Name: _____ Score (Out of 7 points):

1. (7 points) For each of the following statements: either give a proof of the statement, or state a specific counterexample. If the statement is false, you can simply state the counterexample without further justification.

   (a) Let $(X, d)$ be a metric space, and $A, B \subseteq X$ be subsets. If a point $x \in X$ is an accumulation point of $A$ and is an accumulation point of $B$, then $x$ must be an accumulation point of the intersection $A \cap B$.

   (b) Let $(X, d)$ be a metric space, and $A, B \subseteq X$ be subsets. If $x \in X$ is an accumulation point of the union $A \cup B$, then $x$ must be an accumulation point of at least one of $A$ and $B$.