Advanced Calculus II, Fall 2022, Worksheet for Lecture 9

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Name: _____

Discussing the problems with other people is encouraged,
but you must write up your own work independently!

1. Suppose (a_n) is a sequence in a metric space X with no convergent subsequences. Show that for each n, there exists some $\epsilon = \epsilon_n > 0$ such that $B_\epsilon(a_n)$ contains no other point a_m, $m \neq n$ in the sequence.

2. Let $f : \mathbb{Z} \to \mathbb{R}$ be an arbitrary function. Using the standard metric on both $\mathbb{Z}$ and $\mathbb{R}$ given by

$$d(x, y) = |x - y|,$$

show that f is continuous.