INTRO TO ALGEBRAIC TOPOLOGY
HOMEWORK 8 DUE APRIL 9

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 $f : A \to B$ is a *chain homotopy equivalence* if there exists a chain map $g : B \to A$ 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 $f : A \to B$ 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.)

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

- Let $0 \to A \to B \to C$ be a short exact sequence of chain complexes. Finish the proof from class that this induces a long exact sequence on homology.