

## Problema 4

Determinar x tal que:

**A)**

$$\text{a) } \begin{array}{|c|} \hline \begin{array}{ccc} 1 & x & x \\ 2 & 2x & 1=0 \\ 3 & x+1 & 1 \end{array} \\ \hline \end{array}$$

**Resolução:**

$$\text{a) } \begin{array}{|c|} \hline \begin{array}{ccc} 1 & x & x \\ 2 & 2x & 1=0 \\ 3 & x+1 & 1 \end{array} \\ \hline \end{array} \quad \begin{array}{|c|} \hline \begin{array}{ccccc} 1 & x & x & 1 & x \\ 2 & 2x & 1 & 2 & 2x =0 \\ 3 & x+1 & 1 & 3 & x+1 \end{array} \\ \hline \end{array}$$

$$(1 * 2x * 1) + (x * 1 * 3) + (x * 2 * (x+1)) - (x * 2x * 3) - (1 * 1 * (x+1)) - (x * 2 * 1) = 0$$

$$(2x) + (3x) + (2x^2 + 2x) - (6x^2) - (x+1) - (2x) = 0$$

$$2x + 3x + 2x^2 + 2x - 6x^2 - x - 1 - 2x = 0$$

*Agrupando os termos comuns*

$$(-6x^2 + 2x^2) + (2x + 3x + 2x - x - 2x) + (-1) = 0$$
$$-4x^2 + 4x - 1 = 0$$

*Cálculo das raízes*

$$\mathbf{x_1 = (-b + \text{raiz}(\Delta)) / 2a} \text{ e } \mathbf{x_2 = (-b - \text{raiz}(\Delta)) / 2a.}$$

<b>Cálculo de <math>\Delta</math></b>	<b>Cálculo de <math>X_1</math></b>	<b>Cálculo de <math>X_2</math></b>
$\Delta = b^2 - 4ac$	$x_1 = (-b + \text{raiz}(\Delta)) / 2a$	$x_2 = (-4 - \text{raiz}(\Delta)) / 2a$
$\Delta = (4)^2 - 4(-4)(-1)$	$x_1 = (-4 + \text{raiz}(0)) / 2 \cdot (-4)$	$x_2 = (-4 - \text{raiz}(0)) / 2 \cdot (-4)$
$\Delta = 16 - 4(+4)$	$x_1 = (-4 + 0) / -8$	$x_2 = (-4 - 0) / -8$
$\Delta = 16 - 16$	$x_1 = -4 / -8$	$x_2 = -4 / -8$
$\Delta = 0$	$x_1 = 1 / 2$	$x_2 = 1 / 2$

Portanto,  $\mathbf{x_1 = x_2 = 1/2}$

**B)**

$$\text{b) } \begin{array}{|c|c|c|} \hline 1 & x & 1 \\ \hline 1 & -1 & x=0 \\ \hline 1 & -x & 1 \\ \hline \end{array}$$

**Resolução:**

$$\text{b) } \begin{array}{|c|c|c|} \hline 1 & x & 1 \\ \hline 1 & -1 & x=0 \\ \hline 1 & -x & 1 \\ \hline \end{array} \quad \begin{array}{|c|c|c|c|c|} \hline 1 & x & 1 & 1 & x \\ \hline 1 & -1 & x & 1 & -1=0 \\ \hline 1 & -x & 1 & 1 & -x \\ \hline \end{array}$$

$$(1 \cdot 1 \cdot 1) + (x \cdot x \cdot 1) + (1 \cdot 1 \cdot -x) - (1 \cdot 1 \cdot 1) - (1 \cdot x \cdot -x) - (x \cdot 1 \cdot 1) = 0$$

$$(-1) + (x^2) + (-x) - (-1) - (-x^2) - (x) = 0$$

$$-1 + x^2 - x + 1 + x^2 - x = 0$$

*Agrupando os termos comuns*

$$(x^2 + x^2) + (-x - x) + (-1 + 1) = 0$$

$$2x^2 - 2x = 0$$

*Fatorando o termo comum (2x), ficamos com:*

$$2x(x - 1) = 0$$

*Cálculo das raízes*

$$x_1 = 0 \text{ e}$$

$$x_2 = (x - 1) = 0$$

$$x - 1 = 0$$

$$x = 1$$

Portanto, **x = 0** ou **x = 1**

**C)**

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

**Resolução:**

$$\begin{array}{ccc} 1 & x & 2 \\ -2 & x & -4=0 \\ 1 & -3 & -x \end{array} \quad \begin{array}{ccccc} 1 & x & 2 & 1 & x \\ -2 & x & -4 & -2 & x =0 \\ 1 & -3 & -x & 1 & -3 \end{array}$$

$$(1 \cdot x \cdot -x) + (x \cdot -4 \cdot 1) + (2 \cdot -2 \cdot -3) - (2 \cdot x \cdot 1) - (1 \cdot -4 \cdot -3) - (x \cdot -2 \cdot -x) = 0$$

$$(-x^2) + (-4x) + (12) - (2x) - (12) - (+2x^2) = 0$$

$$-x^2 - 4x + 12 - 2x - 12 - 2x^2 = 0$$

$$-3x^2 - 6x = 0$$

*Fatorando o termo comum (3x), ficamos com:*

$$3x(-x - 2) = 0$$

*Cálculo das raízes*

$$x_1 = 3x = 0$$

$$3x = 0$$

$$x = 0$$

e

$$x_2 = (-x - 2) = 0$$

$$-x - 2 = 0$$

$$-x = 2$$

$$x = -2$$

Portanto,  $x = 0$  ou  $x = -2$

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