Topology Final topics

Math 4063 Spring 2015

Final topics are from Chapter 1–Chapter 8, Chapter 11 of Topology Without Tears and Section 1.1 of Algebraic Topology.

Guaranteed question types.

• Prove that the fundamental group of path-connected topological spaces is a topological property up to group isomorphisms. In other words, if \((X, \tau_X)\) and \((Y, \tau_Y)\) are homeomorphic and path-connected, then \(\pi_1(X, x)\) and \(\pi_1(Y, y)\) are isomorphic for any \(x \in X\) and \(y \in Y\).
• Given two functions \(f_0, f_1: X \to Y\) explicitly. Construct the homotopy \(F\).
• Prove a proposition with the given set of definitions and propositions.
• Homework problems.
• Something new.

Key topics

Chapter 1

• Definition of topology.
• Basic examples: discrete, indiscrete, finite-closed.

Chapter 2

• Euclidean topology.
• Definition of basis and related propositions.

Chapter 3

• Definition of limit points and related terms.
• The idea behind proving \(\mathbb{R}\) is connected.

Chapter 4

• Subspace topology.
• Definition of homeomorphism.
• Topological properties.

Chapter 5

• Definition of continuous.
• Paths and path-connected.

Chapter 6

• Definition of a metric.
• Induced topology and metrizable.
• Convergent sequence.
• Definition of complete.

Chapter 7

• Definition of compact.
• Heine-Borel Theorem.

Chapter 8

• Definition of product topology.
• Tychonoff’s Theorem.

Chapter 11
• Definition of quotient map and quotient topology.
• Definition of identification space.

Section 1.1
• Definition of homotopy of paths.
• Definition of the fundamental group.