Math 441 **Topology** **Fall 2012**

Assignment #8 (CORRECTED Nov. 28)

Exercise S7: Endow the set $\mathbb{Z}$ of integers with the topology defined by declaring a subset $U \subset \mathbb{Z}$ to be open if and only if it ***symmetric***, meaning that $n \in U \implies -n \in U$. Prove that $\mathbb{Z}$ with this topology is limit point compact but not compact.

Exercise S8: If X is a compact metric space, prove that there is a countable basis for its topology. [Hint: begin by covering X with open balls of radius $1/n$.]

Exercise S9: If X is a topological space, a subset $S \subset X$ is said to be ***dense*** if every nonempty open subset of X contains a point of S. Prove that every compact metric space contains a countable dense subset.