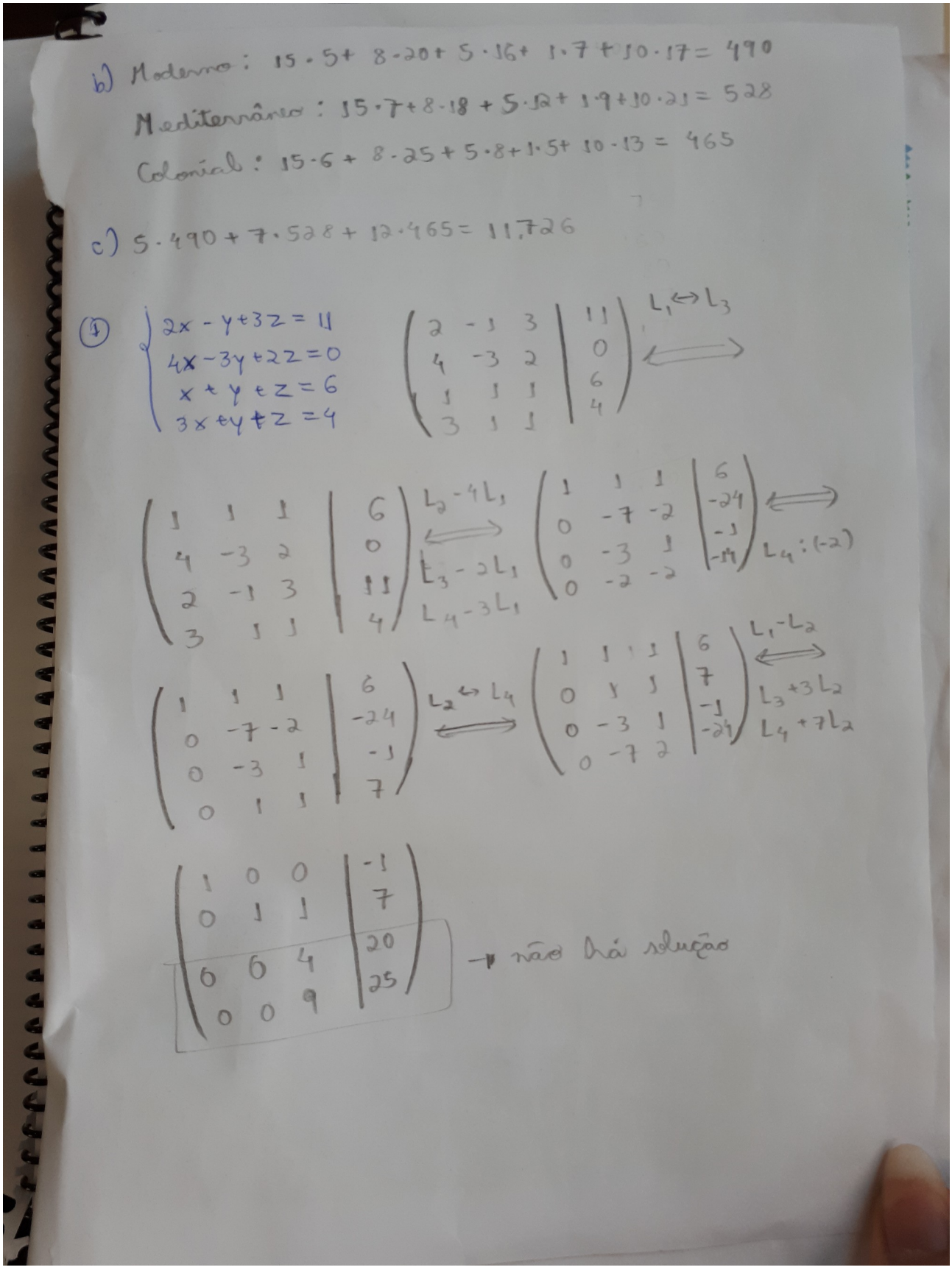
2ª Lista de Exercícios



(12) $\left(\begin{array}{ccc|c} 1 & 1 & 1 & 4 \\ 2 & 5 & -2 & 3 \\ 1 & 7 & -7 & 5 \end{array}\right) \Longleftrightarrow \begin{matrix} \\ L_2 - 2L_1 \\ L_3 - L_1 \end{matrix} \left(\begin{array}{ccc|c} 1 & 1 & 1 & 4 \\ 0 & 3 & -4 & -5 \\ 0 & 6 & -8 & 1 \end{array}\right) \Longleftrightarrow \begin{matrix} \\ \\ L_3 - 2L_2 \end{matrix}$

$\left(\begin{array}{ccc|c} 1 & 1 & 1 & 4 \\ 0 & 3 & -4 & -5 \\ 0 & 0 & 0 & 11 \end{array}\right) \rightarrow$ sem solução

(13) $\left(\begin{array}{ccc|c} 1 & -2 & 3 & 0 \\ 2 & 5 & 6 & 0 \end{array}\right) \Longleftrightarrow \begin{matrix} \\ L_2 - 2L_1 \end{matrix} \left(\begin{array}{ccc|c} 1 & -2 & 3 & 0 \\ 0 & 9 & 0 & 0 \end{array}\right)$

$\begin{cases} x - 2y + 3z = 0 \\ 9y = 0 \\ z = 0 \end{cases} \Longleftrightarrow \begin{cases} x = -3\theta \\ y = 0 \\ z = \theta \end{cases}$

(14) $\left(\begin{array}{cccc|c} 1 & 1 & 1 & 1 & 0 \\ 1 & 1 & 1 & -1 & 4 \\ 1 & 1 & -1 & 1 & -4 \\ 1 & -1 & 1 & 1 & 2 \end{array}\right) \Longleftrightarrow \begin{matrix} \\ L_2 - L_1 \\ L_3 - L_1 \\ L_4 - L_1 \end{matrix} \left(\begin{array}{cccc|c} 1 & 1 & 1 & 1 & 0 \\ 0 & 0 & 0 & -2 & 4 \\ 0 & 0 & -2 & 0 & -4 \\ 0 & -2 & 0 & 0 & 2 \end{array}\right) \Longleftrightarrow$

$\begin{cases} x_1 = 1 \\ x_4 = -2 \\ x_3 = 2 \\ x_2 = -1 \end{cases}$

(15) $\left(\begin{array}{ccc|c} 1 & 2 & 3 & 0 \\ 2 & 1 & 3 & 0 \\ 3 & 2 & 1 & 0 \end{array}\right) \Longleftrightarrow \begin{matrix} \\ L_2 - 2L_1 \\ L_3 - 3L_1 \end{matrix} \left(\begin{array}{ccc|c} 1 & 2 & 3 & 0 \\ 0 & -3 & -3 & 0 \\ 0 & -4 & -8 & 0 \end{array}\right) \Longleftrightarrow \begin{matrix} \\ L_2 : (-3) \\ L_3 : (-4) \end{matrix}$

$\left(\begin{array}{ccc|c} 1 & 2 & 3 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 1 & 2 & 0 \end{array}\right) \Longleftrightarrow \begin{matrix} L_1 - 2L_2 \\ \\ L_3 - L_2 \end{matrix} \left(\begin{array}{ccc|c} 1 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 0 \end{array}\right) \Longleftrightarrow \begin{cases} x = 0 \\ y = 0 \\ z = 0 \end{cases}$

(14)

b) $\det(A) = 3 \cdot 18 \cdot (-5) \cdot 0 \cdot (-1) = 0$

(16)

$$\begin{cases} x - 2y + z = 1 \\ 2x + y = 3 \\ y - 5z = 4 \end{cases} \qquad A = \begin{pmatrix} 1 & -2 & 1 \\ 2 & 1 & 0 \\ 0 & 1 & -5 \end{pmatrix}$$

$$\det(A) = \begin{vmatrix} 1 & -2 & 1 & 1 & -2 \\ 2 & 1 & 0 & 2 & 1 \\ 0 & 1 & -5 & 0 & 1 \end{vmatrix}$$

$$= (-5 + 0 + 2) - (0 + 0 + 20)$$

$$= -3 - 20 = -23$$

$$A_x = \begin{pmatrix} 1 & -2 & 1 \\ 3 & 1 & 0 \\ 4 & 1 & -5 \end{pmatrix} \qquad \det(A_x) = \begin{vmatrix} 1 & -2 & 1 & 1 & -2 \\ 3 & 1 & 0 & 3 & 1 \\ 4 & 1 & -5 & 4 & 1 \end{vmatrix}$$

$$= (-5 + 0 + 3) - (4 + 0 + 30)$$

$$= -2 - 34 = -36$$

$$A_y = \begin{pmatrix} 1 & 1 & 1 \\ 2 & 3 & 0 \\ 0 & 4 & -5 \end{pmatrix} \qquad \det(A_y) = \begin{vmatrix} 1 & 1 & 1 & 1 & 1 \\ 2 & 3 & 0 & 2 & 3 \\ 0 & 4 & -5 & 0 & 4 \end{vmatrix}$$

$$= (-15 + 0 + 8) - (0 + 0 - 10)$$

$$= 3$$

$$A_z = \begin{pmatrix} 1 & -2 & 1 \\ 2 & 1 & 3 \\ 0 & 1 & 4 \end{pmatrix} \quad \det(A_z) = \begin{vmatrix} 1 & -2 & 1 & 1 & -2 \\ 2 & 1 & 3 & 2 & 1 \\ 0 & 1 & 4 & 0 & 1 \end{vmatrix}$$

$$= (4 + 0 + 2) - (0 + 3 - 16)$$

$$= 19$$

$$x = \frac{36}{23}, \quad y = \frac{-3}{23}, \quad z = -\frac{19}{23}$$