

Algebraic topology, Fall 2013

Homework 1, due Wednesday, September 11

1. Prove: (a) If X is contractible then X is path-connected. (b) A homotopy equivalence $f : X \rightarrow Y$ induces a bijection between the set of path-connected components of X and Y . (c) The set of rational numbers \mathbb{Q} with the topology induced from its inclusion into real numbers \mathbb{R} is not homotopy equivalent to \mathbb{Q} with discrete topology.

2. Explain how to equip (a) \mathbb{R}^2 and (b) $\mathbb{R}^2 \setminus \{(0,0)\}$ (punctured plane) with a CW-complex structure.

Exercises 5, 6ab, 9, 10, 17 from Hatcher, Chapter 0, pages 18-19.