INTRO TO ALGEBRAIC TOPOLOGY
HOMEWORK 1 DUE JANUARY 29

Turn in the following:

(1) Prove that if a space $X$ is contractible, then $X$ is path-connected.
(2) Show that homotopy is compatible with composition: If $f_0, f_1 : X \to Y$ are homotopic and $g_0, g_1 : X \to Y$ are homotopic, then
   
   
   $g_0 \circ f_0 : X \to Z$ and $g_1 \circ f_1 : X \to Z$

   are homotopic.
(3) Hatcher Exercise 0.2 (p. 18)
(4) Hatcher Exercise 0.3 (p. 18)
(5) Hatcher Exercise 0.9 (p. 19)

Think about the following (but do NOT turn in):

• Show that punctured $\mathbb{R}P^n$ is homotopy equivalent to $\mathbb{R}P^{n-1}$.
• Hatcher Exercise 0.18 (p. 19)
• Hatcher Exercise 0.20 (p. 19)