INSA | INSTITUT NATIONAL DES SCIENCES APPLIQUÉES LYON

October 30, 20..

SCAN 1 — Quiz #4 — 13'

Name: DEVIN Tristan G1 — 11/20

Exercise 1. Let A be a non-empty set, let $f : A \to \mathbb{R}$ and let $M \in \mathbb{R}$. Recall the definition of "M is an upper bound of f."

2 — $\forall x \in \cancel{\mathbb{R}}\ A,\ (M \geq f(x))$

Exercise 2. Let A be a non-empty subset of $\mathbb{R}$ symmetric with respect to 0, and let $f : A \to \mathbb{R}$. Recall the definition of "f is even."

2 — $\forall x \in \cancel{\mathbb{R}}\ A,\ f(x) = f(-x)$

Exercise 3. Let A and B be two non-empty subsets of $\mathbb{R}$ symmetric with respect to 0, and let $f : A \to B$ and $g : B \to \mathbb{R}$. We assume that f is odd and that g is odd.

1. What can you say about the parity of $g \circ f$? (no justifications required, the proof will be required in the next question).

3 — $g \circ f$ is odd

2. Prove it!

4 —
Let $x \in \cancel{\mathbb{R}}\ A$

$g \circ f = g(f(x))$ since f is odd $g(-f(x)) = g(f(-x))$

so $-g(f(x)) = g(f(-x))$

or since g is odd $-g(f(-x))$ an

Exercise 4. Let f be the polynomial function defined by:

$$f : \mathbb{R} \longrightarrow \mathbb{R}$$
$$x \longmapsto x^4 + x^3 - 3x^2 - 5x - 2.$$

$x^4 + x^3 - 3x^2 - 5x - 2 \mid x+1$

$-3x^2 - 5x - 2$

$+3x^2 + 3x$ $= -2x - 2$

$x^3 - 3x$ -2

1. Among the numbers -1 and -2, only one of them is a root of f (that we shall dènote by x_0). Which one is it? (no justifications required).

0 — $x_0 =$ ~~-1~~ ~~-2~~ -1 — -1 is a root

2. Find a polynomial function g such that $\forall x \in \mathbb{R},\ f(x) = (x - x_0)g(x)$.

0 — $\forall x \in \mathbb{R},\ g(x) = \cancel{x^3 + 3x^2 + 3x + 1}$ — $x^3 - 3x - 2$