Homework 5: Limit Points

Assignments should be **stapled** and written clearly and legibly.

- 1. $\S 2.2, \# 2.13(a)(c)(e)(f), 2.15.$
- 2. Let X be a topological space and $A \subseteq X$.
 - (a) Prove that if a sequence $(x_1, x_2, ...)$ of points in A converges to x, then $x \in \overline{A}$.
 - (b) Prove that if a sequence $(x_1, x_2, ...)$ of points in $A \setminus \{x\}$ converges to x, then $x \in A'$.
- 3. A topological space X is said to be a T_1 -space if finite subsets of X are closed. Prove that a Hausdorff space is a T_1 -space.

Hint. Use a theorem we proved in class about Hausdorff spaces.

- 4. Suppose that a topological space X is a T_1 -space. Let $A \subseteq X$.
 - (a) Prove that x is a limit point of A if and only if every neighborhood of x intersects A in infinitely many points.
 - (b) Prove that $(A')' \subseteq A'$.