

Fonctions quadratiques, graphes et optimisation

Exercice 1.

a) $f(3) = 8$

b) $f(-2) = -7$

c) $f(0) = 6 \Rightarrow H(0; 5)$

$$\Delta = 16 + 20 = 36 \Rightarrow x = \frac{-4 \pm 6}{-2}$$

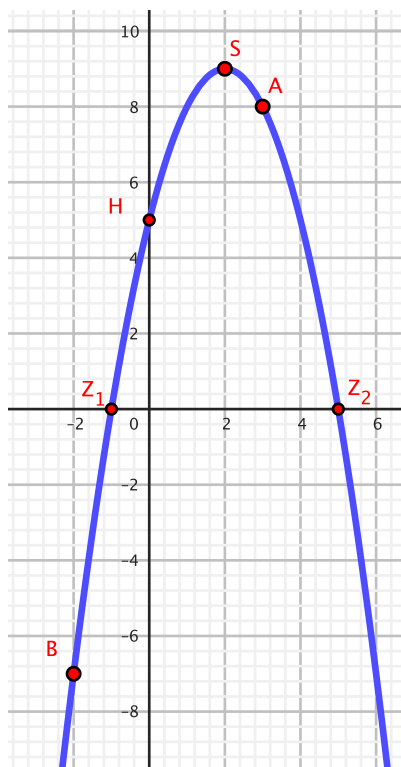
$$\Rightarrow x_1 = -1 \text{ et } x_2 = 5$$

$$\Rightarrow Z_1(-1; 0) \text{ et } Z_2(5; 0)$$

d) $\frac{-b}{2a} = \frac{-4}{-2} = 2 \quad \frac{-\Delta}{4a} = \frac{-36}{-4} = 9$

$$\Rightarrow S(2; 9)$$

e)



$f(3) = -7$

$f(-2) = 8$

$f(0) = 8 \Rightarrow H(0; 8)$

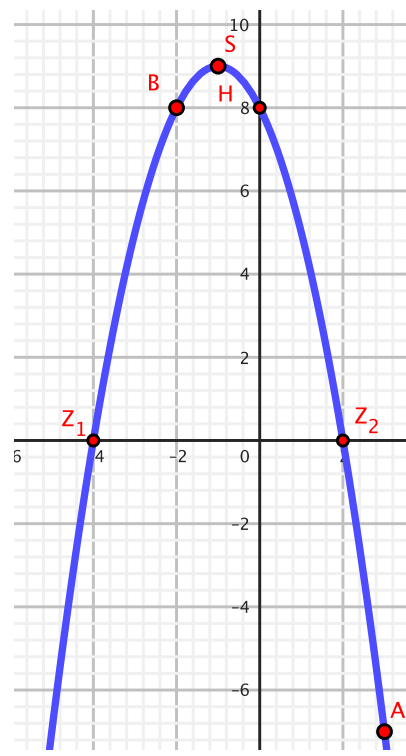
$$\Delta = 4 + 32 = 36 \Rightarrow x = \frac{2 \pm 6}{-2}$$

$$\Rightarrow x_1 = -4 \text{ et } x_2 = 2$$

$$\Rightarrow Z_1(-4; 0) \text{ et } Z_2(2; 0)$$

$\frac{-b}{2a} = \frac{2}{-2} = -1 \quad \frac{-\Delta}{4a} = \frac{-36}{-4} = 9$

$$\Rightarrow S(-1; 9)$$



Exercice 2.

$$3x^2 - x - 4 = -4x + 2 \Leftrightarrow 3x^2 + 3x - 6 = 0 \quad | \quad 2x^2 - 4x - 10 = -2x - 6 \Leftrightarrow 2x^2 - 2x - 4 = 0$$

$$\Delta = 9 + 72 = 81 \Rightarrow x = \frac{-3 \pm 9}{6}$$

$$\Rightarrow x_1 = 1 \text{ et } x_2 = -2$$

$$\Rightarrow y_1 = -2 \text{ et } y_2 = 10$$

$$\Rightarrow I_1(1; -2) \text{ et } I_2(-2; 10)$$

$$\Delta = 4 + 32 = 36 \Rightarrow x = \frac{2 \pm 6}{4}$$

$$\Rightarrow x_1 = 2 \text{ et } x_2 = -1$$

$$\Rightarrow y_1 = -10 \text{ et } y_2 = -4$$

$$\Rightarrow I_1(2; -10) \text{ et } I_2(-1; -4)$$

Exercice 3.

a) production totale = $1600 + 10 \cdot 20 = 1800 \text{ kg}$

prix (au kg) = $0,72 - 10 \cdot 0,005 = 0,67 \text{ franc}$

b) $f(x) = (1600 + 20x)(0,72 - 0,005x)$

$$\Rightarrow f(x) = 1152 - 8x + 14,4x - 0,1x^2$$

$$\Rightarrow f(x) = -0,1x^2 + 6,4x + 1152$$

c) parabole concave, max au sommet

$$\Delta = 501,78$$

$$\frac{-b}{2a} = \frac{-6,4}{-0,2} = 32$$

$$\frac{-\Delta}{4a} = \frac{-501,76}{-0,4} = 1254,4$$

$$\Rightarrow S(32; 1254,4)$$

$$\Rightarrow \text{revenu max de } 1254,40 \text{ frs après } 32 \text{ jours}$$

production totale = $1250 + 10 \cdot 20 = 1450 \text{ kg}$

prix (au kg) = $0,65 - 10 \cdot 0,004 = 0,61 \text{ franc}$

$f(x) = (1250 + 20x)(0,65 - 0,004x)$

$$\Rightarrow f(x) = 812,5 - 5x + 13x - 0,08x^2$$

$$\Rightarrow f(x) = -0,08x^2 + 8x + 812,5$$

parabole concave, max au sommet

$$\Delta = 324$$

$$\frac{-b}{2a} = \frac{-8}{-0,16} = 50$$

$$\frac{-\Delta}{4a} = \frac{-324}{-0,32} = 1012,5$$

$$\Rightarrow S(50; 1012,5)$$

$$\Rightarrow \text{revenu max de } 1012,50 \text{ frs après } 50 \text{ jours}$$