

MTG 5316/4302 ASSIGNMENT 3

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These problems are due on September 26, 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. Let X and Y be topological spaces. Suppose that $f : X \rightarrow Y$ is continuous and suppose that $A \subset X$ is a connected set in X . Show that $f(A) \subset Y$ is a connected set in Y .

Problem 2. Suppose that $f : [a, b] \rightarrow \mathbb{R}$ is continuous and suppose that $f([a, b]) \supset [a, b]$. Show that there is an $x \in [a, b]$ such that $f(x) = x$. Such an x is said to be a *fixed point* for f .

Problem 3. Suppose that $f : [a, b] \rightarrow \mathbb{R}$ is continuous. Suppose that $f([a, b]) \supset [c, d]$. Show that there is an interval $[\alpha, \beta] \subset [a, b]$ such that $f([\alpha, \beta]) = [c, d]$.