INTRODUCTION TO ALGEBRAIC TOPOLOGY
TUTORIAL 2

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Problem 1. Show that any map from a compact space to a Hausdorff space is a closed map.

Problem 2. Show that $D^n/S^{n-1}$ is homeomorphic to $S^n$.

Problem 3. Show that $X \wedge (Y \wedge Z)$ is homeomorphic to $X \wedge (Y \wedge Z)$ if $X$ and $Z$ are locally compact and Hausdorff.

Problem 4. Let $X$ be a locally compact Hausdorff space. Given a point $x \in X$ and a neighborhood $U$ of $x$. Show that there is an open set $V$ such that $x \in V \subseteq \bar{V} \subseteq U$ and $\bar{V}$ is compact. (The hint is given in the lecture notes.)

Problem 5. Show that (1) $\mathbb{R}P^n$ is Hausdorff and (2) $S^n/(\mathbb{Z}/2) \cong \mathbb{R}P^n$.

Problem 6. For each $m, n \geq 0$, show that $S^{m+n}$ is homeomorphic to $S^m \wedge S^n$.