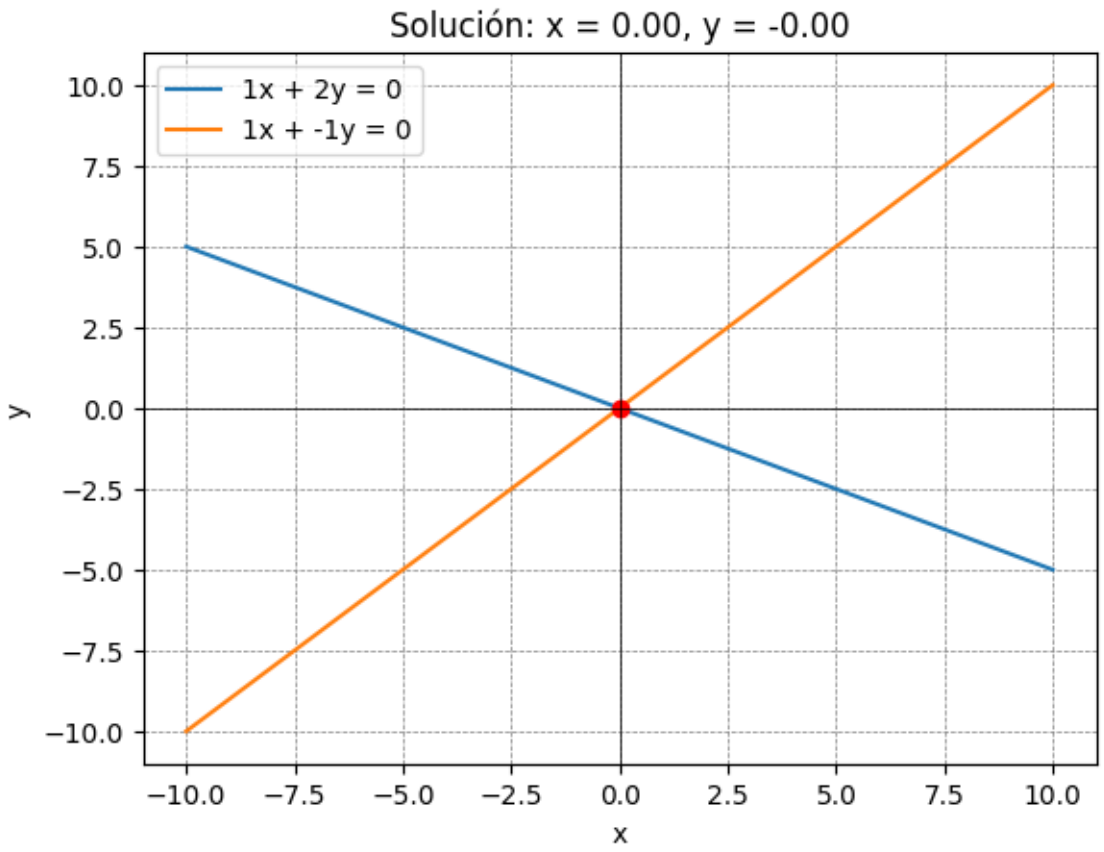
Métodos numéricos

1. Para cada uno de los siguientes sistemas lineales, obtenga, de ser posible, una solución con métodos gráficos.

a. $x_1 + 2x_2 = 0$, $x_1 - x_2 = 0$

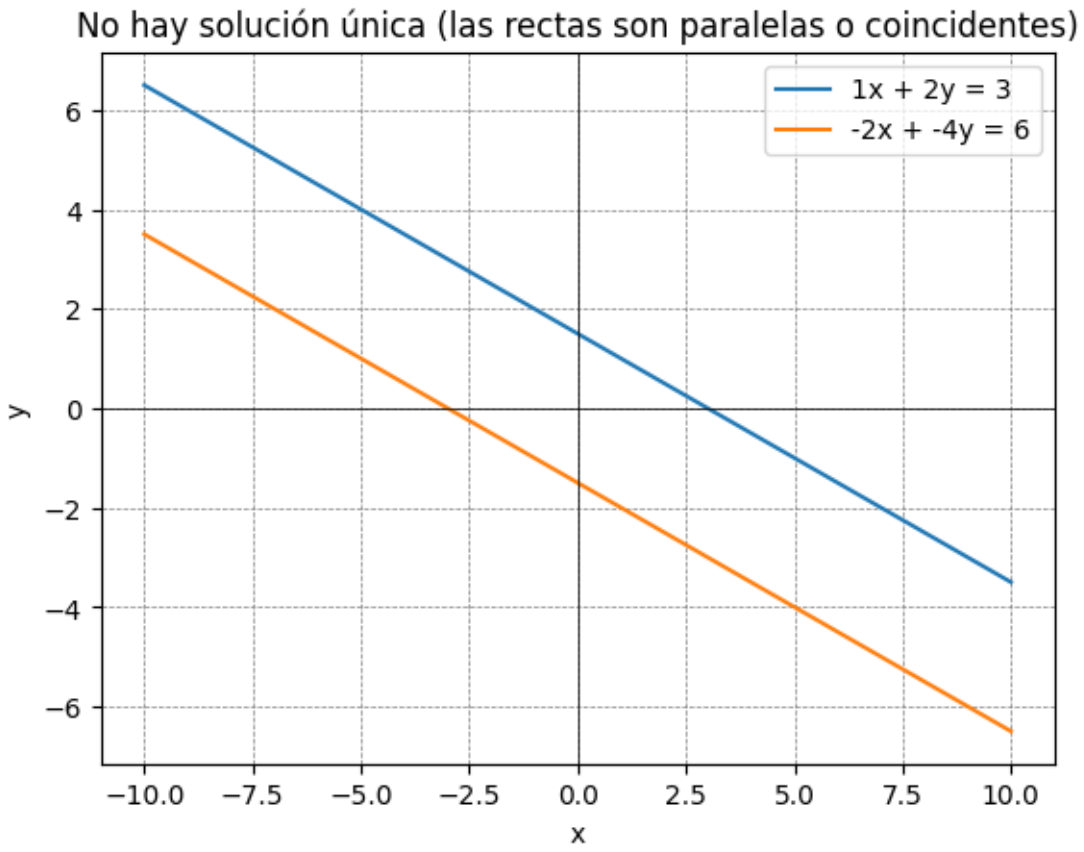
```
from src import plot_system
a1, b1, c1 = 1, 2, 0
a2, b2, c2 = 1, -1, 0
plot_system(a1, b1, c1, a2, b2, c2)
```



b. $x_1 + 2x_2 = 3, -2x_1 - 4x_2 = 6$

```
from src import plot_system
from src import eliminacion_gaussiana

a1, b1, c1 = 1, 2, 3
a2, b2, c2 = -2, -4, 6
plot_system(a1, b1, c1, a2, b2, c2)
```



c. $2x_1 + x_2 = -1,\ x_1 - x_2 = 2,\ x_1 - 3x_2 = 5$

Se espera que sea una ecuacion consistente para esto, la resolución puede darse mediante la reducción Gaussiana, o propiamente implementando una función de resolución mas compleja en relacion a la propuesta para los demás ejercicios.

d. $2x_1 + x_2 + x_3 = 1,\ 2x_1 + 4x_2 - x_3 = -2$

Dado que en el sistema se presentan mas variables que ecuaciones, la solución de la misma es indefinida.

2. Utilice la eliminación gaussiana con sustitución hacia atrás y aritmética de dos d;igitos para resolver los siguientes sistemas lineales.

a. $-x_1 + 4x_2 + x_3 = 8,\ \frac{5}{3}x_1 + \frac{2}{3}x_2 + \frac{2}{3}x_3 = 1,\ 2x_1 + x_2 + 4x_3 = 11$

```
A = [[-1,4,1,8],[1.67,0.67,0.67,1],[2,1,4,11.]]
eliminacion_gaussiana(A)
```

```
[07-21 17:49:48][INFO]
[[-1.    4.    1.    8.  ]
 [ 0.    7.35  2.34 14.36]
 [ 0.    9.    6.   27.  ]]
[07-21 17:49:48][INFO]
[[-1.          4.          1.          8.        ]
 [ 0.          7.35        2.34       14.36      ]
 [ 0.          0.          3.13469388  9.41632653]]

array([-1.00651042,  0.99739583,  3.00390625])
```

b. $4x_1 + 2x_2 - x_3 = -5$, $\frac{1}{9}x_1 + \frac{1}{9}x_2 - \frac{1}{3}x_3 = -1$, $x_1 + 4x_2 + 2x_3 = 9$

```
B = [[4,2,-1,-5],[0.11,0.11,-0.33,-1],[1,4,2,9]]
eliminacion_gaussiana(B)
```

```
[07-21 17:55:56][INFO]
[[ 0.11        0.11       -0.33       -1.        ]
 [ 0.         -2.         11.         31.36363636]
 [ 0.          3.          5.         18.09090909]]
[07-21 17:55:56][INFO]
[[ 0.11        0.11       -0.33       -1.        ]
 [ 0.         -2.         11.         31.36363636]
 [ 0.          0.         21.5        65.13636364]]

array([-0.98308668,  0.98097252,  3.02959831])
```

3. Utilice el algoritmo de eliminación guassiana para resolver, de ser posible, los siguientes sistemas lineales, y determine si se necesitan intercambios de fila.

a. $x_1 - x_2 + 3x_3 = 2$, $3x_1 - 3x_2 + x_3 = -1$, $x_1 + x_2 = 3$

```
A = [[1,-1,3,2],[3,-3,1,-1],[1,1,0,3.]]
eliminacion_gaussiana(A)
```

```
[07-21 17:57:42][INFO]
[[ 1. -1.  3.  2.]
 [ 0.  0. -8. -7.]
 [ 0.  2. -3.  1.]]
[07-21 17:57:42][INFO]
[[ 1. -1.  3.  2.]
 [ 0.  2. -3.  1.]
 [ 0.  0. -8. -7.]]
```

```
array([1.1875, 1.8125, 0.875 ])
```

b. $2x_1 - 1.5x_2 + 3x_3 = 1$, $-x_1 + 2x_3 = 3$, $4x_1 - 4.5x_2 + 5x_3 = 1$

```
B = [[2,-1.5,3,1],[-1,0,2,3],[4,-4.5,5,1.]]
eliminacion_gaussiana(B)
```

```
[07-21 18:02:42][INFO]
[[-1.   0.   2.   3. ]
 [ 0.  -1.5  7.   7. ]
 [ 0.  -4.5 13.  13. ]]
[07-21 18:02:42][INFO]
[[-1.   0.   2.   3. ]
 [ 0.  -1.5  7.   7. ]
 [ 0.   0.  -8.  -8. ]]
```

```
array([-1., -0.,  1.])
```

c. $2x_1 = 3$, $x_1 + 1.5x_2 = 4.5$, $-3x_2 + 0.5x_3 = -6.6$, $2x_1 - 2x_2 + x_3 + x_4 = 0.8$

```
C= [[2,0,0,0,3],[1,1.5,0,0,4.5],[0,-3,0.5,0,-6.6],[2,-2,1,1,0.8]]
eliminacion_gaussiana(C)
```

```
[07-21 18:06:06][INFO]
[[ 1.   1.5  0.   0.   4.5]
 [ 0.  -3.   0.   0.  -6. ]
 [ 0.  -3.   0.5  0.  -6.6]
 [ 0.  -5.   1.   1.  -8.2]]
[07-21 18:06:06][INFO]
[[ 1.   1.5  0.   0.   4.5]
 [ 0.  -3.   0.   0.  -6. ]
 [ 0.   0.   0.5  0.  -0.6]
 [ 0.   0.   1.   1.   1.8]]
[07-21 18:06:06][INFO]
[[ 1.   1.5  0.   0.   4.5]
 [ 0.  -3.   0.   0.  -6. ]
 [ 0.   0.   0.5  0.  -0.6]
 [ 0.   0.   0.   1.   3. ]]
```

```
array([ 1.5,  2. , -1.2,  3. ])
```