Math 871 Topology I
Worksheet 7

1. Let X and Y be nonempty topological spaces and endow $X \times Y$ with the product topology. Let $\sim$ be the equivalence relation on $X \times Y$ defined by

$$(x_1, y_1) \sim (x_2, y_2) \iff x_1 = x_2.$$

   Show that the quotient space $X \times Y / \sim$ is homeomorphic to X.

2. Recall that a space X is **totally disconnected** if the only nonempty connected subspaces of X are the subspaces of the form $\{p\}$ for some $p \in X$.

   (a) Prove that if A is a subspace of a totally disconnected space X, then A is totally disconnected.

   (b) Prove that if X is a totally disconnected space, then X is T_1.