MTG 5317/4303 TEST 1 - JAMES KEESLING

NAME ____

Work all problems. Each problem is worth 20 points. Partial credit will be given for correct reasoning. Credit will be deducted for statements and reasoning that are incorrect.

Problem 1. Show that a regular Lindelöf space is normal.

Problem 2. Let C be the Cantor set. Show that there is a continuous function $f : C \to [0, 1]^2$ which is onto.

Problem 3. Let $f, g : X \to S^n$ be continuous. Suppose that for all $x \in X$, $f(x) \neq -g(x)$. Show that $f(x)$ and $g(x)$ are homotopic.

Problem 4. Let (X, x_0) be a pointed space. Define $\pi_1(X, x_0)$. Define the binary operation on $\pi_1(X, x_0)$ that makes $\pi_1(X, x_0)$ a group.

Problem 5. State the following theorems.

The Urysohn Metrization Theorem

The Urysohn Lemma

The Tietze Extension Theorem

The Hahn-Mazurkiewicz Theorem