

**18.905 HOMEWORK SIX**  
**DUE 10-20-2004 BY 3PM**

Reading Assignment for the week:

pp. 160–162 Axioms for Homology  
pp. 134–137 Degree of Maps  
pp. 137–146 Cellular Homology  
pp. 146–148 Euler Characteristic

Complete the following problems. You are encouraged to work with other students in the class on the problems. You may also consult Hatcher's book on Algebraic Topology. However, you must write up your own solutions. Please use complete sentences when writing up your solutions.

1. Exercise 20, p.132 (Use Mayer-Vietoris for the suspension, you can compute the more general coning question with whatever tools you wish to use)
2. Using Mayer-Vietoris, compute the homology of  $S^2 \times S^1$ .
3. Using Mayer-Vietoris, or your lecture notes (from Wed 10-13) on the effect of adding a cell on Homology, compute the homology of the orientable surface of genus  $g$ .
4. Let  $X$  be the subspace of  $B^3 = \{(x, y, z) \in \mathbb{R}^3 \mid |(x, y, z)| \leq 1\}$  such that  $|(\mathbf{x}, \mathbf{y}, \mathbf{z})| = 1$ , or  $x = 0$ , or  $y = 0$ , or  $z = 0$ . Note,  $X$  is the union of three disks and a sphere. Using Mayer-Vietoris, compute the homology groups of  $X$ .
5. Using either Mayer-Vietoris or your lecture notes (from Wed 10-13) on the effect of adding a cell on Homology, compute the homology of  $\mathbb{R}P^n$ .

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† Late homeworks will not be graded and will receive at most 50% of the total grade.