

L'usage de la calculatrice n'est pas autorisé

Exercice 1

1. Q1 a)
2. Q2 b)
3. Q3 d)
4. Q4 a)

Exercice 2

1.

$$\begin{aligned} f(x) &= (3x - 4 - 5)(3x - 4 + 5) \\ &= (3x - 9)(3x + 1) \end{aligned}$$

2.

$$f(x) = 9x^2 - 24x + 16 - 25 = 9x^2 - 24x - 9$$

3.

$$\begin{aligned} f(x) \leq -9 &\iff 9x^2 - 24x \leq 0 \\ &\iff x(9x - 24) \leq 0 \end{aligned}$$

Les deux racines sont 0 et

$$\frac{24}{9} = \frac{8}{3}.$$

Donc

$$f(x) \leq -9 \quad \text{pour} \quad x \in \left[0; \frac{8}{3}\right].$$

Exercice 3

1.

$3x^3 - 63x + 60$	$x - 4$
$-3x^3 + 12x^2$	$3x^2 + 12x - 15$
$12x^2 - 63x + 60$	
$-12x^2 + 48x + 60$	
$-15x + 60$	
$+15x - 60$	
0	

Donc

$$f(x) = (x - 4)(3x^2 + 12x - 15).$$

2.

$$f(x) = 0 \iff x - 4 = 0 \quad \text{ou} \quad 3x^2 + 12x - 15 = 0$$

$$\underline{x = 4} \quad \text{ou} \quad 3(x^2 + 4x - 5) = 0$$

$$\Delta = 16 + 20 = 36$$

$$x_1 = -5, \quad x_2 = 1.$$

3.

$$f(x) \geq 0$$

On utilise un tableau de signes :

x	$-\infty$	-5	1	4	$+\infty$
$x - 4$		$-$	$-$	$-$	0 $+$
$3x^2 + 12x - 15$		$+$ 0	$-$ 0	$+$	$+$
$f(x)$		$-$ 0	$+$ 0	$-$ 0	$+$

$$f(x) \geq 0 \iff x \in [-5; 1] \cup [4; +\infty[$$

Exercice 4

$$f(x) = 6(x^2 - 5x + 6)$$

1. (a)

$$\Delta = 1, \quad x_1 = 2, \quad x_2 = 3$$

(b)

$$f(x) = 6(x - 2)(x - 3)$$

(c)

$$f(x) > 0 \iff x \in]-\infty; 2[\cup]3; +\infty[$$

2.

$$g(x) = 5(x^2 - 8x + 12)$$

(a)

$$\Delta = 64 - 48 = 16$$

$$x_1 = 6, \quad x_2 = 2$$

(b)

$$g(x) = 5(x - 6)(x - 2)$$

(c)

$$g(x) < 0 \iff x \in]2; 6[$$