

# Interrogation de mathématique n° I

(Chapitre 1 - 1)

Résoudre par factorisation les équations  $f(x) = 0$  suivantes si :

- 1)  $f(x) = (x-4)^2 - 169$
- 2)  $f(x) = 10x^2 - x - 3$
- 3)  $f(x) = 9x^3 - 42x^2 + 6x^4$
- 4)  $f(x) = 4x^2 - 16x - 84$
- 5)  $f(x) = (x-3)(x^2 - 25) - (x-5)(x-2) + 7(x^2 - 10x + 25)$
- 6)  $f(x) = x^3 + x^2 - 4x - 4$

1)  $f(x) = (x-4)^2 - 169 = 0$  et  $x \in \mathbb{R}$

$$\Leftrightarrow (x-4)^2 - 13^2 = 0$$

$$\Leftrightarrow (x-4-13) \cdot (x-4+13) = 0$$

$$\Leftrightarrow (x-17) \cdot (x+9) = 0 \Leftrightarrow x \in \{17; -9\}$$

2)  $f(x) = 10x^2 - x - 3 = 0$  et  $x \in \mathbb{R}$

$$\Leftrightarrow 10x^2 - 6x + 5x - 3 = 0$$

$$\Leftrightarrow 2x(5x-3) + 1 \cdot (5x-3) = 0$$

$$\Leftrightarrow (5x-3)(2x+1) = 0$$

$$\Leftrightarrow x \in \left\{ \frac{3}{5}; -\frac{1}{2} \right\}$$

$$\begin{cases} m+n = -1 \\ m \cdot n = -30 \end{cases}$$

$$\Leftrightarrow \begin{cases} m = -6 \\ n = +5 \end{cases}$$

3)  $f(x) = 9x^3 - 42x^2 + 6x^4 = 0$  et  $x \in \mathbb{R}$

$$\Leftrightarrow 3x^2(2x^2 + 3x - 14) = 0$$

$$\Leftrightarrow x^2(2x^2 + 7x - 4x - 14) = 0$$

$$\Leftrightarrow x^2[x(2x+7) - 2(2x+7)] = 0$$

$$\Leftrightarrow x^2(2x+7)(x-2) = 0 \Leftrightarrow x \in \left\{ 0; \frac{7}{2}; +2 \right\}$$

$$\begin{cases} m+n = +3 \\ m \cdot n = -28 \end{cases}$$

$$\Leftrightarrow \begin{cases} m = +7 \\ n = -4 \end{cases}$$

4)  $f(x) = 4x^2 - 16x - 84 = 0$  et  $x \in \mathbb{R}$

$$\Leftrightarrow 4(x^2 - 4x - 21) = 0$$

$$\Leftrightarrow (x-7)(x+3) = 0$$

$$\Leftrightarrow x \in \{7; -3\}$$

$$\begin{cases} m+n = -4 \\ m \cdot n = -21 \end{cases}$$

$$\Leftrightarrow \begin{cases} m = -7 \\ n = +3 \end{cases}$$

$$5) f(x) = (x-3)(x^2-25) - (x-5)(x-2) + 7(x^2-10x+25) = 0$$

$$\Leftrightarrow (x-3)(x-5)(x+5) - (x-5)(x-2) + 7(x-5)^2 = 0 \quad \text{et } x \in \mathbb{R}$$

$$\Leftrightarrow (x-5) \left[ (x-3)(x+5) - (x-2) + 7(x-5) \right] = 0$$

$$\Leftrightarrow (x-5) (x^2 + 5x - 3x - 15 - x + 2 + 7x - 35) = 0$$

$$\Leftrightarrow (x-5) (x^2 + 8x - 48) = 0$$

$$\Leftrightarrow (x-5) (x+12)(x-4) = 0$$

$$\Leftrightarrow x \in \{5; -12; 4\}$$

$$\left\{ \begin{array}{l} m+m = +8 \\ m \cdot m = -48 \end{array} \right. \Leftrightarrow \left\{ \begin{array}{l} m = +12 \\ m = -4 \end{array} \right.$$

$$6) f(x) = x^3 + x^2 - 4x - 4 = 0 \quad \text{et } x \in \mathbb{R} \quad f(1) = 1+1-4-4 = -6$$

$$\Leftrightarrow (x+1)(x^2-4) = 0$$

$$\Leftrightarrow (x+1)(x-2)(x+2) = 0$$

$$\Leftrightarrow x \in \{-1; +2; -2\}$$

$$f(-1) = -1+1+4-4 = 0$$

$$\begin{array}{c|ccc|c} & 1 & 1 & -4 & -4 \\ & & -1 & 0 & +4 \\ \hline -1 & 1 & 0 & -4 & 0 \end{array}$$

ou

$$f(x) = x^3 + x^2 - 4x - 4 = 0 \quad \text{et } x \in \mathbb{R}$$

$$\Leftrightarrow (x^3 + x^2) - (4x + 4) = 0$$

$$\Leftrightarrow x^2(x+1) - 4(x+1) = 0$$

$$\Leftrightarrow (x+1)(x^2-4) = 0$$

$$\Leftrightarrow (x+1)(x-2)(x+2) = 0$$

$$\Leftrightarrow x \in \{-1; 2; -2\}$$