

INTRO TO ALGEBRAIC TOPOLOGY
HOMEWORK 8 DUE APRIL 2

Turn in the following:

- (1) Hatcher Exercise 2.1.11 (p. 132)
- (2) Hatcher Exercise 2.1.12 (p. 132)
- (3) Hatcher Exercise 2.1.14 (p. 132)
- (4) Hatcher Exercise 2.1.15 (p. 132)
- (5) Let A and B be chain complexes. A chain map $f : A \rightarrow B$ is a *chain homotopy equivalence* if there exists a chain map $g : B \rightarrow A$ such that $f \circ g$ and id_B are chain homotopic, and $g \circ f$ and id_A are chain homotopic.
 - (a) Prove that if $f : A \rightarrow B$ is a chain homotopy equivalence, then f induces an isomorphism on homology.
 - (b) Give an example of chain complexes A and B with isomorphic homology but no chain homotopy equivalence between them. (Hint: Let A be \mathbb{Z} in two consecutive gradings and zero everywhere else.)