Midterm 2 / 2011.11.28 / MAT 5243.001 / General Topology I

Name: ______________________________

Please show all work and justify your answers.

1. Prove that a continuous real-valued function on a topological space that is zero on a dense subset must be the zero function.

2. Given a family of topological spaces, pick a subset in each and prove that in general, the product of the subsets' closures is the closure of their product.

3. Suppose X is a topological space and $A \subseteq X$. Recall that A is a retract of X whenever there exists an onto continuous function $X \to A$ that is indentity on A.

   (a) Prove that A is a retract of X if and only if and continuous function on A can be extended to X.

   (b) Prove that if X is Hausdorff, then A must be closed in X.

   (c) Prove that the unit circle in the plane is a retract of the plane punctured at the origin.

4. Given a point in a discrete space, which filters converge to that point? What happens in a trivial space?

5. Prove that the intersection of compact subsets of a Hausdorff space is compact.

1	2	3	4	5	total (50)	%

Prelim. course grade: %