Introduction to Analysis
Home Work 7, due Wednesday, October 26.
Instructor: Prof. Artem Zvavitch

Problem 1. *Show that* $\frac{(1-)^n}{2^n}$ *is a Cauchy sequence.*

Problem 2. *Show that* $\sqrt{n}$ *is not a Cauchy sequence.*

Problem 3. *Let*

$$\lim_{n\to\infty} |x_n - x_{n+1}| = 0.$$

It is true that x_n *is a Cauchy sequence? Is it true that* x_n *is a bounded sequence? (HINT: You may use the previous problem)*

Problem 4. *Is it true that every bounded sequence is a Cauchy sequence? Is it true that every bounded sequence has a Cauchy subsequence?*

Problem 5. *Consider a sequence* (a_n)*. Assume that*

$$|a_{n+1} - a_n| \leq \frac{1}{3^n}, \text{ for } n \in N.$$

Show that a_n *is a Cauchy sequence.*