

Homework 1 – Math 446 – Spring 09

Write up solutions for the exercises below.

1. Let X and Y be topological spaces and $f : X \rightarrow \mathbb{R}^n$ and $\varrho : Y \rightarrow \mathbb{R}$ continuous maps. Show that the map $F : X \times Y \rightarrow \mathbb{R}^n$ given by $F(x, y) := \varrho(y) \cdot f(x)$ is continuous, when $X \times Y$ is given the product topology and \mathbb{R}^n and \mathbb{R} the standard topologies.
2. Endow the sphere $S^2 := \{(x, y, z) \in \mathbb{R}^3 : x^2 + y^2 + z^2 = 1\}$ with the subspace topology from \mathbb{R}^3 . Give an explicit path homotopy from $f(t) := (\cos(2\pi t), \sin(2\pi t), 0)$ to the constant map $g(t) := (1, 0, 0)$.
3. Solve exercises 2. and 3. of Section 51 in the textbook.
4. Let X be a contractible topological space and $x_0, x_1 \in X$. Show that any two paths starting at x_0 and ending at x_1 are path homotopic.

Due date: Wednesday, January 21, 2009 (at 5pm)