Eliminación Gaussiana

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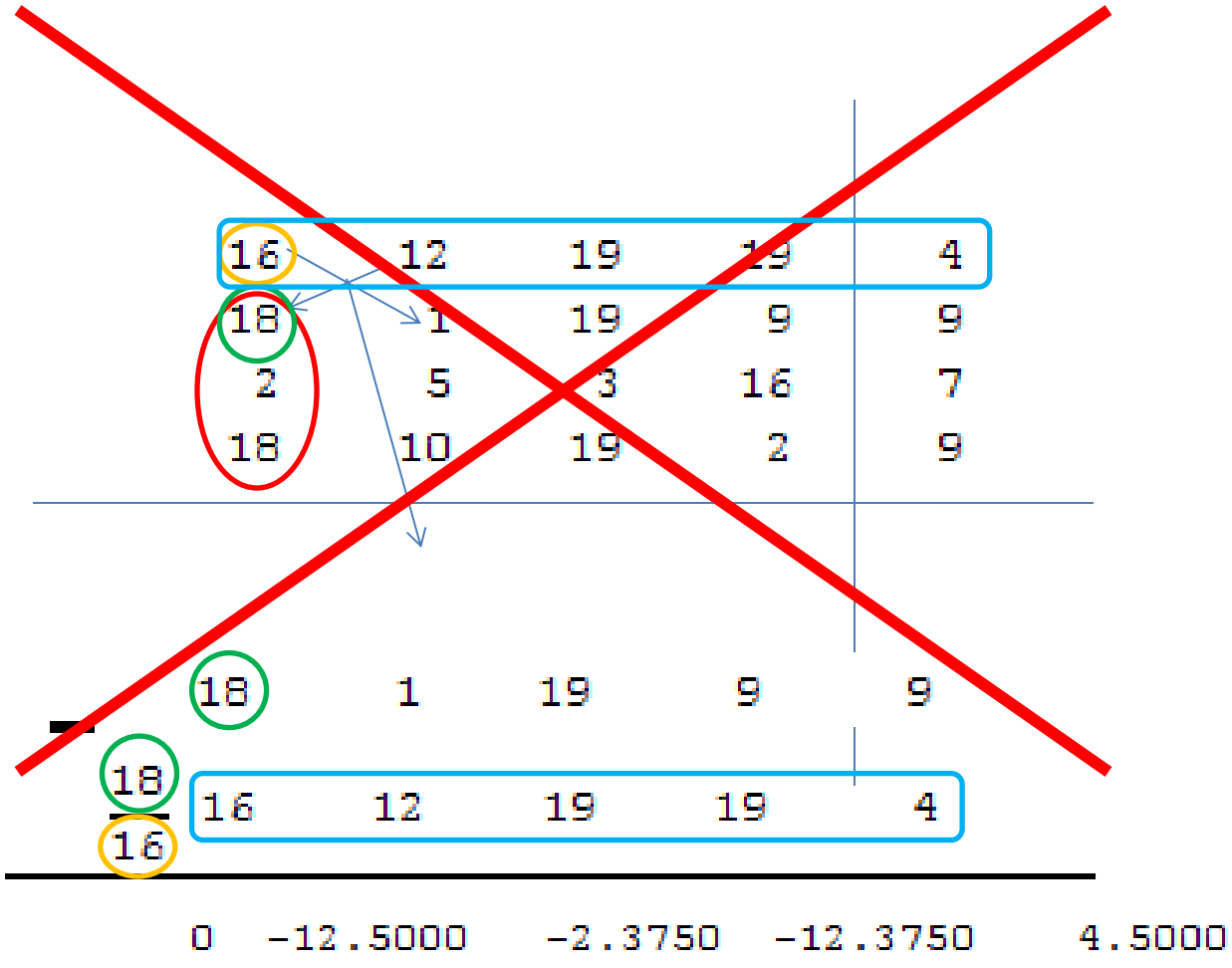
Eliminación Gaussiana

$$A = \begin{bmatrix} 16 & 12 & 19 & 19 \\ 18 & 1 & 19 & 9 \\ 2 & 5 & 3 & 16 \\ 18 & 10 & 19 & 2 \end{bmatrix} \qquad b = \begin{bmatrix} 4 \\ 9 \\ 7 \\ 9 \end{bmatrix}$$

$$C = \left[\begin{array}{cccc|c} 16 & 12 & 19 & 19 & 4 \\ 18 & 1 & 19 & 9 & 9 \\ 2 & 5 & 3 & 16 & 7 \\ 18 & 10 & 19 & 2 & 9 \end{array}\right]$$

Debemos trabajar la matriz para que estos elementos tomen el valor cero

Eliminación Gaussiana



Eliminación Gaussiana

```
C =

    16    12    19    19     4
    18     1    19     9     9
     2     5     3    16     7
    18    10    19     2     9
```

```
C =

   16.0000   12.0000   19.0000   19.0000    4.0000
         0  -12.5000   -2.3750  -12.3750    4.5000
         0    3.5000    0.6250   13.6250    6.5000
         0   -3.5000   -2.3750  -19.3750    4.5000
```

Eliminación Gaussiana

$$C(1,:) = C(1,:)$$ Fila 1

$$C(2,:) = C(2,:) - \frac{C(2,1)}{C(1,1)} C(1,:)$$ Fila 2

$$C(3,:) = C(3,:) - \frac{C(3,1)}{C(1,1)} C(1,:)$$ Fila 3

$$C(4,:) = C(4,:) - \frac{C(4,1)}{C(1,1)} C(1,:)$$ Fila 4

Eliminación Gaussiana

16.0000	12.0000	19.0000	19.0000	4.0000
0	-12.5000	-2.3750	-12.3750	4.5000
0	3.5000	0.6250	13.6250	6.5000
0	-3.5000	-2.3750	-19.3750	4.5000

$$\begin{array}{llllll} & 0 & 3.5000 & 0.6250 & 13.6250 & 6.5000 \\ - & & & & & \\ \dfrac{3.5000}{-12.5000} & 0 & -12.5000 & -2.3750 & -12.3750 & 4.5000 \\ \hline & 0 & 0.0000 & -0.0400 & 10.1600 & 7.7600 \end{array}$$

Eliminación Gaussiana

```
C =

   16.0000   12.0000   19.0000   19.0000    4.0000
         0  -12.5000   -2.3750  -12.3750    4.5000
         0    3.5000    0.6250   13.6250    6.5000
         0   -3.5000   -2.3750  -19.3750    4.5000
```

```
C =

   16.0000   12.0000   19.0000   19.0000    4.0000
         0  -12.5000   -2.3750  -12.3750    4.5000
         0    0.0000   -0.0400   10.1600    7.7600
         0    0.0000   -1.7100  -15.9100    3.2400
```

Eliminación Gaussiana

$$C(1,:) = C(1,:)$$ Fila 1

$$C(2,:) = C(2,:)$$ Fila 2

$$C(3,:) = C(3,:) - \frac{C(3,2)}{C(2,2)} C(2,:)$$ Fila 3

$$C(4,:) = C(4,:) - \frac{C(4,2)}{C(2,2)} C(2,:)$$ Fila 4

Eliminación Gaussiana

16.0000	12.0000	19.0000	19.0000	4.0000
0	-12.5000	-2.3750	-12.3750	4.5000
0	0.0000	-0.0400	10.1600	7.7600
0	0.0000	-1.7100	-15.9100	3.2400

$$
\begin{array}{rrrrr} 0 & 0.0000 & -1.7100 & -15.9100 & 3.2400 \end{array}
$$
$$
- \; \frac{-1.7100}{-0.0400} \quad \begin{array}{rrrrr} 0 & 0.0000 & -0.0400 & 10.1600 & 7.7600 \end{array}
$$
$$
\overline{\begin{array}{rrrrr} 0 & 0.0000 & 0.0000 & -450.2500 & -328.5000 \end{array}}
$$

Eliminación Gaussiana

```
C =

   16.0000   12.0000   19.0000   19.0000    4.0000
         0  -12.5000   -2.3750  -12.3750    4.5000
         0    0.0000   -0.0400   10.1600    7.7600
         0    0.0000   -1.7100  -15.9100    3.2400
```

```
C =

   16.0000   12.0000   19.0000   19.0000    4.0000
         0  -12.5000   -2.3750  -12.3750    4.5000
         0    0.0000   -0.0400   10.1600    7.7600
         0    0.0000    0.0000 -450.2500 -328.5000
```

Eliminación Gaussiana

$$C(1,:) = C(1,:)$$ Fila 1

$$C(2,:) = C(2,:)$$ Fila 2

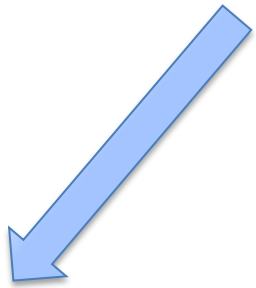
$$C(3,:) = C(3,:)$$ Fila 3

$$C(4,:) = C(4,:) - \frac{C(4,3)}{C(3,3)} C(3,:)$$ Fila 4

Eliminación Gaussiana

```
C =

    16    12    19    19 |   4
    18     1    19     9 |   9
     2     5     3    16 |   7
    18    10    19     2 |   9
```



```
C =

  16.0000   12.0000   19.0000   19.0000 |   4.0000
         0  -12.5000   -2.3750  -12.3750 |   4.5000
         0    0.0000   -0.0400   10.1600 |   7.7600
         0    0.0000    0.0000 -450.2500 | -328.5000
```

Eliminación Gaussiana

1

$$C(1,:) = C(1,:)$$

$$C(2,:) = C(2,:) - \frac{C(2,1)}{C(1,1)} C(1,:)$$

$$C(3,:) = C(3,:) - \frac{C(3,1)}{C(1,1)} C(1,:)$$

$$C(4,:) = C(4,:) - \frac{C(4,1)}{C(1,1)} C(1,:)$$

2

$$C(1,:) = C(1,:)$$

$$C(2,:) = C(2,:)$$

$$C(3,:) = C(3,:) - \frac{C(3,2)}{C(2,2)} C(2,:)$$

$$C(4,:) = C(4,:) - \frac{C(4,2)}{C(2,2)} C(2,:)$$

3

$$C(1,:) = C(1,:)$$

$$C(2,:) = C(2,:)$$

$$C(3,:) = C(3,:)$$

$$C(4,:) = C(4,:) - \frac{C(4,3)}{C(3,3)} C(3,:)$$

$$C(j,:) = C(j,:) - \frac{C(j,i)}{C(i,i)} C(i,:)$$

$$C(1,:) = C(1,:)$$

$$C(2,:) = C(2,:) - \frac{C(2,1)}{C(1,1)} C(1,:)$$

$$C(3,:) = C(3,:) - \frac{C(3,1)}{C(1,1)} C(1,:)$$

$$C(4,:) = C(4,:) - \frac{C(4,1)}{C(1,1)} C(1,:)$$

i=1

j=2,3 y 4

$$C(1,:) = C(1,:)$$

$$C(2,:) = C(2,:)$$

$$C(3,:) = C(3,:) - \frac{C(3,2)}{C(2,2)} C(2,:)$$

$$C(4,:) = C(4,:) - \frac{C(4,2)}{C(2,2)} C(2,:)$$

i=2

j=3 y 4

$$C(1,:) = C(1,:)$$

$$C(2,:) = C(2,:)$$

$$C(3,:) = C(3,:)$$

$$C(4,:) = C(4,:) - \frac{C(4,3)}{C(3,3)} C(3,:)$$

i=3

j=4

```
for i=1:3
    for j=i+1:4
        C(j,:)=C(j,:)-(C(j,i)/C(i,i))*C(i,:);
    end
end
```

$$C(j,:) = C(j,:) - \frac{C(j,i)}{C(i,i)} C(i,:)$$

Eliminación Gaussiana

```
function [D,e]=gaussiana(A, b)
[f c]=size(A);
n = length(b);
if f==n
        C=[A,b];
        for i=1:f-1
                for j=i+1:f
                C(j,:)=C(j,:)-(C(j,i)/C(i,i))*C(i,:);
                end
        end
        D=C(:,[1:c]);
        e=C(:,c+1);
else
disp('Incompatibles');
D=0;
e=0;
end
endfunction
```

Eliminación Gaussiana

```
--> A  = [38 26 23 67;73 53 63 20;26 54 76 39;50 12 5 83]
 A  =

   38.   26.   23.   67.
   73.   53.   63.   20.
   26.   54.   76.   39.
   50.   12.   5.    83.


--> b  = [59;48;22;84]
 b  =

   59.
   48.
   22.
   84.


--> [A b]=gaussiana(A,b)
 b  =

   59.
  -65.342105
   756.72414
   49.444444

 A  =

   38.   26.          23.          67.
   0.    3.0526316    18.815789   -108.71053
   0.    0.          -162.93103    1282.6897
   0.    0.           0.           82.759259
```

```
A = [38 26 23 67;73 53 63 20;26 54 76 39;50 12 5 83]
b = [59;48;22;84]
[A b]=gaussiana(A,b)
```