```python
#Importa biblioteca numpy que permite trabalhar com matrizes
#Função matrix para definir matrizes
#função linalg para fazer matiz inversa
import numpy as np
#cria a matriz A
matriz_A=np.matrix([[3,2,1],[2,3,1],[1,2,3]])
#cria a matriz B
matriz_B=([[39],[34],[26]])
#cria a matriz inversa de A
matriz_A_inv=np.linalg.inv(matriz_A)
#Resolve o sistema linear
sol=matriz_A_inv*matriz_B
print("Resultado do sistema linear")
print(sol)
```

```
Resultado do sistema linear
[[9.25]
 [4.25]
 [2.75]]
```

```python
# Exemplo de Cramer
import numpy as np
#cria a matriz incompleta
matriz_D=np.matrix([[3,2,1],[2,3,1],[1,2,3]])
#calcula o determinante de D
D=np.linalg.det(matriz_D)
print(round(D,2))
#cria a matriz Dx
matriz_Dx=np.matrix([[39,2,1],[34,3,1],[26,2,3]])
Dx=np.linalg.det(matriz_Dx)
#cria a matriz Dy
matriz_Dy=np.matrix([[3,39,1],[2,34,1],[1,26,3]])
Dy=np.linalg.det(matriz_Dy)
#cria a matriz Dz
matriz_Dz=np.matrix([[3,2,39],[2,3,34],[1,2,26]])
Dz=np.linalg.det(matriz_Dz)
x=Dx/D
y=Dy/D
z=Dz/D
print("x=",np.round(x,2))
print("y=",np.round(y,2))
print("z=", np.round(z,2))
```

```
12.0
x= 9.25
y= 4.25
z= 2.75
```

```python
import numpy as np
matriz_A=np.matrix([[3,5,1],[2,2,2],[4,7,3]])
D=np.linalg.det(matriz_A)
print("Determinante: ", round(D,2))

matriz_B=([[1],[3],[0]])

matriz_A_inv=np.linalg.inv(matriz_A)

sol=matriz_A_inv*matriz_B

print("Resposta: \n", sol)
```

```
Determinante:  -8.0
Resposta:
 [[ 4.   ]
 [-2.125]
 [-0.375]]
```

```python
import numpy as np

matriz_D=np.matrix([[3,5,1],[2,2,2],[4,7,3]])
D=np.linalg.det(matriz_D)
print("Determinante: ", round(D,2))

matriz_Dx=np.matrix([[1,5,1],[3,2,2],[0,7,3]])
Dx=np.linalg.det(matriz_Dx)
x=Dx/D

matriz_Dy=np.matrix([[3,1,1],[2,3,2],[4,0,3]])
Dy=np.linalg.det(matriz_Dy)
y=Dy/D

matriz_Dz=np.matrix([[3,5,1],[2,2,3],[4,7,0]])
Dz=np.linalg.det(matriz_Dz)
z=Dz/D

print("Valor de x = ", np.round(x,2))
print("Valor de y = ", np.round(y,2))
print("Valor de z = ", np.round(z,2))
```

```
Determinante:  -8.0
Valor de x =  4.0
Valor de y =  -2.12
Valor de z =  -0.37
```

Atividade 1

1) Resolver o sistema linear a seguir:

$$\begin{cases} 3x+5y+z=1 \\ 2x+2y+2z=3 \\ 4x+7y+3z=0 \end{cases} \Rightarrow D=\begin{vmatrix} 3 & 5 & 1 \\ 2 & 2 & 2 \\ 4 & 7 & 3 \end{vmatrix} \begin{matrix} 3 & 5 \\ 2 & 2 \\ 4 & 7 \end{matrix}$$

$$D = 18+40+14-8-42-30$$

$$\boxed{D=-8}$$

- $D_x = \begin{vmatrix} 1 & 5 & 1 \\ 3 & 2 & 2 \\ 0 & 7 & 3 \end{vmatrix} \begin{matrix} 1 & 5 \\ 3 & 2 \\ 0 & 7 \end{matrix}$

$$D_x = 6+0+21-0-14-45$$

$$\boxed{D_x=-32}$$

- $D_y = \begin{vmatrix} 3 & 1 & 1 \\ 2 & 3 & 2 \\ 4 & 0 & 3 \end{vmatrix} \begin{matrix} 3 & 1 \\ 2 & 3 \\ 4 & 0 \end{matrix}$

$$D_y = 27+8+0-12-0-6$$

$$\boxed{D_y=17}$$

- $D_z = \begin{vmatrix} 3 & 5 & 1 \\ 2 & 2 & 3 \\ 4 & 7 & 0 \end{vmatrix} \begin{matrix} 3 & 5 \\ 2 & 2 \\ 4 & 7 \end{matrix}$

$$D_z = 0+60+14-8-63-0$$

$$\boxed{D_z=3}$$

- $x = \frac{D_x}{D} = \frac{-32}{-8}$

$$\boxed{x=4}$$

- $y = \frac{D_y}{D} = \frac{17}{-8}$

$$\boxed{y=-2,1}$$

- $z = \frac{D_z}{D} = \frac{3}{-8}$

$$\boxed{z=-0,3}$$

2)

$$\begin{cases} 3x + 2y + 1z = 39 \\ 2x + 3y + 1z = 34 \\ 1x + 2y + 3z = 26 \end{cases}$$

- $D = \begin{vmatrix} 3 & 2 & 1 & 3 & 2 \\ 2 & 3 & 1 & 2 & 3 \\ 1 & 2 & 3 & 1 & 2 \end{vmatrix}$

$$D = 27 + 2 + 4 - 3 - 6 - 12$$

$$\boxed{D = 12}$$

- $D_x = \begin{vmatrix} 39 & 2 & 1 & 39 & 2 \\ 34 & 3 & 1 & 34 & 3 \\ 26 & 2 & 3 & 26 & 2 \end{vmatrix}$

$$D_x = 351 + 52 + 68 - 78 - 78 - 204$$

$$\boxed{D_x = 111}$$

- $D_y = \begin{vmatrix} 3 & 39 & 1 & 3 & 3 \\ 2 & 34 & 1 & 2 & 3 \\ 1 & 26 & 3 & 1 & 2 \end{vmatrix}$ $\begin{matrix} 9 \\ 4 \\ 6 \end{matrix}$

$$D_y = 204 + 39 + 52 - 34 - 78 - 239$$

$$\boxed{D_y = 51}$$

• $D_z = \begin{vmatrix} 3 & 2 & 3 & 9 & 3 & 2 \\ 2 & 3 & 3 & 4 & 2 & 3 \\ 1 & 2 & 2 & 6 & 1 & 2 \end{vmatrix}$

$D_z = 234 + 68 + 156 - 104 - 204 - 117$

$\boxed{D_z = 33}$ //

* $X = \frac{D_x}{D} = \frac{111}{12} = 9,25$

$\boxed{X = 9,25}$ //

* $Y = \frac{D_y}{D} = \frac{51}{12} = 4,25$

$\boxed{Y = 4,25}$ //

* $Z = \frac{D_z}{D} = \frac{33}{12} = 2,75$

$\boxed{Z = 2,75}$ //

$\therefore S = \{(9,25; 4,25; 2,75)\}$