

1. (Simon & Blume - Exercício 7.2) Resolva os seguintes sistemas por substituição, por eliminação Gaussiana e por eliminação de Gauss-Jordan:

$$(a) \begin{cases} x - 3y + 6z = -1 \\ 2x - 5y + 10z = 0 \\ 3x - 8y + 17z = 1 \end{cases}$$

Substituição

$$\begin{aligned}
 1a \quad & \begin{cases} x - 3y + 6z = -1 & x = -1 + 3y - 6z \\ 2x - 5y + 10z = 0 \Rightarrow & \\ 3x - 8y + 17z = 1 & \end{cases} \\
 \Rightarrow & 2(-1 + 3y - 6z) - 5y + 10z = 0 \Rightarrow -2 + 6y - 12z - 5y + 10z = 0 \\
 \Rightarrow & y - 2z = 2 \Rightarrow y = 2 + 2z \Rightarrow x = -1 + 3(2 + 2z) - 6z \Rightarrow \\
 & x = -1 + 6 + 6z - 6z \Rightarrow x = 5 \Rightarrow 3(5) - 8(2 + 2z) + 17z = 1 \\
 \Rightarrow & 15 - 16 - 16z + 17z = 1 \Rightarrow -1 + 1z = 1 \Rightarrow z = 2 \\
 & \text{Substituir } z = 2 \text{ nos outros termos:} \\
 & x = 3y + 6z = -1 \Rightarrow 17 - 3y = -1 \Rightarrow -3y = -18 \Rightarrow y = \frac{-18}{-3} \\
 & 5 - 3y + 6(2) = -1 \\
 \Rightarrow & y = 6
 \end{aligned}$$

Gaussiano

$$7a \quad \begin{cases} x - 3y + 6z = -1 \\ 2x - 5y + 10z = 0 \\ 3x - 8y + 17z = 1 \end{cases} \Rightarrow \begin{cases} x - 3y + 6z = -1 & L1 \\ 0 + 7y - 2z = 2 & L2 \leftarrow L2 - 2L1 \\ 0 + 1y - 7z = 4 & L3 \leftarrow L3 - 3L1 \end{cases}$$

$$\Rightarrow \begin{cases} x - 3y + 6z = -1 & L1 \\ 0 + 7y - 2z = 2 & L2 \\ 0 + 0 + 1z = 2 & L3 \leftarrow L3 - L2 \end{cases}$$

$\boxed{z=2} \Rightarrow y - 4 = 2 \Rightarrow$   
 $\boxed{y=6} \Rightarrow x - 18 + 12 = -1$   
 $\boxed{x=5}$

Gauss-Jordan

$$7a \quad \begin{cases} x - 3y + 6z = -1 \\ 2x - 5y + 10z = 0 \\ 3x - 8y + 17z = 1 \end{cases} \Rightarrow \begin{cases} x - 3y + 6z = -1 & L1 \\ 0 + y - 2z = 2 & L2 \leftarrow L2 - 2L1 \\ 0 + y - z = 4 & L3 \leftarrow L3 - 3L1 \end{cases}$$

$$\Rightarrow \begin{cases} x - 3y + 6z = -1 & L1 \\ 0 + y - 2z = 2 & L2 \\ 0 + 0 + z = 2 & L3 \leftarrow L3 - L2 \end{cases}$$

$$\Rightarrow \begin{cases} x - 3y + 0 = -13 & L1 \leftarrow L1 - 6L3 \\ 0 + y + 0 = 6 & L2 \leftarrow L2 + 2L3 \\ 0 + 0 + z = 2 & L3 \end{cases} \Rightarrow$$

$$\begin{cases} x + 0 + 0 = 5 & L1 \leftarrow L1 + 3L2 \\ 0 + y + 0 = 6 & L2 \\ 0 + 0 + z = 2 & L3 \end{cases} \Rightarrow \begin{matrix} x = 5 \\ y = 6 \\ z = 2 \end{matrix}$$

$$(b) \quad \begin{cases} x_1 + x_2 + x_3 = 0 \\ 12x_1 + 2x_2 - 3x_3 = 5 \\ 3x_1 + 4x_2 + x_3 = -4 \end{cases}$$

Substituição

$$7_6 \begin{cases} x_1 + x_2 + x_3 = 0 \\ 12x_1 + 2x_2 - 3x_3 = 5 \\ 3x_1 + 4x_2 + x_3 = -4 \end{cases} \Rightarrow \begin{array}{l} x_1 = -x_2 - x_3 \Rightarrow 12(-x_2 - x_3) + 2x_2 - 3x_3 = 5 \\ -12x_2 - 12x_3 + 2x_2 - 3x_3 = 5 \Rightarrow \\ -10x_2 - 15x_3 = 5 \Rightarrow \end{array}$$

$$\therefore -10x_2 = 5 + 15x_3 \Rightarrow x_2 = \frac{-(5 + 15x_3)}{10} \Rightarrow$$

$$3\left(\frac{-(5 + 15x_3)}{10} - x_3\right) + 4\left(\frac{-(5 + 15x_3)}{10}\right) + x_3 = -4 \Rightarrow$$

$$3\left(\frac{-5 - 15x_3}{10}\right) - 4\left(\frac{5 + 15x_3}{10}\right) + x_3 = -4 \Rightarrow x_3 + \frac{15 + 15x_3 - 20 - 60x_3}{10} = -4$$

$$\frac{15 + 15x_3}{10} - \frac{20 - 60x_3}{10} + x_3 = -4 \Rightarrow$$

$$\frac{-5 - 45x_3}{10} + x_3 = -4 \Rightarrow \frac{-5 - 35x_3}{10} = -4 \Rightarrow$$

$$-5 - 35x_3 = -40 \Rightarrow -35x_3 = -35 \Rightarrow x_3 = 1$$

$$x_1 = -\left(-\left(\frac{5 + 15(1)}{10}\right)\right) - (1) = -(-2) - 1 \Rightarrow x_1 = 1$$

$$x_2 = -\left(\frac{5 + 15(1)}{10}\right) \Rightarrow -(2) \Rightarrow x_2 = -2 \Rightarrow \boxed{\begin{array}{l} x_1 = 1 \\ x_2 = -2 \\ x_3 = 1 \end{array}}$$

$$7b \quad \begin{cases} x_1 + x_2 + x_3 = 0 \\ 12x_1 + 2x_2 - 3x_3 = 5 \\ 3x_1 + 4x_2 + x_3 = -4 \end{cases} \Rightarrow \begin{cases} x_1 + x_2 + x_3 = 0 & L_1 \\ 0 - 10x_2 - 15x_3 = 5 & L_2 \leftarrow L_2 - 12L_1 \\ 0 + 0 - \frac{7}{2}x_3 = -\frac{7}{2} & L_3 \leftarrow L_3 - 3L_1 \end{cases}$$

$$\Rightarrow \begin{cases} x_1 + x_2 + x_3 = 0 & L_1 \\ 0 - 10x_2 - 15x_3 = 5 & L_2 \\ 0 + 0 - \frac{7}{2}x_3 = -\frac{7}{2} & L_3 \leftarrow L_3 + \frac{1}{10}L_2 \end{cases}$$

$$x_3 = 1$$

$$-10x_2 - 15(1) = 5$$

$$-10x_2 = 20$$

$$x_2 = -2$$

$$x_1 + (-2) + 1 = 0$$

$$x_1 = 1$$

$$7b \quad \begin{cases} x_1 + x_2 + x_3 = 0 \\ 12x_1 + 2x_2 - 3x_3 = 5 \\ 3x_1 + 4x_2 + x_3 = -4 \end{cases} \Rightarrow \begin{cases} x_1 + x_2 + x_3 = 0 & L_1 \\ 0 - 10x_2 - 15x_3 = 5 & L_2 \leftarrow L_2 - 12L_1 \\ 0 + 1x_2 - 2x_3 = -4 & L_3 \leftarrow L_3 - 3L_1 \end{cases}$$

$$\Rightarrow \begin{cases} x_1 + x_2 + x_3 = 0 & L_1 \\ 0 - 10x_2 - 15x_3 = 5 & L_2 \\ 0 + 0 - \frac{7}{2}x_3 = -\frac{7}{2} & L_3 \leftarrow L_3 + \frac{1}{10}L_2 \end{cases}$$

$$\Rightarrow \begin{cases} x_1 + x_2 + x_3 = 0 & L_1 \\ 0 + x_2 + \frac{3}{2}x_3 = -\frac{1}{2} & L_2 \leftarrow -\frac{1}{10}L_2 \\ 0 + 0 + x_3 = 1 & L_3 \leftarrow -\frac{7}{2}L_3 \end{cases} \Rightarrow$$

$$\begin{cases} x_1 + x_2 + 0 = -1 & L_1 \leftarrow L_1 - L_3 \\ 0 + x_2 + 0 = -2 & L_2 \leftarrow L_2 - \frac{3}{2}L_3 \\ 0 + 0 + x_3 = 1 & L_3 \end{cases} \Rightarrow$$

$$\begin{cases} x_1 + 0 + 0 = 1 & L_1 \leftarrow L_1 - L_2 \\ 0 + x_2 + 0 = -2 & L_2 \\ 0 + 0 + x_3 = 1 & L_3 \end{cases} \Rightarrow$$

$x_1 = 1$   
 $x_2 = -2$   
 $x_3 = 1$

2. (Simon & Blume - Exercício 7.3) Resolva os seguintes sistemas por eliminação de Gauss-Jordan.

(a)  $\begin{cases} 3x + 3y = 4 \\ x - y = 10 \end{cases}$

$$2a \quad \begin{cases} 3x + 3y = 4 \\ x - y = 10 \end{cases} \Rightarrow \begin{cases} x + y = 4/3 & L1 \\ x - y = 10 & L2 \end{cases}$$

$$\Rightarrow \begin{cases} x + y = 4/3 & L1 \\ 0 - 2y = 20/3 & L2 \leftarrow L2 - L1 \end{cases} \Rightarrow \begin{cases} x + y = 4/3 & L1 \\ 0 + y = -7/3 & L2 \leftarrow -\frac{1}{2}L2 \end{cases}$$

$$\Rightarrow \begin{cases} x + 0 = \frac{7}{3} & L1 \leftarrow L1 - L2 \\ 0 + y = -\frac{7}{3} & \end{cases}$$

$$(b) \quad \begin{cases} 4x + 2y - 3z = 1 \\ 6x + 3y - 5z = 0 \\ x + y + 2z = 9 \end{cases}$$

$$2b \quad \begin{cases} 4x + 2y - 3z = 1 \\ 6x + 3y - 5z = 0 \\ x + y + 2z = 9 \end{cases} \Rightarrow \begin{cases} x + \frac{1}{2}y - \frac{3}{4}z = \frac{1}{4} & L1 \leftarrow \frac{1}{4}L1 \\ 6x + 3y - 5z = 0 & L2 \\ x + y + 2z = 9 & L3 \end{cases}$$

$$\begin{cases} x + \frac{1}{2}y - \frac{3}{4}z = \frac{1}{4} \\ 0 + 0 - \frac{1}{2}z = -\frac{3}{2} & L2 \leftarrow L2 - 6L1 \\ 6 + \frac{7}{2}y + \frac{11}{4}z = \frac{35}{4} & L3 \leftarrow L3 - L1 \end{cases} \Rightarrow$$

$$\begin{cases} x + \frac{1}{2}y - \frac{3}{4}z = \frac{1}{4} & L1 \\ 0 + y + \frac{11}{2}z = \frac{35}{2} & L2 \leftarrow 2L3 \\ 0 + 0 + z = 3 & L3 \leftarrow -2L2 \end{cases} \Rightarrow$$

$$\begin{aligned}
 x + \frac{1}{2}y + 0 &= \frac{5}{2} \quad L_1 \leftarrow L_1 + \frac{3}{4}L_3 \Rightarrow \\
 0 + y + 0 &= 1 \quad L_2 \leftarrow L_2 - \frac{11}{2}L_3 \\
 0 + 0 + z &= 3 \quad L_3
 \end{aligned}$$

$$\left\{
 \begin{aligned}
 x + 0 + 0 &= 2 \quad L_1 \leftarrow L_1 - \frac{1}{2}L_2 \\
 0 + y + 0 &= 1 \quad L_2 \\
 0 + 0 + z &= 3 \quad L_3
 \end{aligned}
 \right.$$

(c) 
$$\begin{cases}
 2x + 2y - z = 2 \\
 x + y + z = -2 \\
 2x - 4y + 3z = 0
 \end{cases}$$

$$2C \begin{cases} 2x + 2y - z = 2 \\ x + y + z = -2 \\ 2x - 4y + 3z = 0 \end{cases} \Rightarrow \begin{cases} x + y - z/2 = 1 \\ x + y + z = -2 \\ 2x - 4y + 3z = 0 \end{cases} \quad |L1 + L2$$

$$\Rightarrow \begin{cases} x + y - z/2 = 1 \\ 0 + 3z/2 = -3 \\ 0 - 6y + 4z = -2 \end{cases} \quad |L2 - L1 \Rightarrow \begin{cases} x + y - z/2 = 1 \\ L3 + L3 - 2L1 \end{cases}$$

$$\Rightarrow \begin{cases} x + y - z/2 = 1 \\ 0 + y - \frac{2}{3}z = \frac{1}{3} \\ 0 + 0 + z = -2 \end{cases} \quad |L2 + -\frac{1}{6}L3 \Rightarrow \begin{cases} x + y - z/2 = 1 \\ L3 + \frac{2}{3}L2 \end{cases}$$

$$\Rightarrow \begin{cases} x + y + 0 = 0 \\ 0 + y + 0 = -1 \\ 0 + 0 + z = -2 \end{cases} \quad |L1 + L1 + L3 \Rightarrow \begin{cases} x + y + 0 = 0 \\ L2 + L2 + \frac{2}{3}L3 \\ L3 \end{cases}$$

$$\Rightarrow \begin{cases} x + 0 + 0 = 1 \\ 0 + y + 0 = -1 \\ 0 + 0 + z = -2 \end{cases} \quad |L1 + L1 - L2$$

$$\Rightarrow \begin{cases} x + 0 + 0 = 1 \\ 0 + y + 0 = -1 \\ 0 + 0 + z = -2 \end{cases} \quad |L2$$

$$\Rightarrow \begin{cases} x + 0 + 0 = 1 \\ 0 + y + 0 = -1 \\ 0 + 0 + z = -2 \end{cases} \quad |L3$$

In [1]:

```
pip install nbconvert[webpdf]
```

```
Requirement already satisfied: nbconvert[webpdf] in d:\anaconda\anaconda_instalado\lib\site-packages (6.1.0)
Requirement already satisfied: pandocfilters>=1.4.1 in d:\anaconda\anaconda_instalado\lib\site-packages (from nbconvert[webpdf]) (1.4.3)
Requirement already satisfied: traitlets>=5.0 in d:\anaconda\anaconda_instalado\lib\site-packages (from nbconvert[webpdf]) (5.1.0)
Requirement already satisfied: jupyterlab-pygments in d:\anaconda\anaconda_instalado\lib\site-packages (from nbconvert[webpdf]) (0.1.2)
Requirement already satisfied: defusedxml in d:\anaconda\anaconda_instalado\lib\site-packages (from nbconvert[webpdf]) (0.7.1)
Requirement already satisfied: pygments>=2.4.1 in d:\anaconda\anaconda_instalado\lib\site-packages (from nbconvert[webpdf]) (2.10.0)
Requirement already satisfied: jupyter-core in d:\anaconda\anaconda_instalado\lib\site-packages (from nbconvert[webpdf]) (4.8.1)
Requirement already satisfied: testpath in d:\anaconda\anaconda_instalado\lib\site-packages (from nbconvert[webpdf]) (0.5.0)
Requirement already satisfied: nbclient<0.6.0,>=0.5.0 in d:\anaconda\anaconda_instalado\lib\site-packages (from nbconvert[webpdf]) (0.5.3)
Requirement already satisfied: nbformat>=4.4 in d:\anaconda\anaconda_instalado\lib\site-packages (from nbconvert[webpdf]) (5.1.3)
Requirement already satisfied: jinja2>=2.4 in d:\anaconda\anaconda_instalado\lib\site-packages (from nbconvert[webpdf]) (2.11.3)
Requirement already satisfied: mistune<2,>=0.8.1 in d:\anaconda\anaconda_instalado\lib\site-packages (from nbconvert[webpdf]) (0.8.4)
Requirement already satisfied: bleach in d:\anaconda\anaconda_instalado\lib\site-packages
```

```
(from nbconvert[webpdf]) (4.0.0)
Requirement already satisfied: entrypoints>=0.2.2 in d:\anaconda\anaconda_instalado\lib\site-packages (from nbconvert[webpdf]) (0.3)
Requirement already satisfied: pypeteer==0.2.2 in d:\anaconda\anaconda_instalado\lib\site-packages (from nbconvert[webpdf]) (0.2.2)
Requirement already satisfied: urllib3<2.0.0,>=1.25.8 in d:\anaconda\anaconda_instalado\lib\site-packages (from pypeteer==0.2.2->nbconvert[webpdf]) (1.26.7)
Requirement already satisfied: websockets<9.0,>=8.1 in d:\anaconda\anaconda_instalado\lib\site-packages (from pypeteer==0.2.2->nbconvert[webpdf]) (8.1)
Requirement already satisfied: appdirs<2.0.0,>=1.4.3 in d:\anaconda\anaconda_instalado\lib\site-packages (from pypeteer==0.2.2->nbconvert[webpdf]) (1.4.4)
Requirement already satisfied: tqdm<5.0.0,>=4.42.1 in d:\anaconda\anaconda_instalado\lib\site-packages (from pypeteer==0.2.2->nbconvert[webpdf]) (4.62.3)
Requirement already satisfied: pyee<8.0.0,>=7.0.1 in d:\anaconda\anaconda_instalado\lib\site-packages (from pypeteer==0.2.2->nbconvert[webpdf]) (7.0.4)
Requirement already satisfied: MarkupSafe>=0.23 in d:\anaconda\anaconda_instalado\lib\site-packages (from jinja2>=2.4->nbconvert[webpdf]) (1.1.1)
Requirement already satisfied: async-generator in d:\anaconda\anaconda_instalado\lib\site-packages (from nbclient<0.6.0,>=0.5.0->nbconvert[webpdf]) (1.10)
Requirement already satisfied: jupyter-client>=6.1.5 in d:\anaconda\anaconda_instalado\lib\site-packages (from nbclient<0.6.0,>=0.5.0->nbconvert[webpdf]) (6.1.12)
Requirement already satisfied: nest-asyncio in d:\anaconda\anaconda_instalado\lib\site-packages (from nbclient<0.6.0,>=0.5.0->nbconvert[webpdf]) (1.5.1)
Requirement already satisfied: python-dateutil>=2.1 in d:\anaconda\anaconda_instalado\lib\site-packages (from jupyter-client>=6.1.5->nbclient<0.6.0,>=0.5.0->nbconvert[webpdf]) (2.8.2)
Requirement already satisfied: pyzmq>=13 in d:\anaconda\anaconda_instalado\lib\site-packages (from jupyter-client>=6.1.5->nbclient<0.6.0,>=0.5.0->nbconvert[webpdf]) (22.2.1)
Requirement already satisfied: tornado>=4.1 in d:\anaconda\anaconda_instalado\lib\site-packages (from jupyter-client>=6.1.5->nbclient<0.6.0,>=0.5.0->nbconvert[webpdf]) (6.1)
Requirement already satisfied: pywin32>=1.0 in d:\anaconda\anaconda_instalado\lib\site-packages (from jupyter-core->nbconvert[webpdf]) (228)
Requirement already satisfied: ipython-genutils in d:\anaconda\anaconda_instalado\lib\site-packages (from nbformat>=4.4->nbconvert[webpdf]) (0.2.0)
Requirement already satisfied: jsonschema!=2.5.0,>=2.4 in d:\anaconda\anaconda_instalado\lib\site-packages (from nbformat>=4.4->nbconvert[webpdf]) (3.2.0)
Requirement already satisfied: setuptools in d:\anaconda\anaconda_instalado\lib\site-packages (from jsonschema!=2.5.0,>=2.4->nbformat>=4.4->nbconvert[webpdf]) (58.0.4)
Requirement already satisfied: six>=1.11.0 in d:\anaconda\anaconda_instalado\lib\site-packages (from jsonschema!=2.5.0,>=2.4->nbformat>=4.4->nbconvert[webpdf]) (1.16.0)
Requirement already satisfied: attrs>=17.4.0 in d:\anaconda\anaconda_instalado\lib\site-packages (from jsonschema!=2.5.0,>=2.4->nbformat>=4.4->nbconvert[webpdf]) (21.2.0)
Requirement already satisfied: pyrsistent>=0.14.0 in d:\anaconda\anaconda_instalado\lib\site-packages (from jsonschema!=2.5.0,>=2.4->nbformat>=4.4->nbconvert[webpdf]) (0.18.0)
Requirement already satisfied: colorama in d:\anaconda\anaconda_instalado\lib\site-packages (from tqdm<5.0.0,>=4.42.1->pypeteer==0.2.2->nbconvert[webpdf]) (0.4.4)
Requirement already satisfied: webencodings in d:\anaconda\anaconda_instalado\lib\site-packages (from bleach->nbconvert[webpdf]) (0.5.1)
Requirement already satisfied: packaging in d:\anaconda\anaconda_instalado\lib\site-packages (from bleach->nbconvert[webpdf]) (21.0)
Requirement already satisfied: pyparsing>=2.0.2 in d:\anaconda\anaconda_instalado\lib\site-packages (from packaging->bleach->nbconvert[webpdf]) (3.0.4)
Note: you may need to restart the kernel to use updated packages.
```

In [2]:

```
--allow-chromium-download
```

---

```
NameError Traceback (most recent call last)
~\AppData\Local\Temp\ipykernel_4412\634439718.py in <module>
----> 1 --allow-chromium-download
```

```
NameError: name 'allow' is not defined
```

In [ ]:

