Introduction to Analysis 1(42001/52001 Section 01)
HW4, due Wednesday, September 28
Instructor: Prof. Artem Zvavitch

Problem 1. *Let A and B are nonempty subspaces of R such that $A \cap B \neq 0$*

- *Prove that* $\min(\sup(A), \sup(B))$ *is an upper bound for* $A \cap B$.
- *Is it true that* $\min(\sup(A), \sup(B)) = \sup(A \cap B)$. *(if yes then prove it if the answer is No show a counterexample).*

Problem 2. *Suppose that f and g are real valued functions with common domain$D \subset R$. PLEASE, check the following statements (if it is true then prove it if it is false then show a counterexample)*

- $\sup\limits_{x \in D} f(x) + \sup\limits_{x \in D} g(x) \leq \sup\limits_{x \in D}(f(x) + g(x))$.
- $\sup\limits_{x \in D} f(x) + \sup\limits_{x \in D} g(x) = \sup\limits_{x \in D}(f(x) + g(x))$.
- $\sup\limits_{x \in D} f(x) \times \sup\limits_{x \in D} g(x) \leq \sup\limits_{x \in D}(f(x) \times g(x))$.
- $\inf\limits_{x \in D} f(x)^2 \leq \left(\inf\limits_{x \in D}(f(x))\right)^2$.