

§ 3.1-4 Armstrong

1. (3.3.9) If  $A_1$  and  $A_2$  are nonempty disjoint *compact* subsets of a Hausdorff space, then there are disjoint open sets  $U_j$  with  $A_j \subset U_j$  ( $j = 1, 2$ ).
2. (10 points) (3.3.10) Recall that the diameter of a set in a metric space is the supremum of distances between points in the set. Show that the diameter of a compact set in a metric space is the maximum distance between points in that set.
3. (10 points) (3.3.12) Show that the real numbers with the finite complement topology is a compact space.
4. (10 points) Show that that union of two compact sets is compact.
5. (10 points) The uniform limit of discontinuous functions is discontinuous. (True or false?)