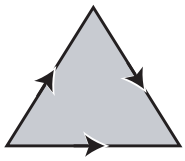
Math 8062 Homework 1

Due Wednesday, 1/21/26

1. In Hatcher's book: Chapter 0 (p. 18), Exercise 1.

2. Consider a cell complex X, with one 0–cell, one 1–cell, and one triangular 2–cell. The three sides of the triangle are identified to the same edge, with the following orientations:



Prove that X is contractible. *Hint:* It really helps to visualize this object. In fact, it can be made out of paper or cloth, and embedded in $\mathbb{R}^3$. To actually prove contractibility, consider using the homotopy equivalence criterion on page 13 of Hatcher.

3. Let x_0, x_1 be points in the same path-component of a topological space X. Construct a bijection between $\pi_1(X, x_0)$ and the set of homotopy classes of paths from x_0 to x_1.

4. In Hatcher's book: Section 1.1 (p. 38), Exercise 1.