MAT8201, Algebraic Topology

Assignment 1

Due in-class on Tuesday, February 27

Numbered exercises are from Hatcher's "Algebraic Topology."

1. Suppose X is a CW complex and $\{x_n\}$ is a sequence of points of X such that no two points lie in the interior of the same cell. Show that the sequence $\{x_n\}$ does not converge. Then use this to show that this sequence cannot be contained in any compact set.

2. Prove that a CW complex is locally path connected.

3. Hatcher, Exercise 10 on page 19.

4. Hatcher, Exercise 16 on page 19.

5. Suppose we have a Δ-set X with

$$X_0 = \{p\}$$
$$X_1 = \{a, b, c\}$$
$$X_2 = \{u, v\}$$

and face maps

$$\partial^i(a) = p \qquad \partial^i(b) = p \qquad \partial^i(c) = p$$
$$\partial^0(u) = a \qquad \partial^1(u) = c \qquad \partial^2(u) = b$$
$$\partial^0(v) = b \qquad \partial^1(v) = c \qquad \partial^2(v) = a$$

What is the resulting space?

6. Construct a Δ-set whose geometric realization is the 2-sphere S^2.