# Homework #11

*Due Thursday, December 14, in class*

**Problem 1** Construct a homeomorphism between annulus $\{(x, y) : 1 < x^2 + y^2 < 2\}$ and the disk without center $\{(x, y) : 0 < x^2 + y^2 < 1\}$.

**Problem 2** Show that the intersection of any number of Hausdorff compact spaces is again Hausdorff compact (or empty).

**Problem 3** Show that any continuous map of a compact to a Hausdorff space maps closed sets to closed sets.

**Problem 4** Let $X$ be the annulus $\{(x, y) : 1 \leq x^2 + y^2 < 2\}$ and $K = \{(x, y) : x^2 + y^2 = 1\}$. Describe $X/K$.

**Problem 5** Let $X$ be the unit circle, and $K = \{(1, 0), (0, 1), (-1, 0), (0, -1)\}$. Describe $X/K$.

**Problem 6** Show that the unit spere without a point is not homeomorphic to the closed unit disk.