Topology II HW 1 Due: Jan. 25

1. (a) Suppose F is a continuous map from a compact space to a Hausdorff space. Prove that F is a homeomorphism if F is bijective.
(b) Let R^{2^*} be the compactification of R^2. Give an example of open set in R^{2^*} that is not in R^2.
(c) Prove that R^{2^*} is homeomorphic to S^2.

2. Let $F : X \mapsto Y$ be a continuous and open map. Suppose X and Y are both compact and connected. Prove that F must be surjective.

3. Let K be a $l-$simplex in Euclidean space. Prove that $\chi(K) = 1$. Hint: Find the number of k simplex for $k \leq l$ and use binomial Theorem.

4. Compute the Euler Characteristic of the Möbius band and the torus using Figure 5.7 on p105 and Figure 5.13 on page 115. (You only count distinct vertices, edges and faces).