Exercise Sheet N◦1 D'Algebra 1

Promotion: First-Year Engineering Technology **Section B**

Exercise 1 *let* $P(x) = -4x^3 + 3x - 1$.

1) Show that -1 *is a root of* P.

2) Solve in $\mathbb{R}$ *the polynomial equation:* $P(x) = 0$.

3) Solve in $\mathbb{R}$ *the polynomial inequality:* $-1 \leq 3x - 4x^3 \leq 1$.

Exercise 2 *Solve in* $\mathbb{R}$ *the following rational inequality:*

$$\frac{1}{2}(x + \frac{1}{x}) \geq 1.$$

Exercise 3 *Solve in* $\mathbb{R}$ *the irrational equation:* $\sqrt{x^3 + x^2} = x + 1$.

Exercise 4 *Solve in* $\mathbb{R}$ *the following irrational inequality:*

a) $\frac{\sqrt{1+x^2}-\sqrt{1-x^2}}{\sqrt{1+x^2}+\sqrt{1-x^2}} \geq 0$.

b) $\sqrt{x^3 + x^2} \leq x + 1$

Exercise 5 *Solve in* $I = [-\pi, \pi]$*:*

1) $\left(\sqrt{2} - 2\cos x\right)\sin x = 0$.

2) $\left(\sqrt{2} - 2\cos x\right)\sin x < 0$.

Exercise 6 *Solve the following non linear system:*

$$\begin{cases} x^2 - y = 26 \\ 2x^2 + y = 100 \end{cases}$$