Math 205 **HW 9/30**

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1. (a) Let A be a compact subset of a metric space (X, d). Show that every point $x \in X$ has a *closest* neighbor on A: that is, there exists $a_0 \in A$ such that $d(x, a_0) \leq d(x, a)$, for all $a \in A$. Also show via example that the closest neighbor need not be unique.

   (b) Show via explicit counterexample that the above claim fails for A not compact:

2. Show via explicit countexample that the following claim is false. Let (X, d) be a metric space, and $A \subseteq X$. Then A is compact iff A is closed and bounded under d: