INTRODUCTION TO TOPOLOGY I
Home Work 6, due on October 5.
Instructor: Prof. Artem Zvavitch

Problem 1. *Show that* $\mathbb{R}_l$ *is not metrazable.*

Problem 2. *Let* $f, g : X \to Y$ *be continuous; assume that* Y *is Hausdorff. Show that* $\{x | f(x) = g(x)\}$ *is closed in* X.

Problem 3. *Show that closed subspace of the normal space is normal.*

Problem 4. *Show that every locally compact Hausdorff space is regular.*

Problem 5. *Give a direct proof of the Urysohn lemma for a metric space* (X, d) *by setting*

$$f(x) = \frac{d(x, A)}{d(x, A) + d(x, B)}$$

Problem 6. *Let* X *be completely regular; let* A *and* B *be disjoint closed subsets of* X*. Show that if* A *is compact, there is a continouus function* $f : X \to [0, 1]$ *such that* $f(A) = \{0\}$ *and* $f(B) = \{1\}$.

Problem 7. *Give an example showing that a Hausdorff space with a countable basis need not be metrizable.*