INSTITUT NATIONAL DES SCIENCES APPLIQUÉES LYON

SCAN 1 — Quiz #7 — 11' — *November 8, 2017*

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19/20

Exercise 1. Determine, if they exist, the following values (if a value doesn't exist, cross out the equal sign and write *DNE*). No justifications required.

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$\inf([0,2]) = 0$ ✓	$\min([0,2]) = 0$ ✓
$\sup((0,2)) = 2$ ✓	$\max((0,2)) \neq$ DNE ✓
$\inf(\mathbb{Z}) = -\infty$ ✓	$\min(\mathbb{Z}) \neq$ DNE ✓
$\inf(\mathbb{Z} \cap [-1/2, 9/2]) = 0$ ✓	$\min(\mathbb{Z} \cap [-1/2, 9/2]) = 0$ ✓

Exercise 2. Let $A = (-\infty, 1)$ and let $M \in \mathbb{R}$ such that $M < 1$.

1. Find $x \in A$ such that $x > M$. No justifications required.

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$x = \frac{M+1}{2}$

2. Is M an upper bound of A? (no justifications required).

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No

Exercise 3. Let $x \in \mathbb{R}$ be such that $\tanh(x) = -1/2$. Determine the value of $\tanh(2x)$:

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$\tanh(2x) = \frac{2\tanh(x)}{1+\tanh^2(x)} = \frac{-1}{1+\frac{1}{4}} = \frac{-1}{\frac{5}{4}} = -\frac{4}{5}$

Exercise 4. Let A be a non-empty subset of $\mathbb{R}$, and let $m \in \mathbb{R}$. Recall the definition of "m is a lower bound of A."

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$\forall a \in A, \ a \geq m$

Exercise 5. Are the following statements true or false? (no justifications required):

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- $(-1, 5)$ is a neighborhood of 0 ... True ✓
- $(-1, 5)$ is a punctured left-sided neighborhood of 5 ... True ✓
- $(-1, 5)$ is a right-sided neighborhood of -1 ... False ✓
- $\mathbb{R}$ is a neighborhood of $+\infty$ ... ~~False~~