

## Ex 2.5.2

a)  $2x^2 - 7x - 4$

résoudre :  $2x^2 - 7x - 4 = 0$        $\Delta = 49 - 4 \cdot 2 \cdot (-4) = 81$

$$x_{1,2} = \frac{7 \pm 9}{4} = \begin{cases} 4 \\ -1/2 \end{cases} \Rightarrow \underline{S = \{-1/2, 4\}}$$

factoriser :  $2x^2 - 7x - 4 = 2(x-4)(x + \frac{1}{2}) = \underline{(x-4)(2x+1)}$

c)  $6x^2 - 25x - 25$

résoudre :  $6x^2 - 25x - 25 = 0$        $\Delta = 25^2 - 4 \cdot 6 \cdot (-25) = 1225 = 35^2$

$$x_{1,2} = \frac{25 \pm 35}{12} = \begin{cases} 5 \\ -10/12 = -5/6 \end{cases} \Rightarrow \underline{S = \{-5/6, 5\}}$$

factoriser :  $6x^2 - 25x - 25 = 6(x-5)(x + \frac{5}{6}) = \underline{(x-5)(6x+5)}$

d)  $6x^2 - 20x + 20$

résoudre :  $6x^2 - 20x + 20 = 0$        $\Delta = 20^2 - 4 \cdot 6 \cdot 20 = -80 < 0$

factoriser :  $6x^2 - 20x + 20$  n'est pas factorisable  $\Rightarrow \underline{S = \emptyset}$

### Ex 2.5.3

a)  $x^2 - 9 = 0$

PR  $(x+3)(x-3) = 0$

$$\begin{array}{l} \downarrow \\ x+3=0 \\ x=-3 \end{array}$$

$$\begin{array}{l} \downarrow \\ x-3=0 \\ x=3 \end{array}$$

$$\Rightarrow \underline{S = \{\pm 3\}}$$

b)  $4x^2 - 1 = 0$

PR  $(2x+1)(2x-1) = 0$

$$\begin{array}{l} \downarrow \\ 2x+1=0 \\ 2x=-1 \\ x=-\frac{1}{2} \end{array}$$

$$\begin{array}{l} \downarrow \\ \vdots \\ x=\frac{1}{2} \end{array}$$

$$\Rightarrow \underline{S = \{\pm \frac{1}{2}\}}$$

c)  $(x-2)^2 - 9(x-2) = 0$

Mez  $(x-2)[(x-2)-9] = 0$

$$(x-2)(x-11) = 0$$

$$\begin{array}{l} \downarrow \quad \downarrow \\ 2 \quad 11 \end{array}$$

$$\Rightarrow \underline{S = \{2; 11\}}$$

d)  $(x^2 - x - 6)(x+5) = 0$

SP  $(x+2)(x-3)(x+5) = 0$

$$\begin{array}{l} \downarrow \quad \downarrow \quad \downarrow \\ -2 \quad 3 \quad -5 \end{array}$$

$$\Rightarrow \underline{S = \{-5; -2; 3\}}$$

e)  $x^4 - 5x^2 + 4 = 0$

$$y = x^2 \Rightarrow y^2 - 5y + 4 = 0$$

SP  $(y-4)(y-1) = 0$

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

PR  $(x+2)(x-2)(x+1)(x-1) = 0$

$$\begin{array}{l} \downarrow \quad \downarrow \quad \downarrow \quad \downarrow \\ -2 \quad 2 \quad -1 \quad 1 \end{array}$$

$$\Rightarrow \underline{S = \{\pm 1; \pm 2\}}$$

$$f) \quad (x-1)(x^2+1) = 0$$

$\downarrow$   
 1

$\underbrace{\hspace{2em}}$  pas factorisable, pas de zéro

$\Rightarrow S = \{1\}$

$$g) \quad x^3 + x^2 = 4x + 4$$

GR  $x^3 + x^2 - 4x - 4 = 0$

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

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

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

$\downarrow$        $\downarrow$        $\downarrow$   
 -1      -2      2

$\Rightarrow S = \{-1, -2, 2\}$

$$h) \quad x^2 - 9 - 4(x-3) = 0$$

$$\underbrace{(x+3)(x-3)} - 4(x-3) = 0$$

GR  $(x-3)[(x+3)-4] = 0$

$$(x-3)(x-1) = 0$$

$\downarrow$        $\downarrow$   
 3      1

$\Rightarrow S = \{1, 3\}$

$$j) \quad x^3 + 2x^2 - x - 2 = 0$$

GR  $x^2(x+2) - (x+2) = 0$

PR  $(x+2)(x^2-1) = 0$

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

$\downarrow$        $\downarrow$        $\downarrow$   
 -2      -1      1

$\Rightarrow S = \{-2, -1, 1\}$

## Ex 2.5.4

a)  $(x^2 - 8x + 12)(x+2)^3 = 0$

SP  $(x-6)(x-2)(x+2)^3 = 0$

$\downarrow \quad \downarrow \quad \downarrow$   
6      2      -2  
(valeur triple)

$\Rightarrow S = \underline{\{-2; 2; 6\}}$

b)  $(x-3)(x^2-4) = 0$

PR  $(x-3)(x+2)(x-2) = 0$

$\downarrow \quad \downarrow \quad \downarrow$   
3      -2      2

$\Rightarrow S = \underline{\{-2; 2; 3\}}$

c)  $x^3 + 2x^2 - 4x = 8$

$x^3 + 2x^2 - 4x - 8 = 0$

GR  $x^2(x+2) - 4(x+2) = 0$

$(x+2)(x^2-4) = 0$

$(x+2)(x+2)(x-2) = 0$

$(x+2)^2(x-2) = 0$

$\downarrow \quad \downarrow$   
-2      2  
(double)

$\Rightarrow S = \underline{\{\pm 2\}}$

d)  $(2x^2 + 3x + 1)^2 - (2x^2 - 4x - 1)^2 = 0$

PR  $[(2x^2 + 3x + 1) + (2x^2 - 4x - 1)][(2x^2 + 3x + 1) - (2x^2 - 4x - 1)] = 0$

$(4x^2 - x)(2x^2 + 3x + 1 - 2x^2 + 4x + 1)$

REE  $x(4x-1)(7x+2) = 0$

$\downarrow \quad \downarrow \quad \downarrow$   
0      1/4      -2/7

$\Rightarrow S = \underline{\{0; \frac{1}{4}; -\frac{2}{7}\}}$

$$e) \quad x(x-2) + (x-3)(x-2) = 0$$

$$\text{MEE} \quad (x-2)[x + (x-3)] = 0$$

$$(x-2)(2x-3) = 0$$

$$\begin{array}{cc} \downarrow & \downarrow \\ 2 & 3/2 \end{array}$$

$$\Rightarrow \underline{S = \{2; \frac{3}{2}\}}$$

$$f) \quad 6x^2 = 3x^3 - 72x$$

$$-3x^3 + 6x^2 + 72x = 0$$

$$3x^3 - 6x^2 - 72x = 0$$

$$\text{MEE} \quad 3x(x^2 - 2x - 24) = 0$$

$$\text{SP} \quad 3x(x-6)(x+4) = 0$$

$$\begin{array}{ccc} \downarrow & \downarrow & \downarrow \\ 0 & 6 & -4 \end{array}$$

$$\Rightarrow \underline{S = \{0; 6; -4\}}$$

$$g) \quad x^3 + 3x^2 = 9x + 27$$

$$x^3 + 3x^2 - 9x - 27 = 0$$

$$\text{GR} \quad x^2(x+3) - 9(x+3) = 0$$

$$(x+3)(x^2-9) = 0$$

$$\text{PR} \quad (x+3)(x+3)(x-3) = 0$$

$$(x+3)^2(x-3) = 0$$

$$\begin{array}{cc} \downarrow & \downarrow \\ -3 & 3 \\ \text{(double)} & \end{array}$$

$$\Rightarrow \underline{S = \{\pm 3\}}$$