

**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  $f_0, f_1 : X \rightarrow Y$  are homotopic and  $g_0, g_1 : Y \rightarrow Z$  are homotopic, then

$$g_0 \circ f_0 : X \rightarrow Z \quad \text{and} \quad g_1 \circ f_1 : X \rightarrow Z$$

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)