

Lista 3

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Questão 1

1.

$$\begin{array}{ccc} \begin{array}{cccc} 2 & 1 & 4 & -2 \\ -3 & 4 & 2 & -2 \\ 3 & 5 & -2 & 1 \\ -2 & 3 & 2 & 4 \end{array} & \begin{array}{cccc} 2 & 1 & 4 & -2 & 19 \\ 0 & 11/2 & 8 & -4 & 59/2 \\ 3 & 5 & -2 & 1 & 8 \\ -2 & 3 & 2 & 4 & 13 \end{array} & \begin{array}{cccc} 2 & 1 & 4 & -2 & 19 \\ 0 & 11/2 & 8 & -4 & 59/2 \\ 0 & 7/2 & -8 & 4 & -41/2 \\ -2 & 3 & 2 & 4 & 13 \end{array} \end{array}$$

$$\begin{array}{ccc} \begin{array}{cccc} 2 & 1 & 4 & -2 & 19 \\ 0 & 11/2 & 8 & -4 & 59/2 \\ 0 & 7/2 & -8 & 4 & -41/2 \\ 0 & 4 & 6 & 2 & 32 \end{array} & \begin{array}{cccc} 2 & 1 & 4 & -2 & 19 \\ 0 & 11/2 & 8 & -4 & 59/2 \\ 0 & 0 & \frac{-144}{11} & \frac{72}{11} & \frac{-432}{11} \\ 0 & 4 & 6 & 2 & 32 \end{array} & \begin{array}{cccc} 2 & 1 & 4 & -2 & 19 \\ 0 & 11/2 & 8 & -4 & 59/2 \\ 0 & 0 & \frac{-144}{11} & \frac{72}{11} & \frac{-432}{11} \\ 0 & 0 & \frac{2}{11} & \frac{54}{11} & \frac{116}{11} \end{array} \end{array}$$

$$\begin{array}{ccc} \begin{array}{cccc} 2 & 1 & 4 & -2 & 19 \\ 0 & \frac{11}{2} & 8 & -4 & \frac{59}{2} \\ 0 & \frac{7}{2} & -8 & 4 & \frac{-41}{2} \\ 0 & 4 & 6 & 2 & 32 \end{array} & \begin{array}{cccc} 2 & 1 & 4 & -2 & 19 \\ 0 & \frac{11}{2} & 8 & -4 & \frac{59}{2} \\ 0 & 0 & \frac{-144}{11} & \frac{72}{11} & \frac{-432}{11} \\ 0 & 4 & 6 & 2 & 32 \end{array} & \begin{array}{cccc} 2 & 1 & 4 & -2 & 19 \\ 0 & 11/2 & 8 & -4 & 59/2 \\ 0 & 0 & \frac{-144}{11} & \frac{72}{11} & \frac{-432}{11} \\ 0 & 0 & \frac{2}{11} & \frac{54}{11} & \frac{116}{11} \end{array} \end{array}$$

$$\begin{array}{ccc} \begin{array}{cccc} 2 & 1 & 4 & -2 & 19 \\ 0 & \frac{11}{2} & 8 & -4 & \frac{59}{2} \\ 0 & 0 & \frac{-144}{11} & \frac{72}{11} & \frac{-432}{11} \\ 0 & 0 & 0 & 5 & 10 \end{array} & \begin{array}{l} 5x_4 = 10 \\ \therefore x_4 = 2 \end{array} & \end{array}$$

$$\begin{array}{ccc} \begin{array}{cccc} 2 & 1 & 4 & -2 & 19 \\ 0 & \frac{11}{2} & 8 & -4 & \frac{59}{2} \\ 0 & 0 & \frac{-144}{11} & \frac{72}{11} & \frac{-432}{11} \\ 0 & 0 & 0 & 5 & 10 \end{array} & \begin{array}{l} \frac{-144}{11} \cdot x_3 + \frac{72}{11} \cdot x_4 = \frac{-432}{11} \\ \frac{-144}{11} \cdot x_3 = \frac{-432}{11} - \frac{72}{11} \cdot x_4 \\ \frac{-144}{11} \cdot x_3 = \frac{-432}{11} - \frac{72}{11} \cdot 2 \\ \frac{-144}{11} \cdot x_3 = \frac{-576}{11} \end{array} & \begin{array}{l} \therefore x_3 = 4 \end{array} \end{array}$$

$$\frac{11}{2} \cdot X_2 = \frac{59}{2} - 8X_3 + 4X_4 = \frac{59}{2} - 8 \cdot 4 + 4 \cdot 2 = \frac{11}{2}$$

$$X_2 = 1$$

$$2X_1 + X_2 + 4X_3 - 2X_4 = 19$$

RESPOSTA

$$2X_1 + 1 + 4 \cdot 4 - 2 \cdot 2 = 19$$

$$X_1 = 3$$

$$2X_1 + 1 + 16 - 4 = 19$$

$$X_2 = 1$$

$$2X_1 = 3 + 4 + 2$$

$$X_3 = 4$$

$$2X_1 = 6$$

$$X_4 = 2$$

$$X_1 = 3$$

Questão 2

2.

$$\begin{array}{ccc|ccc} 1 & 2 & -2 & 9 & 1 & 2 & -2 & 9 & 1 & 2 & -2 & 9 \\ 2 & 3 & 1 & 23 & 0 & -1 & 5 & 5 & 0 & -1 & 5 & 5 \\ 3 & 2 & -4 & 11 & 3 & 2 & -4 & 11 & 0 & -4 & 2 & -16 \end{array}$$

$$\begin{array}{ccc|ccc} 1 & 2 & -2 & 9 & 1 & 2 & -2 & 9 & 1 & 2 & -2 & 9 \\ 0 & 1 & -5 & -5 & 0 & 1 & -5 & -5 & 0 & 1 & -5 & -5 \\ 0 & -4 & 2 & -16 & 0 & 0 & -18 & -36 & 0 & 0 & 1 & 2 \end{array}$$

$$\begin{array}{ccc|ccc} 1 & 2 & -2 & 9 & 1 & 2 & 0 & 13 & 1 & 0 & 0 & 3 \\ 0 & 1 & 0 & 5 & 0 & 1 & 0 & 5 & 0 & 1 & 0 & 5 \\ 0 & 0 & 1 & 2 & 0 & 0 & 1 & 2 & 0 & 0 & 1 & 2 \end{array}$$

RESPOSTA

$$x_1 = 3$$

$$x_2 = 5$$

$$x_3 = 2$$

Questão 3

3.

$$\begin{array}{cccc} 2 & -4 & 1 & 4 \\ 6 & 2 & -1 & 10 \\ -2 & 6 & 2 & -6 \end{array}$$

$$\begin{array}{cccc} 1 & -2 & \frac{1}{2} & 2 \\ 6 & 2 & -1 & 10 \\ -2 & 6 & 2 & -6 \end{array}$$

$$\begin{array}{cccc} 1 & -2 & \frac{1}{2} & 2 \\ 0 & 14 & -4 & -2 \\ -2 & 6 & 2 & -6 \end{array}$$

$$\begin{array}{cccc} 1 & -2 & \frac{1}{2} & 2 \\ 0 & 1 & -\frac{2}{7} & -\frac{1}{7} \\ 0 & 2 & -1 & -2 \end{array}$$

$$\begin{array}{cccc} 1 & -2 & \frac{1}{2} & 2 \\ 0 & 1 & -\frac{2}{7} & -\frac{1}{7} \\ 0 & 0 & -\frac{3}{7} & -\frac{12}{7} \end{array}$$

$$\begin{array}{cccc} 1 & -2 & \frac{1}{2} & 2 \\ 0 & 1 & -\frac{2}{7} & -\frac{1}{7} \\ 0 & 0 & 1 & 4 \end{array}$$

$$\begin{array}{cccc} 1 & -2 & 0 & 0 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 4 \end{array}$$

$$\begin{array}{cccc} 1 & 0 & 0 & 2 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 4 \end{array}$$

$x_1 = 2$   
 $x_2 = 1$   
 $x_3 = 4$

Questão 4

$$X_1 = \frac{51 - 2X_2 - 3X_3}{8} \quad \therefore X_1 = 6.375 - 0.25X_2 - 0.375X_3$$

$$X_2 = \frac{23 - 2X_1 - X_3}{5} \quad \therefore X_2 = 4.6 - 0.4X_1 - 0.2X_3$$

$$X_3 = \frac{20 + 3X_1 - X_2}{6} \quad \therefore X_3 = 3.3333 + 0.5X_1 - 0.1667X_2$$

$$X^0 = \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}$$

$$X_1^{(1)} = 6.375$$

$$X_2^{(1)} = 4.6 - 0.4(6.375) = 2.05$$

$$X_3^{(1)} = 3.3333 + 0.5(6.375) - 0.1667(2.05)$$

$$X_3^{(1)} = 6.1790$$

$$X_1^{(2)} = 6.375 - 0.25(2.05) - 0.375(6.1790) = 6.375 - 0.5125 + 2.3171$$

$$X_3^{(2)} = 3.5454$$

$$X_2^{(2)} = 4.6 - 0.4(3.5454) - 0.2(6.1790) = 1.9460$$

$$X_3^{(2)} = 3.3333 + 0.5(3.5454) - 0.1667(1.9460) = 4.7816$$

$$X_1^{(3)} = 6.375 - 0.25(1.9460) - 0.375(4.7816) = 4.0954$$

$$X_2^{(3)} = 4.6 - 0.4(4.0954) - 0.2(4.7816) = 2.0052$$

$$X_3^{(3)} = 3.3333 + 0.5(4.0954) - 0.1667(2.0052) = 5.04679816$$

Questão 5

$$\begin{array}{ccc}
 \begin{array}{cccccc}
 6 & 3 & 11 & 1 & 0 & 0 \\
 3 & 2 & 7 & 0 & 1 & 0 \\
 3 & 2 & 6 & 0 & 0 & 1
 \end{array}
 & \rightarrow &
 \begin{array}{cccccc}
 1 & \frac{1}{2} & \frac{11}{6} & \frac{1}{6} & 0 & 0 \\
 3 & 2 & 7 & 0 & 1 & 0 \\
 3 & 2 & 6 & 0 & 0 & 1
 \end{array}
 \\
 \\
 \begin{array}{cccccc}
 1 & \frac{1}{2} & \frac{11}{6} & \frac{1}{6} & 0 & 0 \\
 0 & \frac{1}{2} & \frac{3}{2} & \frac{-1}{2} & 1 & 0 \\
 3 & 2 & 6 & 0 & 0 & 1
 \end{array}
 & \rightarrow &
 \begin{array}{cccccc}
 1 & \frac{1}{2} & \frac{11}{6} & \frac{1}{6} & 0 & 0 \\
 0 & \frac{1}{2} & \frac{3}{2} & \frac{-1}{2} & 1 & 0 \\
 0 & \frac{1}{2} & \frac{1}{2} & \frac{-1}{2} & 0 & 1
 \end{array}
 \\
 \\
 \begin{array}{cccccc}
 1 & \frac{1}{2} & \frac{11}{6} & \frac{1}{6} & 0 & 0 \\
 0 & 1 & 3 & -1 & 2 & 0 \\
 0 & \frac{1}{2} & \frac{1}{2} & \frac{-1}{2} & 0 & 1
 \end{array}
 & \rightarrow &
 \begin{array}{cccccc}
 1 & \frac{1}{2} & \frac{11}{6} & \frac{1}{6} & 0 & 0 \\
 0 & 1 & 3 & -1 & 2 & 0 \\
 0 & 0 & -1 & 0 & -1 & 1
 \end{array}
 \\
 \\
 \begin{array}{cccccc}
 1 & \frac{1}{2} & \frac{11}{6} & \frac{1}{6} & 0 & 0 \\
 0 & 1 & 3 & -1 & 2 & 0 \\
 0 & 0 & 1 & 0 & 1 & -1
 \end{array}
 & \rightarrow &
 \begin{array}{cccccc}
 1 & \frac{1}{2} & \frac{11}{6} & \frac{1}{6} & 0 & 0 \\
 0 & 1 & 0 & -1 & -1 & 3 \\
 0 & 0 & 1 & 0 & 1 & -1
 \end{array}
 \end{array}$$

$$\begin{array}{cccccc}
 1 & \frac{1}{2} & 0 & \frac{1}{6} & -\frac{11}{6} & \frac{11}{6} \\
 0 & 1 & 0 & -1 & -1 & 3 \\
 0 & 0 & 1 & 0 & 1 & -2
 \end{array}$$

$$\begin{array}{cccccc}
 1 & 0 & 0 & \frac{2}{3} & -\frac{4}{3} & \frac{1}{3} \\
 0 & 1 & 0 & -1 & -1 & 3 \\
 0 & 0 & 1 & 0 & 1 & -2
 \end{array}$$

$$A^{-1} = \begin{array}{ccc} \frac{2}{3} & -\frac{4}{3} & \frac{1}{3} \\ -1 & -1 & 3 \\ 0 & 1 & -2 \end{array}$$