

1 Aula de reforço

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1.1 Exercícios sobre sistemas lineares e inversão de matrizes

1. Seja

$$A = \begin{bmatrix} 1 & 0 & 1 \\ 3 & 3 & 4 \\ 2 & 2 & 3 \end{bmatrix}$$

- (a) Encontre a matriz inversa A^{-1} de A ,
- (b) Use a inversa para resolver $Ax = b$ para as seguintes escolhas de b :
 - (i) $b = (1, 1, 1)^T$
 - (ii) $b = (1, 2, 3)^T$
 - (ii) $b = (-2, 1, 0)^T$

2. Encontre a inversa de cada uma das matrizes a seguir:

(a)
$$\begin{bmatrix} -1 & 1 \\ 1 & 0 \end{bmatrix}$$

(b)
$$\begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$$

(c)
$$\begin{bmatrix} 2 & 6 \\ 3 & 8 \end{bmatrix}$$

(d)
$$\begin{bmatrix} 3 & 0 \\ 9 & 3 \end{bmatrix}$$

(e)
$$\begin{bmatrix} 1 & 1 & 1 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{bmatrix}$$

(f)
$$\begin{bmatrix} 2 & 0 & 5 \\ 0 & 3 & 0 \\ 1 & 0 & 3 \end{bmatrix}$$

(g)

$$\begin{bmatrix} -1 & -3 & -3 \\ 2 & 6 & 1 \\ 3 & 8 & 3 \end{bmatrix}$$

(h)

$$\begin{bmatrix} 1 & 0 & 1 \\ -1 & 1 & 1 \\ -1 & -2 & -3 \end{bmatrix}$$

6. Resolva cada um dos sistemas a seguir invertendo a matriz associada.

(a)

$$\begin{array}{rclcl} x_1 & - & 2x_2 & = & 5 \\ 3x_1 & + & x_2 & = & 1 \end{array}$$

(b)

$$\begin{array}{rclcl} 2x_1 & + & x_2 & = & 8 \\ 4x_1 & - & 3x_2 & = & 6 \end{array}$$

(c)

$$\begin{array}{rclcl} 4x_1 & + & 3x_2 & = & 4 \\ \frac{2}{3}x_1 & + & 4x_2 & = & 3 \end{array}$$

(d)

$$\begin{array}{rclclcl} x_1 & + & 2x_2 & - & x_3 & = & 1 \\ 2x_1 & - & x_2 & + & x_3 & = & 3 \\ -x_1 & + & 2x_2 & + & 3x_3 & = & 7 \end{array}$$

(e)

$$\begin{array}{rclclcl} 2x_1 & + & x_2 & + & 3x_3 & = & 1 \\ 4x_1 & + & 3x_2 & + & 5x_3 & = & 1 \\ 6x_1 & + & 5x_2 & + & 5x_3 & = & -3 \end{array}$$

(f)

$$\begin{array}{rclclcl} 3x_1 & + & 2x_2 & + & x_3 & = & 0 \\ -2x_1 & + & x_2 & - & x_3 & = & 2 \\ 2x_1 & - & x_2 & + & 2x_3 & = & -1 \end{array}$$

(g)

$$\begin{array}{rclclcl} \frac{1}{3}x_1 & + & \frac{2}{3}x_2 & + & 2x_3 & = & -1 \\ x_1 & + & 2x_2 & + & \frac{3}{2}x_3 & = & \frac{3}{2} \\ \frac{1}{2}x_1 & + & 2x_2 & + & \frac{12}{5}x_3 & = & \frac{1}{10} \end{array}$$

(h)

$$\begin{array}{rclclclcl} & & x_2 & + & x_3 & + & x_4 & = & 0 \\ 3x_1 & & & + & 3x_3 & - & 4x_4 & = & 7 \\ x_1 & + & x_2 & + & x_3 & + & 2x_4 & = & 6 \\ x_1 & + & 3x_2 & + & x_3 & + & 3x_4 & = & 6 \end{array}$$