Lista 1. Erickson Müller

1.)

a.) $\begin{cases} x + y + z = 1 \\ x - y + 2z = 2 \\ x + 6y + 3z = 3 \end{cases}$ > $\begin{pmatrix} 1 & 1 & 1 & 1 \\ 1 & -1 & 2 & 2 \\ 1 & 6 & 3 & 3 \end{pmatrix} \begin{matrix} \to L_1 = L_3 \\ \\ \to L_3 = L_1 \end{matrix}$

$\begin{pmatrix} 1 & 6 & 3 & 3 \\ 1 & -1 & 2 & 2 \\ 1 & 1 & 1 & 1 \end{pmatrix} \begin{matrix} \\ \to L_2 - L_3 \\ \to L_3 - L_2 \end{matrix}$ $\begin{pmatrix} 1 & 6 & 3 & 3 \\ 0 & -2 & 1 & 1 \\ 0 & 2 & -1 & -1 \end{pmatrix} \begin{matrix} \\ \\ \to L_1 - 3L_3 \end{matrix}$

$\begin{pmatrix} 1 & 6 & 3 & 3 \\ 0 & -2 & 1 & 1 \\ 0 & 0 & 12 & 12 \end{pmatrix}$

$12z = 12$

$z = 1$

$-2y + 1 = 1$

$y = 0$

$x + 6.0 + 3.1 = 3$

$x = 0$

$S = \{(0, 0, 1)\}$

b.) $\begin{cases} x + y + z = 1 \\ x - y + z = -2 \\ 2y = -3 \end{cases}$ > $\begin{array}{cccc} x & z & y & \\ \hline \end{array}$ $\begin{pmatrix} 1 & 1 & 1 & 1 \\ 1 & 1 & -1 & -2 \\ 0 & 0 & 2 & -3 \end{pmatrix} \begin{matrix} \\ \to L_1 - L_2 \\ \\ \end{matrix}$

$\begin{pmatrix} 1 & 1 & 1 & 1 \\ 0 & 0 & 2 & 3 \\ 0 & 0 & 2 & -3 \end{pmatrix}$ temos que $2y = -3$ ao mesmo tempo que $2y = 3$. Portanto o sistema é impossível

$S = \emptyset$

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2-) $\begin{cases} 3x - 7y = a \\ x + y = b \\ 5x + 3y = 5a + 2b \\ x + 2y = a + b - 1 \end{cases}$

$$\begin{pmatrix} 3 & -7 & a \\ 1 & 1 & b \\ 5 & 3 & 5a+2b \\ 1 & 2 & a+b-1 \end{pmatrix} \begin{array}{l} \\ \to L_1 - 3L_2 \\ \to L_3 - 2L_2 - L_1 \\ \to L_4 - L_2 \end{array}$$

$$\begin{pmatrix} 3 & -7 & a \\ 0 & -10 & a-3b \\ 0 & 8 & 4a \\ 0 & 1 & a-1 \end{pmatrix} \to \div 4 \begin{cases} 2y = a \\ 3x - 7y = a \end{cases}$$

$\cancel{3x}$ $-5a = a - 3b$

$b = 2a$

$\to 3x - \frac{7a}{2} = a$

$3x = \frac{9a}{2}$

$x = \frac{3a}{2}$

SPD $\to a = 2$

$b = 4$

$x = \frac{3 \cdot 2}{2} = 3$

$y = \frac{2}{2} = 1$

$S = \{(3, 1)\}$

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3-) $\begin{pmatrix} 1 & 1 & -a & 0 \\ a & 1 & -1 & 2-a \\ 1 & a & -1 & -a \end{pmatrix} \begin{matrix} \\ \to L_2 - a.L_1 \\ \to L_3 - L_1 \end{matrix} \begin{pmatrix} 1 & 1 & -a & 0 \\ 0 & 1-a & a^2-1 & 2-a \\ 0 & a-1 & a-1 & -a \end{pmatrix} \to L_3 - L_2$

$\begin{pmatrix} 1 & 1 & -a & 0 \\ 0 & 1-a & a^2-1 & 2-a \\ 0 & 0 & -a^2+a & -2 \end{pmatrix}$

SI: $-a^2+a=0$ e $-2 \neq 0$

$a=0$

ou $a=1$

SPI $-a^2+a=0$ e $-2=0$

$\nexists$

SPD $-a^2+a \neq 0$ e $-2 \neq 0$

$a \neq 0$ e $a \neq 1$

3-) $\begin{pmatrix} 3 & -1 & -2 \\ 1 & 1 & 0 \end{pmatrix} \to L_1 + L_2 \begin{pmatrix} 3 & -1 & -2 \\ 4 & 0 & -2 \end{pmatrix}$

$4x = -2$

$x = \frac{-1}{2}$

$y - \frac{1}{2} = 0$

$y = \frac{1}{2}$

$a \cdot \frac{-1}{2} + 2 \cdot \frac{1}{2} = 6$

$a = -2.5$

$a = -10$

SPD: $a = -10$

SPI: $2-a=0$ e $6=0$

$\nexists$

SI: ~~a~~

$a \neq -10$

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4.)

$$\begin{pmatrix} 1 & 2 & -2 & -1 \\ 2 & -2 & -2 & -3 \\ 2 & -2 & -1 & -5 \\ 3 & -1 & 1 & -m \end{pmatrix} \begin{matrix} \\ \to L_2 - 2L_1 \\ \to L_3 - 2L_1 \\ \to L_4 - 3L_1 \end{matrix}$$

$$\begin{pmatrix} 1 & 2 & -2 & -1 \\ 0 & -6 & 2 & -1 \\ 0 & -6 & 3 & -3 \\ 0 & -7 & 7 & 3-m \end{pmatrix} \begin{matrix} \\ \\ \to L_3 - L_2 \\ \to L_4 - \frac{7}{6} L_2 \end{matrix}$$

$$\begin{pmatrix} 1 & 2 & -2 & -1 \\ 0 & -6 & 2 & -1 \\ 0 & 0 & 1 & -2 \\ 0 & 0 & \frac{28}{6} & -m+\frac{25}{6} \end{pmatrix} \begin{matrix} \\ \\ \\ \to L_4 - \frac{14}{3} L_3 \end{matrix}$$

$$\begin{pmatrix} 1 & 2 & -2 & -1 \\ 0 & -6 & 2 & -1 \\ 0 & 0 & 1 & -2 \\ 0 & 0 & 0 & -m+\frac{27}{2} \end{pmatrix}$$

SPD quando $B \neq 0$ e $C \neq 0$

$$2 \neq -m + \frac{27}{2}$$

$$m \neq \frac{27}{2}$$

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5-) b-)
$$\left(\begin{array}{cccc|cc} 1 & 1 & 1 & 1 & -1 & 0 \\ 1 & -1 & -1 & 2 & -1 & 0 \end{array}\right) \to L_2 - L_1$$

$$\left(\begin{array}{cccc|cc} 1 & 1 & 1 & 1 & -1 & 0 \\ 0 & -2 & -2 & 1 & 0 & 0 \end{array}\right)$$

$-2y - 2z + w = 0$

$w = 2y + 2z$

$y = \frac{w}{2} - z$

$x + \frac{w}{2} - z + z + w - t = 0$

$x + \frac{3}{2} \cdot w - t = 0$

$x = t - \frac{3w}{2}$

$S = \left\{\left(t + \frac{3w}{2}, \frac{w}{2} - z, z, w, t \right)\right\}$