

### Ex 2.2.5

a)  $x^4 - 13x^2 + 36 = (x^2)^2 - 13x^2 + 36$  chgmt de variable

$$\begin{aligned} \underset{y=x^2}{\Rightarrow} \quad y^2 - 13y + 36 &\stackrel{SP}{=} (y-4)(y-9) \end{aligned}$$

$$\underset{y=x^2}{\Rightarrow} \quad (x^2-4)(x^2-9) \stackrel{PR}{=} \underline{(x+2)(x-2)(x+3)(x-3)}$$

b)  $a^6 + 19a^3 - 216 = (a^3)^2 + 19a^3 - 216$  chgmt de variable

$$\underset{y=a^3}{\Rightarrow} \quad y^2 + 19y - 216 \stackrel{SP}{=} (y-8)(y+27)$$

$$\underline{a} \quad \Delta = 19^2 - 4 \cdot 1 \cdot (-216) = 1225 = 35^2$$

$$\Rightarrow y_{1,2} = \frac{-19 \pm 35}{2} = \left\langle \begin{array}{l} -27 \\ 8 \end{array} \right. \Rightarrow (y+27)(y-8)$$

$$\underset{y=a^3}{\Rightarrow} \quad (a^3-8)(a^3+27) \stackrel{PR}{=} \underline{(a-2)(a^2+2a+4)(a+3)(a^2-3a+9)}$$

c)  $x^8 - 257x^4 + 256 = (x^4)^2 - 257x^4 + 256$  chgmt de variable

$$\underset{y=x^4}{\Rightarrow} \quad y^2 - 257y + 256 \stackrel{SP}{=} (y-256)(y-1)$$

$$\underset{y=x^4}{\Rightarrow} \quad (x^4-256)(x^4-1) \stackrel{PR}{=} (x^2+16)(x^2-16)(x^2+1)(x^2-1)$$

$$\stackrel{PR}{=} \underline{(x^2+16)(x+4)(x-4)(x^2+1)(x+1)(x-1)}$$

d)  $7x^4 - 61x^2 - 18 = 7(x^2)^2 - 61x^2 - 18$  chgmt de variable

$$\underset{y=x^2}{\Rightarrow} \quad 7y^2 - 61y - 18$$

$$\Delta = 61^2 - 4 \cdot 7 \cdot (-18) = 4225 = 65^2$$

$$y_{1,2} = \frac{61 \pm 65}{14} = \left\langle \begin{array}{l} \frac{126}{14} = 9 \\ -\frac{4}{14} = -\frac{2}{7} \end{array} \right. \Rightarrow 7(y-9)(y+\frac{2}{7}) = (y-9)(7y+2)$$

$$\underset{y=x^2}{\Rightarrow} \quad (x^2-9)(7x^2+2) \stackrel{PR}{=} \underline{(x+3)(x-3)(7x^2+2)}$$

### Ex 2.2.6

$$a) \underline{ax+bx} + \underline{ay+by} = x(a+b) + y(a+b) = \underline{(a+b)(x+y)}$$

$$b) \underline{a+b} + \underline{ax+bx} + \underline{ay+by} = 1(a+b) + x(a+b) + y(a+b) = \underline{(a+b)(1+x+y)}$$

$$\text{ou } \underline{a+b+ax+bx+ay+by} = a(1+x+y) + b(1+x+y) = (1+x+y)(a+b)$$

$$c) \underline{ax-bx} - \underline{ay+by} = x(a-b) - y(a-b) = \underline{(a-b)(x-y)}$$

$$d) \underline{ax-4x} + \underline{4y-ay} = x(a-4) + y(4-a) = x(a-4) - y(-4+a) \\ = x(a-4) - y(a-4) = \underline{(a-4)(x-y)}$$

$$e) \underline{ax+x} - \underline{a-1} = x(a+1) - 1(a+1) = \underline{(a+1)(x-1)}$$

$$f) \underline{x^3+x} - \underline{x^2-1} = x(x^2+1) - 1(x^2+1) = \underline{(x^2+1)(x-1)}$$

↑  
pas factorisable (somme de deux carrés)

$$g) \underline{\frac{xy}{2} - \frac{x}{4}} + \underline{\frac{yz}{3} - \frac{z}{6}} = \frac{x}{2} \left(y - \frac{1}{2}\right) + \frac{z}{3} \left(y - \frac{1}{2}\right) = \underline{\left(y - \frac{1}{2}\right) \left(\frac{x}{2} + \frac{z}{3}\right)}$$

$$h) \underline{10xz - 10z} - \underline{x^2+x} = 10z(x-1) - x(x-1) = \underline{(x-1)(10z-x)}$$

$$i) \underline{a^2-2ab+b^2} - \underline{1} = (a-b)^2 - 1 \stackrel{\text{PR}}{=} [(a-b)+1][(a-b)-1] = \underline{(a-b+1)(a-b-1)}$$

$$j) \underline{4x^2+2x-9y^2-3y} = (4x^2-9y^2) + (2x-3y) \stackrel{\text{PR}}{=} (2x+3y)(2x-3y) + (2x-3y) \\ = \underline{(2x-3y)(2x+3y+1)}$$

$$k) \underline{1+x+x^2} + \underline{x^3+x^4+x^5} = 1(1+x+x^2) + x^3(1+x+x^2) = (1+x+x^2)(1+x^3) \\ \stackrel{\text{PR}}{=} \underline{(1+x+x^2)(1+x)(1-x+x^2)}$$

$$\left( \text{ou } \underline{1+x+x^2+x^3+x^4+x^5} = (1+x) + x^2(1+x) + x^4(1+x) = \underline{(1+x)(1+x^2+x^4)} \right)$$

↓  
pas fini mais on n'a pas la méthode

$$l) \quad \underline{8y^4 - 8y^3} + \underline{y-1} = 8y^3(y-1) + 1(y-1) = (y-1)(8y^3+1) \stackrel{PR}{=} \underline{(y-1)(2y+1)(4y^2-2y+1)}$$

$$m) \quad \underline{x^3+x} - \underline{x^2-1} = x(x^2+1) - 1(x^2+1) = \underline{(x^2+1)(x-1)}$$

$$n) \quad \underline{2a^4-3-2a^3+3a} = a(2a^3+3) - 1(2a^3+3) = \underline{(2a^3+3)(a-1)}$$

$$o) \quad \underline{6x^2+xy} + \underline{18xz+3yz} = x(6x+y) + 3z(6x+y) = \underline{(6x+y)(x+3z)}$$