

Exercícios

01) Determine os números reais x e y em cada caso

$$\text{a) } \begin{bmatrix} 5x - 2y & 6 \\ 1 & x + y \end{bmatrix} = \begin{bmatrix} 4 & 6 \\ 1 & 5 \end{bmatrix}$$

$$\begin{aligned} 5x - 2y = 4 &\Rightarrow \begin{cases} (5x - 2y = 4)(-1) \\ (x + y = 5)(5) \end{cases} \Rightarrow \begin{cases} -5x + 2y = -4 \\ 5x + 5y = 25 \end{cases} \Rightarrow \begin{aligned} -5x + 2y &= -4 \\ \underline{5x + 5y} &= \underline{25} \\ 0 + 7y &= 21 \end{aligned} \Rightarrow y = \frac{21}{7} \Rightarrow y = 3 \\ x + y = 5 &\Rightarrow x + 3 = 5 \Rightarrow x = 5 - 3 \Rightarrow x = 2 \end{aligned}$$

$$\text{b) } \begin{bmatrix} x + y & 3 \\ 1 & x - y \end{bmatrix} = \begin{bmatrix} 10 & 3 \\ 1 & 2 \end{bmatrix}$$

$$\begin{cases} x + y = 10 \\ x - y = 2 \end{cases} \Rightarrow \begin{aligned} x + y &= 10 \\ \underline{x - y} &= \underline{2} \\ 2x + 0 &= 12 \end{aligned} \Rightarrow 2x = 12 \Rightarrow x = \frac{12}{2} \Rightarrow x = 6$$

$$x + y = 10 \Rightarrow 6 + y = 10 \Rightarrow y = 10 - 6 \Rightarrow y = 4$$

$$\text{c) } \begin{bmatrix} 8 & 3x - 2y \\ x + 3y & 5 \end{bmatrix} = \begin{bmatrix} 2 & 1 \\ 4 & 5 \end{bmatrix}$$

$$\begin{aligned} 3x - 2y = 1 &\Rightarrow \begin{cases} (3x - 2y = 1)(-1) \\ (x + 3y = 4)(3) \end{cases} \Rightarrow \begin{cases} -3x + 2y = -1 \\ 3x + 9y = 12 \end{cases} \Rightarrow \begin{aligned} -3x + 2y &= -1 \\ \underline{3x + 9y} &= \underline{12} \\ 0 + 11y &= 11 \end{aligned} \end{aligned}$$

$$\Rightarrow 11y = 11$$

$$\Rightarrow y = \frac{11}{11}$$

$$\Rightarrow y = 1$$

$$3x - 2y = 1$$

$$\Rightarrow 3x - 2(1) = 1$$

$$\Rightarrow 3x - 2 = 1$$

$$\Rightarrow 3x = 1 + 2$$

$$\Rightarrow 3x = 3$$

$$\Rightarrow x = \frac{3}{3}$$

$$\Rightarrow x = 1$$

$$d) \begin{bmatrix} \log_x 16 & 10 \\ -9 & 2^y \end{bmatrix} = \begin{bmatrix} 2 & 6 \\ -9 & 64 \end{bmatrix}$$

$$\begin{cases} \log_x 16 = 2 \Rightarrow \log_x 16 = 2 \Leftrightarrow x^2 = 16 \Rightarrow x = \sqrt{16} \Rightarrow x = 4 \\ 2^y = 64 \end{cases}$$

$$\begin{array}{l} \Rightarrow 2^y = 2^6 \\ \Rightarrow \cancel{2^y} = \cancel{2^6} \\ \Rightarrow y = 6 \end{array} \quad \begin{array}{l} 64|2 \\ 32|2 \\ 16|2 \\ 8|2 \\ 4|2 \\ 2|2 \\ 1| \end{array}$$

2) Dadas as matrizes M e N e sabendo que $M=N^t$, determine o valor de x e de y:

$$M = \begin{bmatrix} x^2 & y \\ x & 2y \end{bmatrix} \quad \text{e} \quad N = \begin{bmatrix} x & x^2 \\ 2y & y \end{bmatrix}$$

Resolução

$$N^t = \begin{bmatrix} x & 2y \\ x^2 & y \end{bmatrix}, \text{ logo } M=N^t$$

$$\begin{bmatrix} x^2 & y \\ x & 2y \end{bmatrix} = \begin{bmatrix} x & 2y \\ x^2 & y \end{bmatrix}$$

$$\begin{cases} x^2=x \\ 2y=y \end{cases}$$

$$\begin{aligned} \Rightarrow x^2 &= x \\ \Rightarrow x^2 - x &= 0 \\ \Rightarrow x(x - 1) &= 0 \\ \Rightarrow x &= 0 \\ &\text{ou} \\ \Rightarrow x - 1 &= 0 \\ \Rightarrow x &= 1 \end{aligned}$$

$$\begin{aligned} \Rightarrow 2y &= y \\ \Rightarrow 2y - y &= 0 \\ \Rightarrow y &= 0 \end{aligned}$$

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