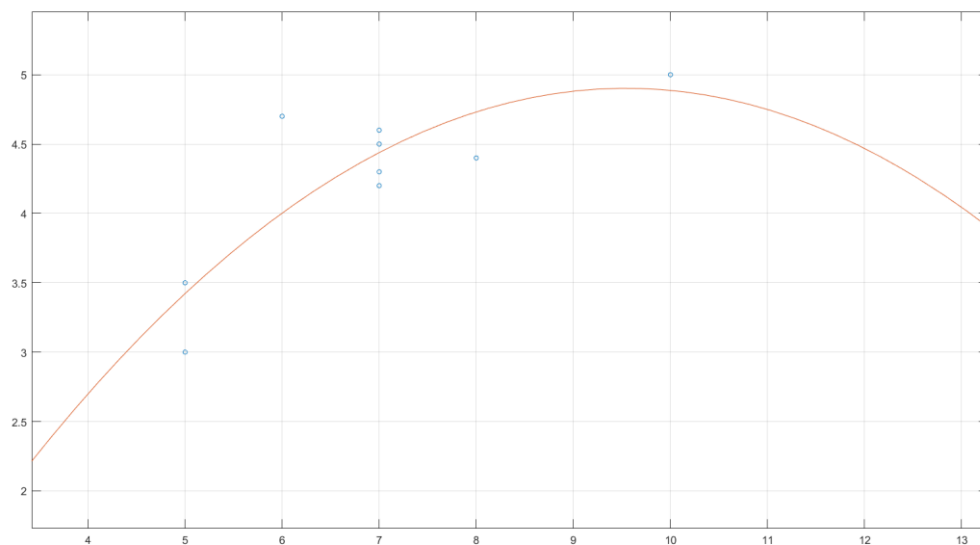
```
disp('Aqui va la fig 7')
```



Aqui va la fig 7

```
fac(M1,1)
0.7670
```

```
fac(M,m)
Ajuste cuadratico
- 0.071735*x^2 + 1.3689*x - 1.6285
```



```
[ Warning: fplot will not accept character vector or string
inputs in a future release. Use
fplot(@(x)+-0.071735.*x.^2+1.3689.*x.^1+-1.6285.*x.^0) instead.]
[ > In <a
href="matlab:matlab.internal.language.introspective.errorDocCallback('fplot', 'C:\Program
Files\Polyspace\R2020a\toolbox\matlab\graphics\function\fplot.m', 110)"
style="font-weight:bold">fplot</a> (<a href="matlab:
opentoline('C:\Program
```

```

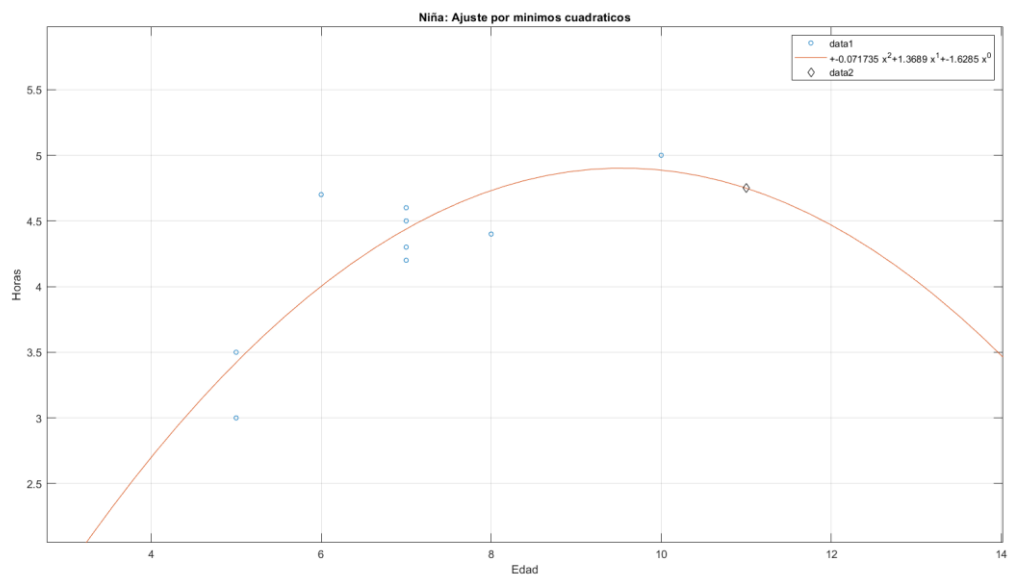
Files\Polyspace\R2020a\toolbox\matlab\graphics\function\fplot.m',110,0)">
line 110</a>)
    In <a
href="matlab:matlab.internal.language.introspective.errorDocCallback('fac
/cuadratico', 'C:\Users\ismae\OneDrive\Documentos\MATLAB\Met.
Numericos\Grupal\Ajuste de Curvas\fac.m', 124)" style="font-
weight:bold">fac/cuadratico</a> (<a href="matlab:
opentoline('C:\Users\ismae\OneDrive\Documentos\MATLAB\Met.
Numericos\Grupal\Ajuste de Curvas\fac.m',124,0)">line 124</a>)
    In <a
href="matlab:matlab.internal.language.introspective.errorDocCallback('fac
', 'C:\Users\ismae\OneDrive\Documentos\MATLAB\Met.
Numericos\Grupal\Ajuste de Curvas\fac.m', 42)" style="font-
weight:bold">fac</a> (<a href="matlab:
opentoline('C:\Users\ismae\OneDrive\Documentos\MATLAB\Met.
Numericos\Grupal\Ajuste de Curvas\fac.m',42,0)">line 42</a>)]
Elapsed time is 0.249538 seconds.
fac(M1,1,11)
    0.7670

fac(M,m,x)
Ajuste cuadratico
- 0.071735*x^2 + 1.3689*x - 1.6285

[ Warning: fplot will not accept character vector or string
inputs in a future release. Use
fplot(@(x)+-0.071735.*x.^2+1.3689.*x.^1+-1.6285.*x.^0) instead.]
[ > In <a
href="matlab:matlab.internal.language.introspective.errorDocCallback('fpl
ot', 'C:\Program
Files\Polyspace\R2020a\toolbox\matlab\graphics\function\fplot.m', 110)"
style="font-weight:bold">fplot</a> (<a href="matlab:
opentoline('C:\Program
Files\Polyspace\R2020a\toolbox\matlab\graphics\function\fplot.m',110,0)">
line 110</a>)
    In <a
href="matlab:matlab.internal.language.introspective.errorDocCallback('fac
/cuadratico', 'C:\Users\ismae\OneDrive\Documentos\MATLAB\Met.
Numericos\Grupal\Ajuste de Curvas\fac.m', 124)" style="font-
weight:bold">fac/cuadratico</a> (<a href="matlab:
opentoline('C:\Users\ismae\OneDrive\Documentos\MATLAB\Met.
Numericos\Grupal\Ajuste de Curvas\fac.m',124,0)">line 124</a>)
    In <a
href="matlab:matlab.internal.language.introspective.errorDocCallback('fac
', 'C:\Users\ismae\OneDrive\Documentos\MATLAB\Met.
Numericos\Grupal\Ajuste de Curvas\fac.m', 61)" style="font-
weight:bold">fac</a> (<a href="matlab:
opentoline('C:\Users\ismae\OneDrive\Documentos\MATLAB\Met.
Numericos\Grupal\Ajuste de Curvas\fac.m',61,0)">line 61</a>)]
4.749465

Elapsed time is 0.476287 seconds.
xlabel('Edad')
ylabel('Horas')
title('Niña: Ajuste por minimos cuadrados')
disp('Aqui va la fig 9')
Aqui va la fig 9

```

diary off