

Homework 2

Due 11:59 PM January 24 on Gradescope

All the problems are nontrivial (some are challenging). Try to solve as many problems as you can. You can discuss with your classmates or the instructor. But you must write the solution in your own words and acknowledge all resources (people you discussed with, book you used) at the beginning of your homework. **At least one** out of the four problems will be carefully graded. **This problem is worth 10 points.** The rest problems worth 2 points each. For these problems, you will get 2 points as long as you write down some reasonable arguments. For problems in Hatcher's book, see <http://pi.math.cornell.edu/~hatcher/AT/ATpage.html>.

Problem 1. (1) Use the standard CW structure on a closed orientable surface Σ to compute the homology group $H_*(\Sigma)$. (2) Use the standard CW structure on a closed nonorientable surface Σ to compute the homology group $H_*(\Sigma)$.

Problem 2. Let $X = (S^1 \vee S^1) \times S^1$. Explicitly describe a CW structure X with six cells. Then compute its cellular homology groups.

Problem 3. Hatcher Section 2.2 Problem 10 (page 156).

Problem 4. Hatcher Section 2.2 Problem 14 (page 156).