

EJERCICIO 2.5.-

Efectuar la factorización L U y calcular el determinante, basándose en lo anterior, de las siguientes matrices:

$$a=[2 \ -1 \ 4 \ 0;4 \ -1 \ 5 \ 1;-2 \ 2 \ -2 \ 3;0 \ 3 \ -9 \ 4]$$

$$b = [3 \ -2 \ 6 \ -5;24 \ -12 \ 41 \ -39;-27 \ 18 \ -62 \ 54;9 \ 14 \ 15 \ -47]$$

RESOLUCIÓN

Utilizamos la aplicación MATLAB

EJERCICIO 2.5 a)

$$a=[2 \ -1 \ 4 \ 0;4 \ -1 \ 5 \ 1;-2 \ 2 \ -2 \ 3;0 \ 3 \ -9 \ 4]$$

$$u=a;i=1;j=2;lij=-u(j,i)/u(i,i);e=pij(j,i,lij,4);u=e*u$$

$$\begin{array}{cccc} 2 & -1 & 4 & 0 \\ 0 & 1 & -3 & 1 \\ -2 & 2 & -2 & 3 \\ 0 & 3 & -9 & 4 \end{array}$$

m=e

$$\begin{array}{cccc} 1 & 0 & 0 & 0 \\ -2 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{array}$$

$$i=1;j=3;lij=-u(j,i)/u(i,i);e=pij(j,i,lij,4);u=e*u$$

$$\begin{array}{cccc} 2 & -1 & 4 & 0 \\ 0 & 1 & -3 & 1 \\ 0 & 1 & 2 & 3 \\ 0 & 3 & -9 & 4 \end{array}$$

m=e*m

$$\begin{array}{cccc} 1 & 0 & 0 & 0 \\ -2 & 1 & 0 & 0 \\ 1 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{array}$$

$$i=2;j=3;lij=-u(j,i)/u(i,i);e=pij(j,i,lij,4);u=e*u$$

$$\begin{array}{cccc} 2 & -1 & 4 & 0 \\ 0 & 1 & -3 & 1 \\ 0 & 0 & 5 & 2 \\ 0 & 3 & -9 & 4 \end{array}$$

m=e*m

$$\begin{array}{cccc} 1 & 0 & 0 & 0 \\ -2 & 1 & 0 & 0 \\ 3 & -1 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{array}$$

$$i=2;j=4;lij=-u(j,i)/u(i,i);e=pij(j,i,lij,4);u=e*u$$

$$\begin{array}{cccc} 2 & -1 & 4 & 0 \\ 0 & 1 & -3 & 1 \\ 0 & 0 & 5 & 2 \\ 0 & 0 & 0 & 1 \end{array}$$

m=e*m

1	0	0	0
-2	1	0	0
3	-1	1	0
6	-3	0	1

L=inv(m)

1.0000	0	0	0
2.0000	1.0000	0	-0.0000
-1.0000	1.0000	1.0000	-0.0000
0	3.0000	0	1.0000

inv(sym(m))

[1, 0, 0, 0]
[2, 1, 0, 0]
[-1, 1, 1, 0]
[0, 3, 0, 1]

L*u

2.0000	-1.0000	4.0000	0
4.0000	-1.0000	5.0000	1.0000
-2.0000	2.0000	-2.0000	3.0000
0	3.0000	-9.0000	4.0000

EJERCICIO 2.5 B)

$b = [3 \ -2 \ 6 \ -5; 24 \ -12 \ 41 \ -39; -27 \ 18 \ -62 \ 54; 9 \ 14 \ 15 \ -47]$

$u=b;i=1;j=2;lij=-u(j,i)/u(i,i);e=pij(j,i,lij,4);u=e*u$

3	-2	6	-5
0	4	-7	1
-27	18	-62	54
9	14	15	-47

$m=e$

1	0	0	0
-8	1	0	0
0	0	1	0
0	0	0	1

$i=1;j=3;lij=-u(j,i)/u(i,i);e=pij(j,i,lij,4);u=e*u$

3	-2	6	-5
0	4	-7	1
0	0	-8	9
9	14	15	-47

$m=e*m$

1	0	0	0
-8	1	0	0
9	0	1	0
0	0	0	1

$i=1;j=4;lij=-u(j,i)/u(i,i);e=pij(j,i,lij,4);u=e*u$

3	-2	6	-5
0	4	-7	1
0	0	-8	9
0	20	-3	-32

$m=e*m$

1	0	0	0
-8	1	0	0
9	0	1	0
-3	0	0	1

$i=2;j=4;lij=-u(j,i)/u(i,i);e=pij(j,i,lij,4);u=e*u$

3	-2	6	-5
0	4	-7	1
0	0	-8	9
0	0	32	-37

$m=e*m$

1	0	0	0
-8	1	0	0
9	0	1	0
37	-5	0	1

```
i=3;j=4;lij=-u(j,i)/u(i,i);e=pij(j,i,lij,4);u=e*u
```

```
3   -2   6   -5
0    4  -7    1
0    0  -8    9
0    0   0   -1
```

```
m=e*m
```

```
1    0    0    0
-8   1    0    0
9    0    1    0
73  -5    4    1
```

```
m*a==u
```

```
1    1    1    1
1    1    1    1
1    1    1    1
1    1    1    1
```

```
l=inv(sym(m))
```

```
[ 1,  0,  0,  0]
[ 8,  1,  0,  0]
[-9,  0,  1,  0]
[ 3,  5, -4,  1]
```

```
a=l*u
```

```
1    1    1    1
1    1    1    1
1    1    1    1
1    1    1    1
```