

LJP: TEL EQUATIONS

Exercice 1

$$1. 15x - x^2 = 0 \Rightarrow x(15 - x) = 0 \Rightarrow \begin{matrix} x=0 \\ x=15 \end{matrix}$$

$$2. -40 + 13x^2 = 0 \Rightarrow 13x^2 = 40 \Rightarrow x^2 = \frac{40}{13} \Rightarrow x = \pm \sqrt{\frac{40}{13}}$$

$$3. 3x + 4x^2 = -7 \Leftrightarrow 4x^2 + 3x + 7 = 0$$

$$\Delta = 9 - 16 \cdot 7 = -103 < 0 \quad \text{impossible}$$

Exercice 2

$$(x-1)(x+10) = 0$$

Exercice 3

$$1. \frac{x^2 - 4x - 21}{(2x+5)(x+3)^2} = \frac{(x-7)(x+3)}{(2x+5)(x+3)^2} = \frac{x-7}{(2x+5)(x+3)}$$

$$\Delta = 16 + 4 \cdot 21 = 100 \quad x_{1,2} = \frac{4 \pm 10}{2} \quad \begin{matrix} x_1 = 7 \\ x_2 = -3 \end{matrix}$$

$$2. \frac{3x^2 - x - 2}{x^2 - x} = \frac{3(x-1)(x+\frac{2}{3})}{x(x-1)} = \frac{3x+2}{x}$$

$$\Delta = 1 + 2 \cdot 4 \cdot 3 = 25 \quad x_{1,2} = \frac{1 \pm 5}{6} \quad \begin{matrix} x_1 = 1 \\ x_2 = -\frac{2}{3} \end{matrix}$$

Exercice 4

$$(2+k)x^2 - 7kx + 1 = 0$$

$$1. 2+k=0 \Rightarrow k=-2$$

$$2. \Delta = 0 \Rightarrow 49k^2 - 4(2+k) = 0 \Rightarrow 49k^2 - 4k - 8 = 0$$

$$\Delta = 16 + 4 \cdot 49 \cdot 8 = 1584 \quad k_{1,2} = \frac{4 \pm \sqrt{1584}}{98}$$

$$3. x=0 \quad 1=0 \quad \text{impossible}$$

$$4. x=-2 \quad (2+k)4 + 14k + 1 = 0 \Leftrightarrow$$

$$8 + 4k + 14k + 1 = 0 \Leftrightarrow 18k = -9 \Rightarrow k = -\frac{1}{2}$$

$$5. x_1 \cdot x_2 = \frac{c}{a} = \frac{1}{2+k} = 5 \Rightarrow 1 = 10 + 5k \Rightarrow 5k = -9 \Rightarrow k = -\frac{9}{5}$$

Exercice 5

$$\bullet x^2 + x - 7 = 0 \quad \Delta = 1 + 28 = 29 > 0 \quad \text{oui}$$

$$x_1 + x_2 = -\frac{b}{a} = -\frac{1}{1} = -1 \quad x_1 \cdot x_2 = \frac{c}{a} = -\frac{7}{1} = -7$$

$$\bullet -3x^2 + 4x + 22 = 0 \quad \Delta = 16 + 4 \cdot 3 \cdot 22 = 280 > 0 \quad \text{oui}$$

$$x_1 + x_2 = -\frac{b}{a} = -\frac{4}{-3} = \frac{4}{3} \quad x_1 \cdot x_2 = \frac{c}{a} = \frac{22}{-3}$$

$$10x^2 + x + 20 = 0 \quad \Delta = 1 - 4 \cdot 10 \cdot 20 = -799 < 0 \quad \text{Non}$$

Exercice 7

$$1. \quad 2x^4 - 9x^2 - 5 = 0 \quad t = x^2 \geq 0$$

$$2t^2 - 9t - 5 = 0 \quad \Delta = 81 + 4 \cdot 5 \cdot 2 = 121$$

$$t_{1,2} = \frac{9 \pm 11}{4} < 5$$

$$t = x^2 = 5 \Rightarrow x = \pm \sqrt{5}$$

$$2. \quad 32x^{10} - 33x^5 + 1 = 0 \quad x^5 = t$$

$$32t^2 - 33t + 1 = 0 \quad \Delta = 33^2 - 4 \cdot 32 = 961$$

$$t_{1,2} = \frac{33 \pm 31}{64} \begin{cases} t_1 = 1 \\ t_2 = \frac{2}{64} = \frac{1}{32} \end{cases}$$

$$x^5 = 1 \Rightarrow x = 1$$

$$x^5 = \frac{1}{32} \Rightarrow x = \frac{1}{2}$$

Exercice 8

x : la part originale } $\Rightarrow x \cdot n = 405000$ ①
 n : les héritiers

$$\begin{cases} x + 22500 \\ n - 3 \end{cases} \Rightarrow (x + 22500)(n - 3) = 405000$$

$$\Leftrightarrow xn + 22500n - 3x - 67500 = 405000 \quad ②$$

$$② - ① \quad 405000 + 22500n - 3x - 67500 = 405000$$

$$\Rightarrow 22500n - 3x = 67500 \Leftrightarrow$$

$$\Leftrightarrow 3x = 22500n - 67500 \Leftrightarrow$$

$$\Leftrightarrow x = 7500n - 22500$$

$$①: (7500n - 22500)n = 405000 \Leftrightarrow$$

$$\Leftrightarrow 7500n^2 - 22500n - 405000 = 0$$

$$\Leftrightarrow 75n^2 - 225n - 4050 = 0$$

$$n^2 - 3n - 54 = 0 \quad \Delta = 9 + 4 \cdot 54 = 225$$

$$n_{1,2} = \frac{3 \pm 15}{2} \begin{cases} n_1 = 9 \\ n_2 = -6 \end{cases}$$

$n_2 = -6$ imp car $n > 0$