Final Exam **Topology 490G** **May 5, 2000** **D. Gottlieb**

1. Prove in the category of sets and functions, that the set of all subsets of a set X is equivalent to the set of all functions from X into a set with two elements.

2. Prove in the category of metric spaces and distance preserving maps, that any two unit circles in the plane are equivalent.

3. Prove in the category of topological spaces and continuous maps, that the boundary of the unit cube and the unit sphere S^2 are equivalent.

4. Prove that $\mathbb{R}^3 - \{\text{the } z\text{-axis}\}$ is homotopy equivalent to the unit circle S^1.

5. Choose any exercise in Hocking and Young which was not assigned or covered in class and do it. You may quote any theorem, corollary, or lemma in Hocking and Young that you need.

   OR: Look up the last theorem in Hocking and Young and give a definition for each term in its statement.