Factorisation

$x^2 + 2 \cdot x \cdot 1 + 1^2$ ✓

$A^2 + 2AB + B^2 = (A+B)^2$

Exo 1

a) $2x^2 + 2ax + a = a\left(x^2 + 2x + 1\right) = a(x+1)^2$

$\left(= a \cdot (x+1) \cdot (x+1)\right)$

b) $m(x+h) - (x+h)m^2 = (x+h)\left(m - m^2\right)$

$= (x+h)\, m \cdot (1-m)$

Exo 2

$ax^2 + bx + c = a(x - x_1)(x - x_2)$ $\qquad \Delta = b^2 - 4ac$

$x_1 = \dfrac{-b + \sqrt{\Delta}}{2a}$ $\qquad x_2 = \dfrac{-b - \sqrt{\Delta}}{2a}$

a) $x^2 + 8x + 15$ $\qquad a = 1$ $\qquad \Delta = 64 - 4 \cdot 1 \cdot 15 = 64 - 60 = 4 = 2^2$

$x_1 = \dfrac{-8+2}{2} = -3$ $\qquad x_2 = \dfrac{-8-2}{2} = -5$

$x^2 + 8x + 15 = \left(x - (-3)\right)\left(x - (-5)\right) = (x+3)(x+5)$

b) $\Delta = 1 - 4 \cdot 2 \cdot (-3) = 1 + 24 = 25 = 5^2$

$x_1 = \dfrac{-1+5}{2 \cdot 2} = \dfrac{4}{4} = 1$ $\qquad x_2 = \dfrac{-1-5}{4} = -1{,}5$

$$\Rightarrow \quad 2x^2+x-3 = \boxed{2(x-1)(x+1{,}5)} = (x-1)(2x+3)$$

EXO 3

$x^4-2x^3-2x^2-2x+1$ | $x+2$ (x−2)

⚠ SIGNE

$x^3-4x^2+6x-14$

	x^4				
	1	−2	−2	−2	1
−2		−2	8	−12	28
	1	−4	6	−14	29
	x^3				

(·(−2) ·(+2))

↑ But de l'exercice

EXO 4

x^3+x^2+0x-1 | x^2+0x+1

x^3+0x^2+1x

$x+1$ Quotient

x^2-x-1

x^2+0x+1

$-x-2$ Reste

EXO 5 $1x^3+6x^2+11x+6$

$x\pm1 \quad x\pm2 \quad x\pm3 \quad x\pm6$

$D_6 = \{\pm1; \pm2; \pm3; \pm6\}$

	1	6	11	6
−1		−1	−5	−6
	1	5	6	0

diviser par $(x+1)$

$(x^2+5x+6)(x+1)$ Réponse partielle

$(x^2+(2+3)x+2\cdot3)(x+1) = (x+2)(x+3)(x+1)$

	1	5	6
1		1	6
	1	6	12

	1	5	6
2		2	14
	1	7	20

x^2

	1	5	6
−2		−2	−6
	1	3	0 ✓

x

$(x+3)(x+2)(x+1)$

x^2+5x+6 | $x+2$

$x+3$

0

EX 6 $\quad x^4 - x^3 - 7x^2 + x + 6$

$D_6 = \{\pm 1; \pm 2; \pm 3; \pm 6\}$

	1	−1	−7	1	6
1		1	0	−7	−6
	1	0	−7	−6	0

1 SIGNE

$(x-1)$ ✓

$(x^3 + 0x^2 - 7x - 6)\,|\,(x-1)$

	1	1	−6	~~12~~
~~1~~				
	1	1	−6	

	x^3			
	1	0	−7	−6
−1		−1	1	6
	x^2			
	1	−1	−6	0

1 SIGNE

$(x+1)$ ✓

$(x^2 - x - 6)(x+1)(x-1)$

$x^2 - x - 2 \cdot 3 = x^2 + \underbrace{(2-3)}_{-1} \cdot x + \underbrace{2 \cdot (-3)}_{-6}$

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

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

EXO 7

	1	−6	11	−6

$D_6 = \{ \pm 1 ; \pm 2 ; \pm 3 ; \pm 6 \}$

	1	−6	11	−6
1		1	−5	6
	1	−5	6	0

$(x-1)(x^2-5x+6)$

$x^2-5x+6 = (x-x_1)(x-x_2) = (x-3)(x-2)$

$\Delta = 25 - 4 \cdot 1 \cdot 6 = 25 - 24 = 1$

$x_1 = \frac{5+1}{2} = 3 \qquad x_2 = \frac{5-1}{2} = 2$

Ainsi, $x^3-6x^2+11x-6=0$ s'écrit $(x-1)(x-2)(x-3)=0$

Les solutions sont donc $x=1 \,/\, x=2 \,/\, x=3$