

MTG 5317/4303 TEST 2 - 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 $\pi_1(S^n) = 1$ for $n \geq 2$.

Problem 2. Show that $e : \mathbb{R} \rightarrow S^1$ is a covering map where $e(t) = \exp(2\pi it)$.

Problem 3. Show that $\pi_1(\mathbb{P}^n) = \mathbb{Z}_2$ for $n \geq 2$.

Problem 4. Show that there is no retraction $r : D^2 \rightarrow \partial D^2$.

Problem 5. State the following theorems.

The Seifert-van Kampen Theorem

The Fundamental Theorem of Algebra

The Brouwer Fixed Point Theorem

The Jordan Curve Theorem