Algebraic Topology
Homework 1

Reading associated with this assignment: Hatcher, pp. 1-4 (and look up what a “wedge sum” is on p. 10), 21-28, and 56-78. Pay attention to the “geometric” notions of a retract and deformation retract, which we will (probably) not discuss in class but may feature in homework assignments, as they serve to illustrate the general theory.

1. Prove that if a space $X$ is contractible, then $X$ is path-connected.

2. Show that homotopy is compatible with composition: If $f, f' : X \to Y$ are homotopic and $g, g' : Y \to Z$ are homotopic, then $g \circ f : X \to Z$ and $g' \circ f' : X \to Z$ are homotopic.


7. Hatcher, p. 38 exercise 5. [NB. This shows that the concept of “simply connected” can be defined without regard to a basepoint.]


