

## MTG 5316/4302 ASSIGNMENT 8

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These problems are due on November 3, 2014. You may discuss the problems with members of the class and with me. You may consult our textbook and other books. You may not read the papers of other students. The final writeup must be done by yourself in your own words. It must not be copied from any sources.

**Problem 1.** Suppose that  $X$  is compact Hausdorff and that  $Y$  is Hausdorff. Suppose that  $f : X \rightarrow Y$  is continuous, one-to-one, and onto. Show that  $f$  is a homeomorphism.

**Problem 2.** Let  $X$  be the  $\sin(1/x)$ -curve. Show that  $X$  is connected and not arcwise connected.

**Problem 3.** Let  $X$  and  $Y$  be topological spaces and  $f : X \rightarrow Y$  a function. We say that  $f : X \rightarrow Y$  is a *quotient map* provided that for all  $U \subset Y$ ,  $U$  is open in  $Y$  if and only if  $f^{-1}(U)$  is open in  $X$ . Suppose that  $X$  is compact,  $Y$  is Hausdorff, and  $f : X \rightarrow Y$  is continuous and onto. Show that  $f$  is a quotient map.