

Introduction to Analysis 1(42001/52001 Section 01)
HW5, due Wednesday, October 5
Instructor: Prof. Artem Zvavitch

Problem 1. *Prove that there exists a positive real number x such that $x^2 = 3$. Show that this number is irrational.*

Problem 2. *Show that the number $\sqrt{3} + \sqrt{2}$ is irrational.*

Problem 3. *Use the definition of the limit of a sequence to establish the following limits.*

- $\lim_{n \rightarrow \infty} \frac{2(-1)^n}{2-n} = 0$
- $\lim_{n \rightarrow \infty} \frac{n+1}{n+2} = 1$

Problem 4. *Please, find an example of two sequences $(a_n : n \in \mathbb{N})$ and $(b_n : n \in \mathbb{N})$ so that $(a_n : n \in \mathbb{N})$ and $(b_n : n \in \mathbb{N})$ are divergent but $(a_n + b_n : n \in \mathbb{N})$ is convergent.*