

$$4a \rightarrow \begin{pmatrix} 3 & -4 & 1 & 9 \\ 1 & 2 & 2 & 3 \\ 4 & 0 & -3 & -2 \end{pmatrix} \rightarrow \begin{pmatrix} 4 & 0 & -3 & -2 \\ 1 & 2 & 2 & 3 \\ 3 & -4 & 1 & 9 \end{pmatrix} \rightarrow \begin{pmatrix} 4 & 0 & -3 & -2 \\ 1 - \frac{1}{4} \cdot 4 & 2 - \frac{1}{4} \cdot 0 & 2 - \frac{1}{4} \cdot (-3) & 3 - \frac{1}{4} \cdot (-2) \\ 3 - \frac{3}{4} \cdot 4 & -4 - \frac{3}{4} \cdot 0 & 1 - \frac{3}{4} \cdot (-3) & 9 - \frac{3}{4} \cdot (-2) \end{pmatrix}$$

$$\rightarrow \begin{pmatrix} 4 & 0 & -3 & -2 \\ 0 & 2 & \frac{11}{4} & \frac{7}{2} \\ 0 & -4 & \frac{13}{4} & \frac{21}{2} \end{pmatrix} \rightarrow \begin{pmatrix} 4 & 0 & -3 & -2 \\ 0 & -4 & \frac{13}{4} & \frac{21}{2} \\ 0 & 2 & \frac{11}{4} & \frac{7}{2} \end{pmatrix} \rightarrow \begin{pmatrix} 4 & 0 & -3 & -2 \\ 0 & -4 & \frac{13}{4} & \frac{21}{2} \\ 0 & 2 - \left(\frac{1}{2}\right) \cdot (-4) & \frac{11}{4} - \left(\frac{1}{2}\right) \cdot \frac{13}{4} & \frac{7}{2} - \left(\frac{1}{2}\right) \cdot \frac{21}{2} \end{pmatrix}$$

$$\rightarrow \begin{pmatrix} 4 & 0 & -3 & -2 \\ 0 & -4 & \frac{13}{4} & \frac{21}{2} \\ 0 & 0 & \frac{35}{8} & \frac{35}{4} \end{pmatrix} \quad \begin{aligned} x_3 &= \frac{35}{4} / \frac{35}{8} = \textcircled{2} \\ x_2 &= \left(\frac{21}{2} - \frac{13}{4} \cdot 2\right) / (-4) = \textcircled{-1} \\ x_1 &= (-2 + 3 \cdot 2) / 4 = \textcircled{1} \end{aligned}$$

5a A matriz de coeficientes fica $\begin{pmatrix} 4 & 0 & -3 \\ 3 & -4 & 0 \\ 0 & 1 & 2 \end{pmatrix}$

$$5b \quad x_1 = (-10 + 3x_3)/4; \quad x_2 = (3 + 3x_1)/4; \quad x_3 = (4 - x_2)/2$$

$$x^0 = (0, 0, 0)$$

$$\begin{cases} x_1^1 = (-10 + 3 \cdot 0) / 4 = -2.5 \\ x_2^1 = (3 + 3(-2.5)) / 4 = -1.125 \\ x_3^1 = (4 - (-1.125)) / 2 = 2.563 \end{cases}$$

$$\begin{cases} x_1^2 = (-10 + 3 \cdot (2.563)) / 4 = -0.578 \\ x_2^2 = (3 + 3(-0.578)) / 4 = 0.317 \\ x_3^2 = (4 - 0.317) / 2 = 1.842 \end{cases}$$

$$\begin{cases} x_1^3 = (-10 + 3(1.842)) / 4 = -1.119 \\ x_2^3 = (3 + 3(-1.119)) / 4 = -0.089 \\ x_3^3 = (4 - x_2) / 2 = (4 - (-0.089)) / 2 = 2.045 \end{cases}$$

5c Solução real: $(-1, 0, 2)$

$$\text{Erro relativo verdadeiro (em } x_1): \epsilon_t = \frac{-1.119 - (-1)}{(-1)} \cdot 100\%$$

$$\boxed{\epsilon_t = 11,9\%}$$