Homework due Thursday, November 9, at 3:00 pm.

A.

(1) Let \((X, d)\) be a compact metric space. Prove that there exists some \(R > 0\) so that
\[d(x, y) \leq R \quad \text{for all } x, y \in X.\]
This in particular implies that \(X\) is bounded.

(2) Give an example of a bounded metric space which is not compact.

B. Rudin, Chapter 2 (page 43), problems # 25, 26, 29.

C. Use Rudin, chapter 2, problem 26 and a lemma from the class to give an alternative proof of the following fact: for all real numbers \(a \leq b\), the closed interval \([a, b]\) is a compact subset of \(\mathbb{R}\) (with respect to the standard metric).