

# Homework 1

Due: Jan 30

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).
6. Hatcher Exercise 0.10 (p. 19).
7. Hatcher Exercise 0.19 (p. 19).
8. Hatcher Exercise 0.23 (p. 20).

Think about the following, but do NOT turn in:

- Hatcher Exercise 0.20 (p. 19).