

Equations / Factorisation

$$\bullet \quad x^2 - 7x + 6 = 0$$

$$\Delta = b^2 - 4ac$$

$$= (-7)^2 - 4 \times 1 \times 6$$

$$= 49 - 24$$

$$= 25 > 0$$

$$x_1 = \frac{-b - \sqrt{\Delta}}{2a}$$

$$= \frac{-(-7) - \sqrt{25}}{2 \times 1}$$

$$= \frac{7-5}{2}$$

$$= \frac{2}{2}$$

$$= 1$$

$$x_2 = \frac{-b + \sqrt{\Delta}}{2a}$$

$$= \frac{7+5}{2}$$

$$= \frac{12}{2}$$

$$= 6.$$

donc $\rightarrow = \{1; 6\}$.

$$\bullet f(x) = -3x^2 + 2x + 5$$

$$\Delta = b^2 - 4ac$$

$$= 2^2 - 4 \times -3 \times 5$$

$$= 4 + 60$$

$$= 64 > 0$$

$$x_1 = \frac{-b - \sqrt{\Delta}}{2a}$$

$$= \frac{-2 - \sqrt{64}}{2 \times -3} = \frac{-2 - 8}{-6}$$

$$= \frac{-10}{-6} = \frac{5}{3}.$$

$$x_2 = \frac{-b + \sqrt{\Delta}}{2a}$$

$$= \frac{-2 + 8}{-6}$$

$$= \frac{6}{-6}$$

$$= -1$$

$$f(x) = -3\left(x - \frac{5}{3}\right)(x + 1)$$

$$\hookrightarrow f(x) = a(x - x_1)(x - x_2)$$

$$\bullet \quad x^2 + 3x - 10 = 0$$

① Forme canonique

$$\boxed{x^2 + 3x} - 10$$

$\swarrow a^2 \quad \searrow 2ab$

$$= \left[x^2 + 2 \times x \times \frac{3}{2} + \left(\frac{3}{2} \right)^2 \right] - \left(\frac{3}{2} \right)^2 - 10$$

$$= \left(x + \frac{3}{2} \right)^2 - \frac{9}{4} - 10$$

$$= \left(x + \frac{3}{2} \right)^2 - \frac{9}{4} - \frac{40}{4}$$

$$= \left(x + \frac{3}{2} \right)^2 - \frac{49}{4}.$$

② - Résoudre

$$x^2 + 3x - 10 = 0$$

$$\Leftrightarrow \left(x + \frac{3}{2}\right)^2 - \frac{49}{4} = 0$$

$$\Leftrightarrow \left(x + \frac{3}{2}\right)^2 = \frac{49}{4}$$

$$\Leftrightarrow \left(x + \frac{3}{2}\right)^2 = \left(\frac{7}{2}\right)^2$$

$$\Leftrightarrow x + \frac{3}{2} = \frac{7}{2}$$

ou

$$x + \frac{3}{2} = -\frac{7}{2}$$

$$\Leftrightarrow x = \frac{7}{2} - \frac{3}{2} = \frac{4}{2} = 2$$

ou

$$x = -\frac{7}{2} - \frac{3}{2} = -\frac{10}{2} = -5$$

$$\bullet 2x^2 + 12x + 18 = 0$$

$$\Delta = b^2 - 4ac$$

$$= 12^2 - 4 \times 2 \times 18$$

$$= 144 - 144$$

$$= 0$$

$$x_0 = \frac{-b}{2a} = \frac{-12}{2 \times 2}$$

$$= -\frac{12}{4}$$

$$= -3$$

$$\text{donc } \Delta = \{-3\}.$$

$$\bullet f(x) = x^2 - 8x + 15$$

$$\Delta = (-8)^2 - 4 \times 1 \times 15$$

$$= 64 - 60$$

$$= 4 > 0$$

$$x_1 = \frac{-b - \sqrt{\Delta}}{2a}$$

$$= \frac{-(-8) - \sqrt{4}}{2 \times 1}$$

$$= \frac{8 - 2}{2}$$

$$= \frac{6}{2} = 3$$

$$x_2 = \frac{-b + \sqrt{\Delta}}{2a}$$

$$= \frac{-(-8) + \sqrt{4}}{2 \times 1}$$

$$= \frac{8 + 2}{2}$$

$$= \frac{10}{2}$$

$$= 5$$

done :

$$f(x) = (x-3)(x-5)$$

$$\bullet x^2 + 5x + 4 = 0$$

$$\left[x^2 + 2 \times x \times \frac{5}{2} + \left(\frac{5}{2} \right)^2 \right] - \left(\frac{5}{2} \right)^2 + 4$$

$$= \left(x + \frac{5}{2} \right)^2 - \frac{25}{4} + \frac{4 \times 4}{1 \times 4}$$

$$= \left(x + \frac{5}{2} \right)^2 - \frac{25}{4} + \frac{16}{4}$$

$$= \left(x + \frac{5}{2} \right)^2 - \frac{9}{4}$$

$$x^2 + 5x + 4 = 0$$

$$\Leftrightarrow \left(x + \frac{5}{2} \right)^2 - \frac{9}{4} = 0$$

$$\Leftrightarrow \left(x + \frac{5}{2} \right)^2 = \frac{9}{4} = \left(\frac{3}{2} \right)^2$$

$$\Rightarrow \underline{\text{or}} \quad x + \frac{5}{2} = \frac{3}{2}$$

$$x + \frac{5}{2} = -\frac{3}{2}$$

$$\Leftrightarrow \underline{\text{or}} \quad x = \frac{3}{2} - \frac{5}{2} = -\frac{2}{2} = -1$$

$$x = -\frac{3}{2} - \frac{5}{2} = -\frac{8}{2} = -4$$

$$\text{donc } \Delta = \{-1; -4\}.$$