```
%load_ext autoreload
```

```
%autoreload 2
from src import gauss_jacobi
from src import gauss_seidel

A = [[2, 10], [3, 2]]
b = [16, 11]
initial_guess = [1, 1]
solution, tray = gauss_jacobi(A=A, b=b, x0=initial_guess, tol=1e-10, max_iter=75)
print("Solucion:", solution)
```

```
[01-25 08:54:16][INFO] i= 0 x: [[1. 1.]]
[01-25 08:54:16][INFO] i= 1 x: [[3. 4.]]
[01-25 08:54:16][INFO] i= 2 x: [[-12.   1.]]
[01-25 08:54:16][INFO] i= 3 x: [[ 3.  23.5]]
[01-25 08:54:16][INFO] i= 4 x: [[-109.5    1. ]]
[01-25 08:54:16][INFO] i= 5 x: [[  3.   169.75]]
[01-25 08:54:16][INFO] i= 6 x: [[-840.75    1.  ]]
[01-25 08:54:16][INFO] i= 7 x: [[   3.    1266.625]]
[01-25 08:54:16][INFO] i= 8 x: [[-6.325125e+03  1.000000e+00]]
[01-25 08:54:16][INFO] i= 9 x: [[3.0000000e+00 9.4931875e+03]]
[01-25 08:54:16][INFO] i= 10 x: [[-4.74579375e+04  1.00000000e+00]]
[01-25 08:54:16][INFO] i= 11 x: [[3.00000000e+00 7.11924062e+04]]
[01-25 08:54:16][INFO] i= 12 x: [[-3.55954031e+05  1.00000000e+00]]
[01-25 08:54:16][INFO] i= 13 x: [[3.00000000e+00 5.33936547e+05]]
[01-25 08:54:16][INFO] i= 14 x: [[-2.66967473e+06  1.00000000e+00]]
[01-25 08:54:16][INFO] i= 15 x: [[3.0000000e+00 4.0045176e+06]]
[01-25 08:54:16][INFO] i= 16 x: [[-2.002258e+07  1.000000e+00]]
[01-25 08:54:16][INFO] i= 17 x: [[3.00000000e+00 3.00338755e+07]]
[01-25 08:54:16][INFO] i= 18 x: [[-1.5016937e+08  1.0000000e+00]]
[01-25 08:54:16][INFO] i= 19 x: [[3.0000000e+00 2.2525406e+08]]
[01-25 08:54:16][INFO] i= 20 x: [[-1.12627029e+09  1.00000000e+00]]
[01-25 08:54:16][INFO] i= 21 x: [[3.00000000e+00 1.68940544e+09]]
[01-25 08:54:16][INFO] i= 22 x: [[-8.4470272e+09  1.0000000e+00]]
[01-25 08:54:16][INFO] i= 23 x: [[3.00000000e+00 1.26705408e+10]]
[01-25 08:54:16][INFO] i= 24 x: [[-6.3352704e+10  1.0000000e+00]]
[01-25 08:54:16][INFO] i= 25 x: [[3.00000000e+00 9.50290561e+10]]
[01-25 08:54:16][INFO] i= 26 x: [[-4.7514528e+11  1.0000000e+00]]
[01-25 08:54:16][INFO] i= 27 x: [[3.00000000e+00 7.12717921e+11]]
[01-25 08:54:16][INFO] i= 28 x: [[-3.5635896e+12  1.0000000e+00]]
```

```
[01-25 08:54:16][INFO] i= 29 x: [[3.0000000e+00 5.3453844e+12]]
[01-25 08:54:16][INFO] i= 30 x: [[-2.6726922e+13  1.0000000e+00]]
[01-25 08:54:16][INFO] i= 31 x: [[3.0000000e+00 4.0090383e+13]]
[01-25 08:54:16][INFO] i= 32 x: [[-2.00451915e+14  1.00000000e+00]]
[01-25 08:54:16][INFO] i= 33 x: [[3.00000000e+00 3.00677873e+14]]
[01-25 08:54:16][INFO] i= 34 x: [[-1.50338936e+15  1.00000000e+00]]
[01-25 08:54:16][INFO] i= 35 x: [[3.00000000e+00 2.25508405e+15]]
[01-25 08:54:16][INFO] i= 36 x: [[-1.12754202e+16  1.00000000e+00]]
[01-25 08:54:16][INFO] i= 37 x: [[3.00000000e+00 1.69131303e+16]]
[01-25 08:54:16][INFO] i= 38 x: [[-8.45656517e+16  1.00000000e+00]]
[01-25 08:54:16][INFO] i= 39 x: [[3.00000000e+00 1.26848478e+17]]
[01-25 08:54:16][INFO] i= 40 x: [[-6.34242388e+17  1.00000000e+00]]
[01-25 08:54:16][INFO] i= 41 x: [[3.00000000e+00 9.51363582e+17]]
[01-25 08:54:16][INFO] i= 42 x: [[-4.75681791e+18  1.00000000e+00]]
[01-25 08:54:16][INFO] i= 43 x: [[3.00000000e+00 7.13522686e+18]]
[01-25 08:54:16][INFO] i= 44 x: [[-3.56761343e+19  1.00000000e+00]]
[01-25 08:54:16][INFO] i= 45 x: [[3.00000000e+00 5.35142015e+19]]
[01-25 08:54:16][INFO] i= 46 x: [[-2.67571007e+20  1.00000000e+00]]
[01-25 08:54:16][INFO] i= 47 x: [[3.00000000e+00 4.01356511e+20]]
[01-25 08:54:16][INFO] i= 48 x: [[-2.00678256e+21  1.00000000e+00]]
[01-25 08:54:16][INFO] i= 49 x: [[3.00000000e+00 3.01017383e+21]]
[01-25 08:54:16][INFO] i= 50 x: [[-1.50508692e+22  1.00000000e+00]]
[01-25 08:54:16][INFO] i= 51 x: [[3.00000000e+00 2.25763037e+22]]
[01-25 08:54:16][INFO] i= 52 x: [[-1.12881519e+23  1.00000000e+00]]
[01-25 08:54:16][INFO] i= 53 x: [[3.00000000e+00 1.69322278e+23]]
[01-25 08:54:16][INFO] i= 54 x: [[-8.4661139e+23  1.0000000e+00]]
[01-25 08:54:16][INFO] i= 55 x: [[3.00000000e+00 1.26991709e+24]]
[01-25 08:54:16][INFO] i= 56 x: [[-6.34958543e+24  1.00000000e+00]]
[01-25 08:54:16][INFO] i= 57 x: [[3.00000000e+00 9.52437814e+24]]
[01-25 08:54:16][INFO] i= 58 x: [[-4.76218907e+25  1.00000000e+00]]
[01-25 08:54:16][INFO] i= 59 x: [[3.00000000e+00 7.14328361e+25]]
[01-25 08:54:16][INFO] i= 60 x: [[-3.5716418e+26  1.0000000e+00]]
[01-25 08:54:16][INFO] i= 61 x: [[3.00000000e+00 5.35746271e+26]]
[01-25 08:54:16][INFO] i= 62 x: [[-2.67873135e+27  1.00000000e+00]]
[01-25 08:54:16][INFO] i= 63 x: [[3.00000000e+00 4.01809703e+27]]
[01-25 08:54:16][INFO] i= 64 x: [[-2.00904851e+28  1.00000000e+00]]
[01-25 08:54:16][INFO] i= 65 x: [[3.00000000e+00 3.01357277e+28]]
[01-25 08:54:16][INFO] i= 66 x: [[-1.50678639e+29  1.00000000e+00]]
[01-25 08:54:16][INFO] i= 67 x: [[3.00000000e+00 2.26017958e+29]]
[01-25 08:54:16][INFO] i= 68 x: [[-1.13008979e+30  1.00000000e+00]]
[01-25 08:54:16][INFO] i= 69 x: [[3.00000000e+00 1.69513468e+30]]
[01-25 08:54:16][INFO] i= 70 x: [[-8.47567342e+30  1.00000000e+00]]
[01-25 08:54:16][INFO] i= 71 x: [[3.00000000e+00 1.27135101e+31]]
```

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[01-25 08:54:16][INFO] i= 72 x: [[-6.35675507e+31  1.00000000e+00]]
[01-25 08:54:16][INFO] i= 73 x: [[3.0000000e+00 9.5351326e+31]]
[01-25 08:54:16][INFO] i= 74 x: [[-4.7675663e+32  1.0000000e+00]]
Solucion: [[-4.7675663e+32]
 [ 1.0000000e+00]]
```

```
solutions, trays = gauss_seidel(A=A, b=b, x0=initial_guess, tol=1e-10, max_iter=50)
print("Solucion:", solutions)
```

```
[01-25 08:54:14][INFO] i= 0 x: [[1. 1.]]
[01-25 08:54:14][INFO] i= 1 x: [[3. 1.]]
Solucion: [[3.]
 [1.]]
```

```
import matplotlib.pyplot as plt

tray_x = [point[0] for point in tray]
tray_y = [point[1] for point in tray]

tray_xs = [points[0] for points in trays]
tray_ys = [points[1] for points in trays]

plt.figure(figsize=(10, 5))

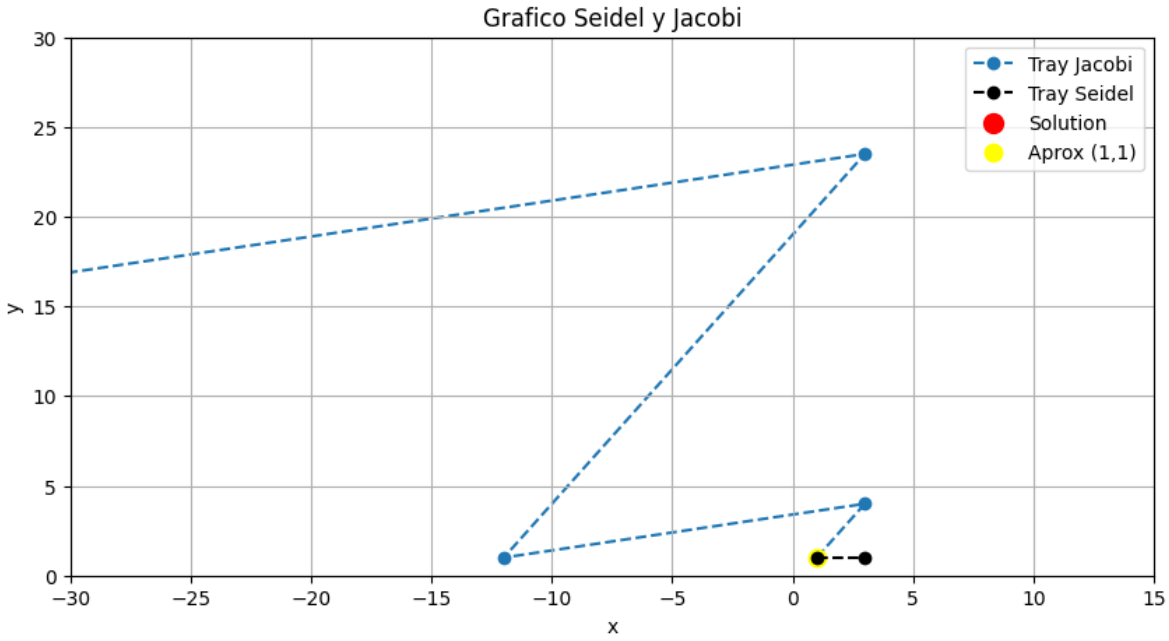
plt.plot(tray_x, tray_y, label='Tray Jacobi', linestyle='--',
         marker='o', zorder=1)

plt.plot(tray_xs, tray_ys, label='Tray Seidel', linestyle='--',
         color='black', marker='o', zorder=4)

plt.scatter(solution[0], solution[1], color='red', label='Solution',
            zorder=3, s=100)
plt.scatter(initial_guess[0], initial_guess[1], color='yellow',
            label='Aprox (1,1)', zorder=2, s=80)

plt.title('Grafico Seidel y Jacobi')
plt.xlim(-30, 15)
plt.ylim(0, 30)
plt.xlabel('x')
plt.ylabel('y')
plt.grid()
```

```
plt.legend()
plt.show()
```




```
%autoreload 2
from src import gauss_jacobi

A = [[3, 2], [2, 10]]
b = [11, 16]
initial_guess = [1, 1]
solution, tray = gauss_jacobi(A=A, b=b, x0=initial_guess, tol=1e-10, max_iter=500)
print("Solucion:", solution)

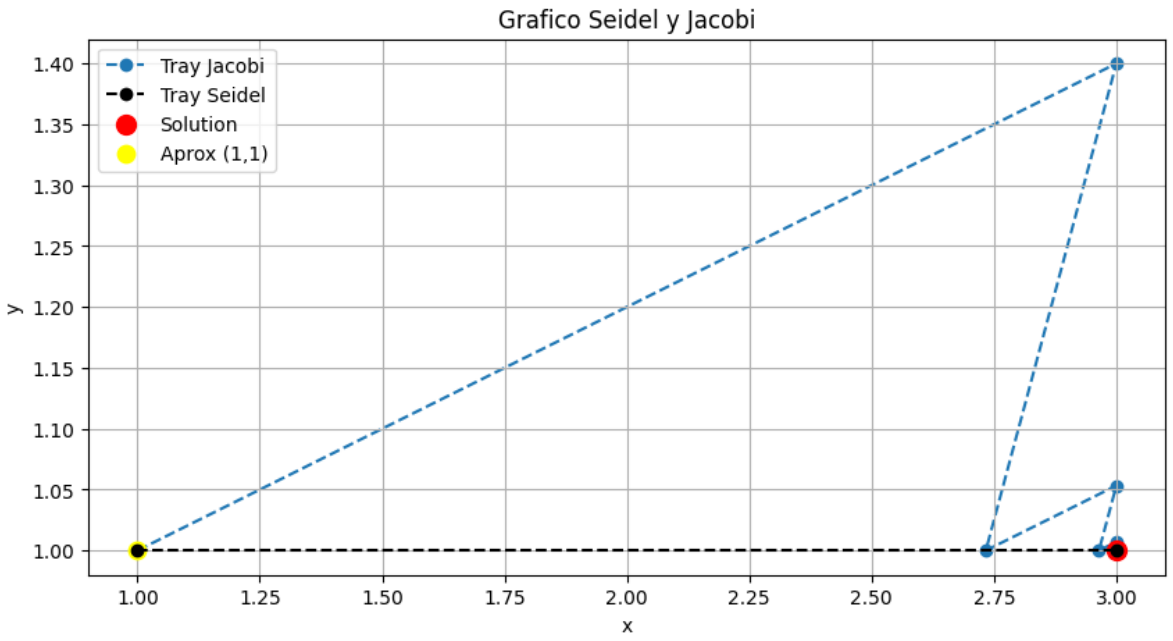
solutions, trays = gauss_seidel(A=A, b=b, x0=initial_guess, tol=1e-10, max_iter=50)
print("Solucion:", solutions)
```

```
[01-25 08:49:38][INFO] i= 0 x: [[1. 1.]]
[01-25 08:49:38][INFO] i= 1 x: [[3.  1.4]]
[01-25 08:49:38][INFO] i= 2 x: [[2.73333333 1.        ]]
[01-25 08:49:38][INFO] i= 3 x: [[3.         1.05333333]]
[01-25 08:49:38][INFO] i= 4 x: [[2.96444444 1.        ]]
[01-25 08:49:38][INFO] i= 5 x: [[3.         1.00711111]]
```

```
[01-25 08:49:38][INFO] i= 6 x: [[2.99525926 1.        ]]
[01-25 08:49:38][INFO] i= 7 x: [[3.         1.00094815]]
[01-25 08:49:38][INFO] i= 8 x: [[2.9993679 1.       ]]
[01-25 08:49:38][INFO] i= 9 x: [[3.         1.00012642]]
[01-25 08:49:38][INFO] i= 10 x: [[2.99991572 1.        ]]
[01-25 08:49:38][INFO] i= 11 x: [[3.         1.00001686]]
[01-25 08:49:38][INFO] i= 12 x: [[2.99998876 1.        ]]
[01-25 08:49:38][INFO] i= 13 x: [[3.         1.00000225]]
[01-25 08:49:38][INFO] i= 14 x: [[2.9999985 1.       ]]
[01-25 08:49:38][INFO] i= 15 x: [[3.        1.0000003]]
[01-25 08:49:38][INFO] i= 16 x: [[2.9999998 1.       ]]
[01-25 08:49:38][INFO] i= 17 x: [[3.         1.00000004]]
[01-25 08:49:38][INFO] i= 18 x: [[2.99999997 1.        ]]
[01-25 08:49:38][INFO] i= 19 x: [[3.         1.00000001]]
[01-25 08:49:38][INFO] i= 20 x: [[3. 1.]]
[01-25 08:49:38][INFO] i= 21 x: [[3. 1.]]
[01-25 08:49:38][INFO] i= 22 x: [[3. 1.]]
[01-25 08:49:38][INFO] i= 23 x: [[3. 1.]]
[01-25 08:49:38][INFO] i= 24 x: [[3. 1.]]
Solucion: [[3.]
 [1.]]
[01-25 08:49:38][INFO] i= 0 x: [[1. 1.]]
[01-25 08:49:38][INFO] i= 1 x: [[3. 1.]]
Solucion: [[3.]
 [1.]]
```

```python
import matplotlib.pyplot as plt

tray_x = [point[0] for point in tray]
tray_y = [point[1] for point in tray]

tray_xs = [points[0] for points in trays]
tray_ys = [points[1] for points in trays]

plt.figure(figsize=(10, 5))

plt.plot(tray_x, tray_y, label='Tray Jacobi', linestyle='--',
         marker='o', zorder=1)

plt.plot(tray_xs, tray_ys, label='Tray Seidel', linestyle='--',
         color='black', marker='o', zorder=4)
```

```
plt.scatter(solution[0], solution[1], color='red', label='Solution',
            zorder=3, s=100)
plt.scatter(initial_guess[0], initial_guess[1], color='yellow',
            label='Aprox (1,1)', zorder=2, s=80)

plt.title('Grafico Seidel y Jacobi')
plt.xlabel('x')
plt.ylabel('y')
plt.grid()
plt.legend()
plt.show()
```




```
%autoreload 2
from src import gauss_jacobi

A = [[3, 2], [2, 10]]
b = [11, 16]
initial_guess = [5, -2]
solution, tray = gauss_jacobi(A=A, b=b, x0=initial_guess, tol=1e-10, max_iter=500)
print("Solucion:", solution)

solutions, trays = gauss_seidel(A=A, b=b, x0=initial_guess, tol=1e-10, max_iter=50)
```

```
print("Solucion:", solutions)
```

```
[01-25 08:50:14][INFO] i= 0 x: [[ 5. -2.]]
[01-25 08:50:14][INFO] i= 1 x: [[5.  0.6]]
[01-25 08:50:14][INFO] i= 2 x: [[3.26666667 0.6       ]]
[01-25 08:50:14][INFO] i= 3 x: [[3.26666667 0.94666667]]
[01-25 08:50:14][INFO] i= 4 x: [[3.03555556 0.94666667]]
[01-25 08:50:14][INFO] i= 5 x: [[3.03555556 0.99288889]]
[01-25 08:50:14][INFO] i= 6 x: [[3.00474074 0.99288889]]
[01-25 08:50:14][INFO] i= 7 x: [[3.00474074 0.99905185]]
[01-25 08:50:14][INFO] i= 8 x: [[3.0006321  0.99905185]]
[01-25 08:50:14][INFO] i= 9 x: [[3.0006321  0.99987358]]
[01-25 08:50:14][INFO] i= 10 x: [[3.00008428 0.99987358]]
[01-25 08:50:14][INFO] i= 11 x: [[3.00008428 0.99998314]]
[01-25 08:50:14][INFO] i= 12 x: [[3.00001124 0.99998314]]
[01-25 08:50:14][INFO] i= 13 x: [[3.00001124 0.99999775]]
[01-25 08:50:14][INFO] i= 14 x: [[3.0000015  0.99999775]]
[01-25 08:50:14][INFO] i= 15 x: [[3.0000015 0.9999997]]
[01-25 08:50:14][INFO] i= 16 x: [[3.0000002 0.9999997]]
[01-25 08:50:14][INFO] i= 17 x: [[3.0000002  0.99999996]]
[01-25 08:50:14][INFO] i= 18 x: [[3.00000003 0.99999996]]
[01-25 08:50:14][INFO] i= 19 x: [[3.00000003 0.99999999]]
[01-25 08:50:14][INFO] i= 20 x: [[3.         0.99999999]]
[01-25 08:50:14][INFO] i= 21 x: [[3. 1.]]
[01-25 08:50:14][INFO] i= 22 x: [[3. 1.]]
[01-25 08:50:14][INFO] i= 23 x: [[3. 1.]]
[01-25 08:50:14][INFO] i= 24 x: [[3. 1.]]
Solucion: [[3.]
 [1.]]
[01-25 08:50:14][INFO] i= 0 x: [[ 5. -2.]]
[01-25 08:50:14][INFO] i= 1 x: [[5.  0.6]]
[01-25 08:50:14][INFO] i= 2 x: [[3.26666667 0.94666667]]
[01-25 08:50:14][INFO] i= 3 x: [[3.03555556 0.99288889]]
[01-25 08:50:14][INFO] i= 4 x: [[3.00474074 0.99905185]]
[01-25 08:50:14][INFO] i= 5 x: [[3.0006321  0.99987358]]
[01-25 08:50:14][INFO] i= 6 x: [[3.00008428 0.99998314]]
[01-25 08:50:14][INFO] i= 7 x: [[3.00001124 0.99999775]]
[01-25 08:50:14][INFO] i= 8 x: [[3.0000015 0.9999997]]
[01-25 08:50:14][INFO] i= 9 x: [[3.0000002  0.99999996]]
[01-25 08:50:14][INFO] i= 10 x: [[3.00000003 0.99999999]]
[01-25 08:50:14][INFO] i= 11 x: [[3. 1.]]
```

```
[01-25 08:50:14][INFO] i= 12 x: [[3. 1.]]
[01-25 08:50:14][INFO] i= 13 x: [[3. 1.]]
Solucion: [[3.]
 [1.]]
```

```python
import matplotlib.pyplot as plt

tray_x = [point[0] for point in tray]
tray_y = [point[1] for point in tray]

tray_xs = [points[0] for points in trays]
tray_ys = [points[1] for points in trays]

plt.figure(figsize=(10, 5))

plt.plot(tray_x, tray_y, label='Tray Jacobi', linestyle='--', marker='o', zorder=1)

plt.plot(tray_xs, tray_ys, label='Tray Seidel', linestyle='--', color='black',
         marker='o', zorder=4)

plt.scatter(solution[0], solution[1], color='red', label='Solution', zorder=3, s=100)
plt.scatter(initial_guess[0], initial_guess[1], color='yellow',
            label='Aprox (5,-2)', zorder=2, s=80)

plt.title('Grafico Seidel y Jacobi')
plt.xlabel('x')
plt.ylabel('y')
plt.grid()
plt.legend()
plt.show()
```

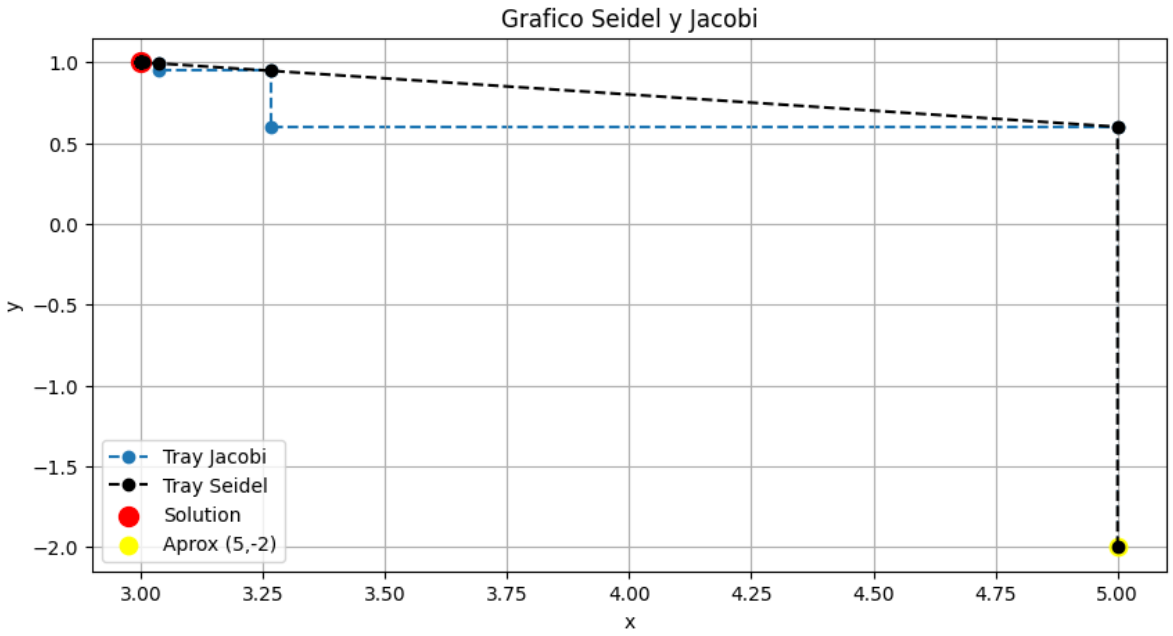


Grafico Seidel y Jacobi
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
y
3.00
3.25
3.50
3.75
4.00
4.25
4.50
4.75
5.00
x
Tray Jacobi
Tray Seidel
Solution
Aprox (5,-2)