

N.E. - chapitre 3 : Fonctions du 2ème degré

Série A

Série B

Exercice 1. (2+2+2.5+1.5=8 pts)

$$\begin{aligned} \text{a) } \dots &\Rightarrow 2 - 16x - x^2 + 7 + 8x = 0 \\ &\Rightarrow x^2 + 8x - 9 = 0 \\ &\Rightarrow (x+9)(x-1) = 0 \\ &\Rightarrow S = \{-9; 1\} \end{aligned}$$

$$\begin{aligned} \text{b) } t = x^4 &\Rightarrow t^2 - t - 12 = 0 \\ &\Rightarrow (t-4)(t+3) = 0 \\ &\Rightarrow (x^4-4)(x^4+3) = 0 \\ &\Rightarrow (x^2-2)(x^2+2)(x^4+3) = 0 \\ &\Rightarrow (x-\sqrt{2})(x+\sqrt{2})(x^2+2)(x^4+3) = 0 \\ &\Rightarrow S = \{-\sqrt{2}; \sqrt{2}\} \end{aligned}$$

$$\begin{aligned} \text{c) } \sqrt{7x+1} - \sqrt{2x+7} &= \sqrt{3x-18} & |(\dots)^2 \\ &\Rightarrow 2\sqrt{(7x+1)(2x+7)} = 6x+26 & |(\dots)^2 \\ &\Rightarrow 56x^2 + 204x + 28 = 36x^2 + 312x + 676 \\ &\Rightarrow 20x^2 - 108x - 648 = 0 \\ &\Rightarrow x_1 = -\frac{18}{5} \text{ ou } x_2 = 9 \\ \text{Vérification : } &-\frac{18}{5} \notin S \text{ et } 9 \in S \end{aligned}$$

$$\begin{aligned} \text{d) } \dots &\Rightarrow (mx+1)(mx-5) = 0 \\ &\Rightarrow S = \left\{-\frac{1}{m}; \frac{5}{m}\right\} \end{aligned}$$

$$\begin{aligned} \dots &\Rightarrow 2 - 20x - x^2 + 7 + 12x = 0 \\ &\Rightarrow x^2 + 8x - 9 = 0 \\ &\Rightarrow (x+9)(x-1) = 0 \\ &\Rightarrow S = \{-9; 1\} \end{aligned}$$

$$\begin{aligned} t = x^4 &\Rightarrow t^2 - 7t - 18 = 0 \\ &\Rightarrow (t-9)(t+2) = 0 \\ &\Rightarrow (x^4-9)(x^4+2) = 0 \\ &\Rightarrow (x^2-3)(x^2+3)(x^4+2) = 0 \\ &\Rightarrow (x-\sqrt{3})(x+\sqrt{3})(x^2+3)(x^4+2) = 0 \\ &\Rightarrow S = \{-\sqrt{3}; \sqrt{3}\} \end{aligned}$$

$$\begin{aligned} \sqrt{5x-1} - \sqrt{8-2x} &= \sqrt{x-1} & |(\dots)^2 \\ &\Rightarrow 2\sqrt{(5x-1)(8-2x)} = 2x+8 & |(\dots)^2 \\ &\Rightarrow -40x^2 + 168x - 32 = 4x^2 + 32x + 64 \\ &\Rightarrow 44x^2 - 136x + 96 = 0 \\ &\Rightarrow x_1 = \frac{12}{11} \text{ ou } x_2 = 2 \\ \text{Vérification : } &\frac{12}{11} \notin S \text{ et } 2 \in S \end{aligned}$$

$$\begin{aligned} \dots &\Rightarrow (mx-1)(mx+5) = 0 \\ &\Rightarrow S = \left\{-\frac{5}{m}; \frac{1}{m}\right\} \end{aligned}$$

Exercice 2. (1+1+2=4 pts)

$$\text{a) } x_1 = 0; x_2 > 0 \Rightarrow \Delta > 0; \Sigma > 0; \Pi = 0$$

$$\text{b) } x_1 = -x_2 \Rightarrow \Delta > 0; \Sigma = 0; \Pi < 0$$

$$\text{c) } x_1 = \frac{3}{5}; x_2 = \frac{7}{3}$$

$$\Rightarrow \left(x - \frac{3}{5}\right)\left(x - \frac{7}{3}\right) = 0$$

$$\Rightarrow (5x-3)(3x-7) = 0$$

$$\Rightarrow 15x^2 - 44x + 21 = 0$$

$$x_1 = 0; x_2 < 0 \Rightarrow \Delta > 0; \Sigma < 0; \Pi = 0$$

$$x_1 = -x_2 \Rightarrow \Delta > 0; \Sigma = 0; \Pi < 0$$

$$x_1 = \frac{5}{3}; x_2 = \frac{3}{7}$$

$$\Rightarrow \left(x - \frac{5}{3}\right)\left(x - \frac{3}{7}\right) = 0$$

$$\Rightarrow (3x-5)(7x-3) = 0$$

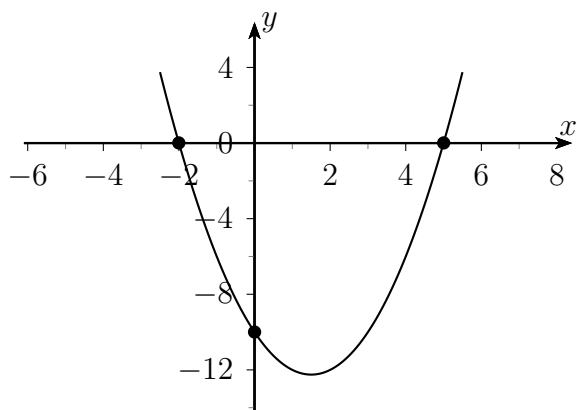
$$\Rightarrow 21x^2 - 44x + 15 = 0$$

Exercice 3. (4 pts)

$$\dots \Rightarrow x^2 - 3x - 10 \leq 0$$

$$\Rightarrow (x - 5)(x + 2) \leq 0$$

- zéros : -2 ou 5
- ordonnée à l'origine : $f(0) = -10$
- parabole tournée vers le haut : $a = 1 > 0$

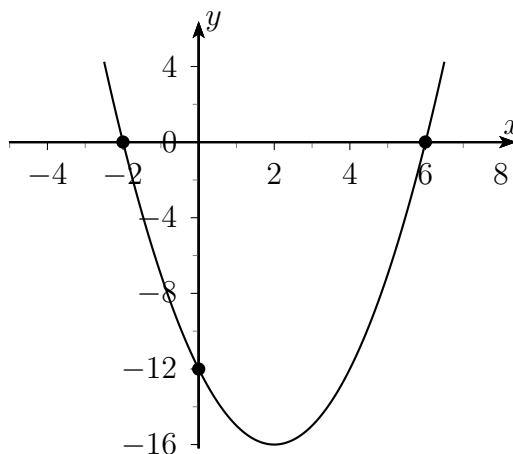


$$\Rightarrow S = [-2 ; 5]$$

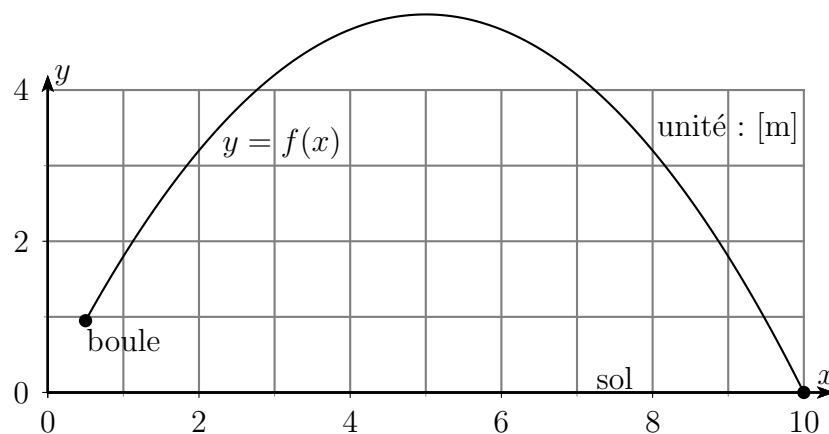
$$\dots \Rightarrow x^2 - 4x - 12 \leq 0$$

$$\Rightarrow (x - 6)(x + 2) \leq 0$$

- zéros : -2 ou 6
- ordonnée à l'origine : $f(0) = -12$
- parabole tournée vers le haut : $a = 1 > 0$



$$\Rightarrow S = [-2 ; 6]$$

Exercice 4. (4 pts)

$$\bullet Z_f = \{0 ; 10\} \Rightarrow f(x) = ax(x - 10)$$

$$\bullet f(0.5) = 0.95 \Rightarrow 0.5a \cdot (-9.5) = 0.95 \Rightarrow a = -\frac{1}{5} = -0.2$$

$$\Rightarrow f(x) = -\frac{1}{5}x(x - 10) = -\frac{1}{5}x^2 + 2x$$

$$\bullet \text{maximum en } x = 5 \Rightarrow f(5) = -5 + 10 = 5$$

$\Rightarrow$ La boule atteint une hauteur maximum d'exactly 5 m.