MATH 5703	**Topology I**	Fall 2014
Section: 001	MWF 10:45 – 11:35	Prof. Matthew Clay
	MAIN 322	

Homework 2

1. Suppose (M, d) and (N, ρ) are metric spaces. Show that a function $f\colon M \to N$ is continuous if and only if for all $x \in M$ and $\epsilon > 0$, there is a $\delta > 0$ such that $d(x, y) < \delta$ implies $\rho(f(x), f(y)) < \epsilon$.

2. Show that $m\colon \mathbb{R}^2 \to \mathbb{R}$ given by $m(x, y) = xy$ is continuous.

3. Let $X = \left\{ \frac{1}{n} \in \mathbb{R} \mid n \in \mathbb{Z} - \{0\} \right\}$. Show that the subspace topology is the discrete topology.

4. Let S be a topological space and let $X \subseteq S$ have the subspace topology. Show that $C \subseteq X$ is closed if and only if $C = X \cap D$ where $D \subseteq S$ is closed.

5. Suppose X is an open set of a topological space S and A is an open set of X (with the subspace topology). Show that A is open in S. Prove the same statement replacing 'open' with 'closed'.