0.1 Basic Constructions

REORDER THIS

A simple distinction between being homeomorphic, homotopic, and homotopy equivalent:

- A **homeomorphism** is the strongest of the three– two spaces being homeomorphic means that there is a bijctive coorespondance between the spaces themselves, and between the open sets of the spaces. For two spaces to be homeomorphic, there must exist a function f between them such that

  f is continuous

  f is bijective

  the inverse function f^{-1} is also continuous

- A **homotopy** is a continuous deformation between two continuous functions.

0.2 Van Kampen's Theorem

0.3 Covering Spaces

Definition 0.1

A **covering space** of a space X is a space $\tilde{X}$ together with a map $\tilde{p}\tilde{X} \to X$ satisfying the following condition: Each point $x \in X$ has an open neighborhood U in X such that $p^{-1}(U)$ is a union of disjoint open sets in $\tilde{X}$, each of which is mapped homeomorphically onto U by p.

Question

What does it mean for something to be mapped homeomorphically?

Answer

All it means is that p is a homeomorphism– which, if you'll recall from the beginning of the class, just means that it is continuous, bijective, and has a continuous inverse.

All this is saying is that there is a space such that

1 Homology

1.1 Simplicial and Singular Homology