MATH 213, SPRING 2009
HOMEWORK 2

1. (Chapter I, ex. 3.4) Let X be a topological space and define an equivalence relation $\sim$ on X by:

   $$x \sim y \quad \text{if and only if there is a connected set containing both } x \text{ and } y.$$

   The equivalence classes of $\sim$ are called the connected components of X.
   (a) Show that the connected components of a (topological) manifold are open sets.
   (b) Show that a manifold can have at most countably many connected components.

2. Chapter II, ex. 1.5

3. Chapter II, ex. 1.6

4. Chapter II, ex. 2.4