

Math 131 Homework #10; Due Tuesday April 15

Munkres: 9.54 4, 5, 7.

9.55 2, 4(a).

9.56 1.

9.58 2(a-e, 1), 5, 8.

N1: Consider the 2-sphere $S^2 = \{\mathbf{x} \in \mathbb{R}^3 \mid \|\mathbf{x}\| = 1\}$. Prove that $\pi_1(S^2, x_0) = 1$ for any $x_0 \in S^2$.

Hint: Let $f: I \rightarrow S^2$ be a loop based at x_0 . Prove that f is path homotopic to a path g so that the image of g is not all of S^2 . (By our space-filling curve construction, there *do* exist loops f so that $f(I)$ is all of S^2 .)