

```

disp('Grupo 5')
Grupo 5
disp('NRC: 7543')
NRC: 7543
date

```

```
ans =
```

```
    '28-Dec-2021'
```

```
clock
```

```
ans =
```

```
    1.0e+03 *
```

```
Columns 1 through 2
```

```
    2.0210000000000000    0.0120000000000000
```

```
Columns 3 through 4
```

```
    0.0280000000000000    0.0110000000000000
```

```
Columns 5 through 6
```

```
    0.0190000000000000    0.0150560000000000
```

```
clc
```

```
disp('Ingreso la Matriz A')
```

```
Ingreso la Matriz A
```

```

A = [1 -1/2 0 0 0 0 0 0 0 0 0 0;-1/2 1 -1/2 0 0 0 0 0 0 0 0 0;0 -1/2
1 -1/2 0 0 0 0 0 0 0 0 0;0 0 -1/2 1 -1/2 0 0 0 0 0 0 0;0 0 0 -1/2 1 -
1/2 0 0 0 0 0 0 0;0 0 0 0 -1/2 1 -1/2 0 0 0 0 0 0 ;0 0 0 0 0 -1/2 1 -1/2
0 0 0 0 0;0 0 0 0 0 0 -1/2 1 -1/2 0 0 0 0;0 0 0 0 0 0 0 -1/2 1 -1/2 0 0
0;0 0 0 0 0 0 0 0 -1/2 1 -1/2 0 0;0 0 0 0 0 0 0 0 0 0 -1/2 1 -1/2 0;0 0 0 0
0 0 0 0 0 -1/2 1 -1/2;0 0 0 0 0 0 0 0 0 0 0 0 -1/2 1]

```

```
A =
```

```
Columns 1 through 2
```

```
    1.0000000000000000   -0.5000000000000000
```

```
   -0.5000000000000000    1.0000000000000000
```

```
         0   -0.5000000000000000
```

```
         0         0
```

```
         0         0
```

```
         0         0
```

```
         0         0
```

```
         0         0
```

```
         0         0
```

```
         0         0
```

```
         0         0
```

```
         0         0
```

```
         0         0
```

```
Columns 3 through 4
```

0	0
-0.5000000000000000	0
1.0000000000000000	-0.5000000000000000
-0.5000000000000000	1.0000000000000000
0	-0.5000000000000000
0	0
0	0
0	0
0	0
0	0
0	0
0	0
0	0

Columns 5 through 6

0	0
0	0
0	0
-0.5000000000000000	0
1.0000000000000000	-0.5000000000000000
-0.5000000000000000	1.0000000000000000
0	-0.5000000000000000
0	0
0	0
0	0
0	0
0	0
0	0

Columns 7 through 8

0	0
0	0
0	0
0	0
0	0
0	0
-0.5000000000000000	0
1.0000000000000000	-0.5000000000000000
-0.5000000000000000	1.0000000000000000
0	-0.5000000000000000
0	0
0	0
0	0
0	0

Columns 9 through 10

0	0
0	0
0	0
0	0
0	0
0	0
0	0
-0.5000000000000000	0
1.0000000000000000	-0.5000000000000000
-0.5000000000000000	1.0000000000000000

```

0 -0.5000000000000000
0 0
0 0

Columns 11 through 12

0 0
0 0
0 0
0 0
0 0
0 0
0 0
0 0
0 0
0 0
-0.5000000000000000 0
1.0000000000000000 -0.5000000000000000
-0.5000000000000000 1.0000000000000000
0 -0.5000000000000000

```

```

Column 13

0
0
0
0
0
0
0
0
0
0
0
0
0
-0.5000000000000000
1.0000000000000000

```

```

disp('Ingreso la Matriz B')
Ingreso la Matriz B
B = [1.32e-4;2.65e-4;3.97e-4;4.3e-4;2.68e-4;2.02e-4;2.16e-4;2.29e-
4;2.42e-4;1.94e-4;1.45e-4;9.68e-5;8.57e-5]

```

```

B =

1.0e-03 *

0.1320000000000000
0.2650000000000000
0.3970000000000000
0.4300000000000000
0.2680000000000000
0.2020000000000000
0.2160000000000000
0.2290000000000000
0.2420000000000000
0.1940000000000000
0.1450000000000000
0.0968000000000000
0.0857000000000000

```

B=-1/2\*B

B =

1.0e-03 \*

-0.0660000000000000  
-0.1325000000000000  
-0.1985000000000000  
-0.2150000000000000  
-0.1340000000000000  
-0.1010000000000000  
-0.1080000000000000  
-0.1145000000000000  
-0.1210000000000000  
-0.0970000000000000  
-0.0725000000000000  
-0.0484000000000000  
-0.0428500000000000

disp('Ingresamos los datos a la funcion')

Ingresamos los datos a la funcion

help fmsl

<strong>fmsl</strong> resuelve un sistema de ecuaciones NxN

[AX=B,Ea,Er] = <strong>fmsl</strong>(A,B,m,f)

[AX=B,Ea,Er,Ec] = <strong>fmsl</strong>(A,B,m,f,n)

[AX=B,Ea,Er,n] = <strong>fmsl</strong>(A,B,m,f,Ec)

A: Una matriz NxN

B: Una matriz 1xN

m: El metodo para resolver el sistema (Integer)

- 0 - Gauss
- 1 - Gauss - Jordan
- 2 - Gauss - Sediel
- 3 - Descomposicion LU
- 4 - Matriz Inversa
- 5 - Todos los metodos

f: Formato de decimales (Integer o String)

- 0 - Short - 4 decimales
- 1 - Long - 15 decimales
- 2 - Bank - 2 decimales
- 3 - Rat - Fraccion
- 'eng' - Notacion Cientifica

n: Numero de iteraccion para Gauss- Sediel(Integer)

Ec: Error de calculo para Gauss- Sediel(Real)

fmsl(A,B,0,1)

fmsl(A,B,m,f)

<strong>format long

</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>  
 <strong>\_\_\_\_</strong>      </strong>

x 1	-0.00165552142857143	-0.00165552142857143
1.0842021724855e-18	-6.54900718150823e-16	
x 2	-0.00317904285714286	-0.00317904285714286
2.16840434497101e-18	-6.82093460960715e-16	
x 3	-0.00443756428571428	-0.00443756428571429
4.33680868994202e-18	-9.7729484255662e-16	
x 4	-0.00529908571428571	-0.00529908571428572
7.80625564189563e-18	-1.47313254829053e-15	
x 5	-0.00573060714285713	-0.00573060714285714
9.54097911787244e-18	-1.66491592950403e-15	
x 6	-0.00589412857142856	-0.00589412857142857
1.04083408558608e-17	-1.76588290019913e-15	
x 7	-0.00585564999999999	-0.00585565
1.04083408558608e-17	-1.77748684703848e-15	
x 8	-0.00560117142857142	-0.00560117142857143
1.12757025938492e-17	-2.01309721326011e-15	
x 9	-0.00511769285714285	-0.00511769285714286
9.54097911787244e-18	-1.86431256900381e-15	
x10	-0.00439221428571428	-0.00439221428571429
7.80625564189563e-18	-1.7772938964489e-15	
x11	-0.00347273571428571	-0.00347273571428572
6.07153216591882e-18	-1.74834270887431e-15	
x12	-0.00240825714285714	-0.00240825714285714
3.90312782094782e-18	-1.62072718543551e-15	
x13	-0.00124697857142857	-0.00124697857142857
2.16840434497101e-18	-1.73892671025359e-15	

fmsl(A,B,1,1)

fmsl(A,B,m,f)

<strong>format long

</strong><strong>Gauss-Jordan

</strong><strong>      Tabla Gauss-Jordan

</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>\_\_\_\_</strong>

x 1	-0.00165552142857143	-0.00165552142857143	0	0
x 2	-0.00317904285714286	-0.00317904285714286	0	0
x 3	-0.00443756428571429	-0.00443756428571429	0	0
x 4	-0.00529908571428571	-0.00529908571428571	0	0
x 5	-0.00573060714285714	-0.00573060714285714	0	0
x 6	-0.00589412857142857	-0.00589412857142857	0	0
x 7	-0.00585565	-0.00585565	0	0
x 8	-0.00560117142857143	-0.00560117142857143	0	0
x 9	-0.00511769285714286	-0.00511769285714286	0	0
x10	-0.00439221428571429	-0.00439221428571429	0	0
x11	-0.00347273571428571	-0.00347273571428571	0	0
x12	-0.00240825714285714	-0.00240825714285714	0	0
x13	-0.00124697857142857	-0.00124697857142857	0	0

```
fmsl(A,B,3,1)
fmsl(A,B,m,f)
<strong>format long
</strong><strong>Descomposicion LU
</strong>L
Columns 1 through 4
```

1.0000000000000000	0	0	
-0.5000000000000000	1.0000000000000000	0	
0	0	-0.666666666666667	1.0000000000000000
0	0	0	-0.7500000000000000
1.0000000000000000	0	0	0
0.8000000000000000	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0

Columns 5 through 8

0	0	0	
0	0	0	
0	0	0	
0	0	0	
0	0	0	
1.0000000000000000	0	0	
-0.833333333333333	1.0000000000000000	0	
0	0	-0.857142857142857	1.0000000000000000
0	0	0	-0.8750000000000000
1.0000000000000000	0	0	0
0.888888888888889	0	0	0
0	0	0	0
0	0	0	0



0.5000000000000000	0	0	0.666666666666667	-
0.6250000000000000	0	0	0	
0	0	0	0	
0	0	0	0	
0	0	0	0	
0	0	0	0	
0	0	0	0	
0	0	0	0	
0	0	0	0	
0	0	0	0	
0	0	0	0	
0	0	0	0	
0	0	0	0	
0	0	0	0	

Columns 5 through 8

0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
-0.5000000000000000	0	0	0
0.6000000000000000	-0.5000000000000000	0	0
0	0	0.583333333333333	-0.5000000000000000
0	0	0	0.571428571428571
0.5000000000000000	0	0	0
0.5625000000000000	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0

Columns 9 through 12

0	0	0
0	0	0



	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
-0.5000000000000000		0	0
0	0.5555555555555556	-0.5000000000000000	0
0	0	0.5500000000000000	-0.5000000000000000
0	0	0	0.5454545454545454
0.5000000000000000	0	0	0
0.5416666666666667	0	0	0
0	0	0	0

Column 13

0
0
0
0
0
0
0
0
0
0
0
0
0
-0.5000000000000000
0.538461538461538

x

-0.001655521428571
-0.003179042857143
-0.004437564285714
-0.005299085714286
-0.005730607142857
-0.005894128571429
-0.005855650000000
-0.005601171428571
-0.005117692857143
-0.004392214285714
-0.003472735714286
-0.002408257142857
-0.001246978571429

disp('Análisis del Problema')  
Análisis del Problema

$$[A] = \begin{bmatrix} +1 - \frac{1}{2} 0 & . & . & . & . & . & 0 \\ -\frac{1}{2} + 1 - \frac{1}{2} 0 & . & . & . & . & . & . \\ 0 - \frac{1}{2} + 1 - \frac{1}{2} 0 & . & . & . & . & . & . \\ . & . & . & . & . & . & . \\ . & . & . & . & . & . & . \\ . & . & . & . & . & . & . \\ 0 & . & . & . & . & 0 - \frac{1}{2} + 1 - \frac{1}{2} \\ 0 & . & . & . & . & . & 0 - \frac{1}{2} + 1 \end{bmatrix}$$

$$X = \begin{bmatrix} -\frac{1}{2} \left[ \frac{M}{EI} \right]_2 (\Delta x)^2 + \frac{1}{2} y_1 \\ -\frac{1}{2} \left[ \frac{M}{EI} \right]_3 (\Delta x)^2 \\ -\frac{1}{2} \left[ \frac{M}{EI} \right]_4 (\Delta x)^2 \\ . \\ . \\ . \\ -\frac{1}{2} \left[ \frac{M}{EI} \right]_{n-1} (\Delta x)^2 + \frac{1}{2} y_n \end{bmatrix}$$

$$Y = \begin{bmatrix} y_1 \\ y_2 \\ . \\ . \\ y_n \end{bmatrix}$$

```
disp('Formulacion del sistema matricial')
Formulacion del sistema matricial
```

$$[A]\{Y\}=\{X\}$$

**MATRIZ A**

1	-1/2	0	0	0	0	0	0	0	0	0	0	0	0
-1/2	1	-1/2	0	0	0	0	0	0	0	0	0	0	0
0	-1/2	1	-1/2	0	0	0	0	0	0	0	0	0	0
0	0	-1/2	1	-1/2	0	0	0	0	0	0	0	0	0
0	0	0	-1/2	1	-1/2	0	0	0	0	0	0	0	0
0	0	0	0	-1/2	1	-1/2	0	0	0	0	0	0	0
0	0	0	0	0	-1/2	1	-1/2	0	0	0	0	0	0
0	0	0	0	0	0	-1/2	1	-1/2	0	0	0	0	0
0	0	0	0	0	0	0	-1/2	1	-1/2	0	0	0	0
0	0	0	0	0	0	0	0	-1/2	1	-1/2	0	0	0
0	0	0	0	0	0	0	0	0	-1/2	1	-1/2	0	0
0	0	0	0	0	0	0	0	0	0	-1/2	1	-1/2	0
0	0	0	0	0	0	0	0	0	0	0	-1/2	1	-1/2
0	0	0	0	0	0	0	0	0	0	0	0	-1/2	1

**MATRIZ B**

Va desde 2 a n-1 de la tabla

$(M/EI)\Delta x^2$
0.000E+00
1.320E-04
2.650E-04
3.970E-04
4.300E-04
2.680E-04
2.020E-04
2.160E-04
2.290E-04
2.420E-04
1.940E-04
1.450E-04
9.680E-05
8.570E-05
0.000E+00

```
disp('Tabla de resultados propuesta por el ejercicio')
Tabla de resultados propuesta por el ejercicio
```

Punto	x	M(x)	I(x)	E(x)	$(M/EI)\Delta x^2$
1	0.00	0.00	12.5664	30,000,000.00	0.000E+00
2	3.00	5,550.00	12.5664	30,000,000.00	1.320E-04
3	6.00	11,100.00	12.5664	30,000,000.00	2.650E-04
4	9.00	16,650.00	12.5664	30,000,000.00	3.970E-04
5	12.00	18,000.00	12.5664	30,000,000.00	4.300E-04
6	15.00	19,350.00	21.6230	30,000,000.00	2.680E-04
7	18.00	20,700.00	30.6796	30,000,000.00	2.020E-04
8	21.00	22,050.00	30.6796	30,000,000.00	2.160E-04
9	24.00	23,400.00	30.6796	30,000,000.00	2.290E-04
10	27.00	24,750.00	30.6796	30,000,000.00	2.420E-04
11	30.00	19,800.00	30.6796	30,000,000.00	1.940E-04
12	33.00	14,850.00	30.6796	30,000,000.00	1.450E-04
13	36.00	9,900.00	30.6796	30,000,000.00	9.680E-05
14	39.00	4,950.00	17.3278	30,000,000.00	8.570E-05
15	42.00	0.00	3.9761	30,000,000.00	0.000E+00

```
disp('Solucion del problema')
```

```
Solucion del problema
```

```
help fmsl
```

```
<strong>fmsl</strong> resuelve un sistema de ecuaciones NxN
```

```
[AX=B,Ea,Er] = <strong>fmsl</strong>(A,B,m,f)
```

```
[AX=B,Ea,Er,Ec] = <strong>fmsl</strong>(A,B,m,f,n)
```

```
[AX=B,Ea,Er,n] = <strong>fmsl</strong>(A,B,m,f,Ec)
```

```
A: Una matriz NxN
```

B: Una matriz 1xN  
 m: El metodo para resolver el sistema (Integer)  
 0 - Gauss  
 1 - Gauss - Jordan  
 2 - Gauss - Sediel  
 3 - Descomposicion LU  
 4 - Matriz Inversa  
 5 - Todos los metodos

f: Formato de decimales (Integer o String)  
 0 - Short - 4 decimales  
 1 - Long - 15 decimales  
 2 - Bank - 2 decimales  
 3 - Rat - Fraccion  
 'eng' - Notacion Cientifica

n: Numero de iteraccion para Gauss- Sediel(Integer)  
 Ec: Error de calculo para Gauss- Sediel(Real)

```
fmsl(A,B,1,1)
fmsl(A,B,m,f)
<strong>format long
</strong><strong>Gauss-Jordan
</strong><strong>
</strong>
<strong>xi</strong>
<strong>vt</strong>
<strong>ve</strong>
<strong>Ea</strong>
<strong>Er</strong>
<strong>__</strong>
<strong>__</strong>
<strong>__</strong>
```

x 1	-0.00165552142857143	-0.00165552142857143	0	0
x 2	-0.00317904285714286	-0.00317904285714286	0	0
x 3	-0.00443756428571429	-0.00443756428571429	0	0
x 4	-0.00529908571428571	-0.00529908571428571	0	0
x 5	-0.00573060714285714	-0.00573060714285714	0	0
x 6	-0.00589412857142857	-0.00589412857142857	0	0
x 7	-0.00585565	-0.00585565	0	0
x 8	-0.00560117142857143	-0.00560117142857143	0	0
x 9	-0.00511769285714286	-0.00511769285714286	0	0
x10	-0.00439221428571429	-0.00439221428571429	0	0
x11	-0.00347273571428571	-0.00347273571428571	0	0
x12	-0.00240825714285714	-0.00240825714285714	0	0
x13	-0.00124697857142857	-0.00124697857142857	0	0

```
fmsl(A,B,1,0)
fmsl(A,B,m,f)
<strong>format short
</strong><strong>Gauss-Jordan
</strong><strong>
</strong>
<strong>xi</strong>
<strong>vt</strong>
<strong>ve</strong>
<strong>Ea</strong>
<strong>Er</strong>
<strong>__</strong>
<strong>__</strong>
<strong>__</strong>
```

x 1	-0.0016555	-0.0016555	0	0
x 2	-0.003179	-0.003179	0	0
x 3	-0.0044376	-0.0044376	0	0

x 4	-0.0052991	-0.0052991	0	0
x 5	-0.0057306	-0.0057306	0	0
x 6	-0.0058941	-0.0058941	0	0
x 7	-0.0058556	-0.0058556	0	0
x 8	-0.0056012	-0.0056012	0	0
x 9	-0.0051177	-0.0051177	0	0
x10	-0.0043922	-0.0043922	0	0
x11	-0.0034727	-0.0034727	0	0
x12	-0.0024083	-0.0024083	0	0
x13	-0.001247	-0.001247	0	0

```
disp('Comprobacion de resultados con la tabla propuesta')
Comprobacion de resultados con la tabla propuesta
```

y(x)
0.000000
-0.001656
-0.003180
-0.004439
-0.005300
-0.005732
-0.005895
-0.005856
-0.005601
-0.005118
-0.004392
-0.003473
-0.002408
-0.001247
-0.000000

```
diary off
```