Final for Math 151b, Winter 2006

Deadline and timelimit: The exam is due in my box at 1:00pm on Friday, March 17. Beyond this deadline, there is no limit on the amount of time you can spend on this exam.

Disclaimer, Terms, and Conditions: You may not discuss the exam with anyone except myself. You may *only* consult the following:

- The beloved text, Hatcher's *Algebraic Topology*.
- Your class notes.
- Your returned HW sets.

You can use without proof any result in Hatcher. You can also use the result of any HW problem that was assigned, whether or not you did it. You may also use a calculator or computer to ease your labors, and consult non-algebraic-topology math texts (e.g. on algebra or basic analysis or point-set topology) as seems appropriate. While I believe all the questions are stated correctly, there could still be a typo somewhere. Please contact me if you think something is fishy.

Good luck and have fun!

Actual exam: Do all five problems; all questions are weighted equally.

1. Hatcher 3.3: #32. Note: In this problem, do not assume that the manifold has a triangulation.

2. Hatcher 4.2: #26.

3. Hatcher 4.3. #4.

4. Hatcher 4.B: #2. (For this problem, you'll need to read §4.B, but this is under two pages)

5. Show that taking stable homotopy groups π_i^s is a functor from the category of CW complexes (with basepoint) to the category of abelian groups. Show that it satisfies all of the axioms in §2.3 for a homology theory, except the condition of on the homology of a point.

6. The final problem is for extra credit only, so you do not need to do it. If you solve it, this problem is worth only a third of a normal problem.

   In class, I purported to give an argument for why the 1-stem $\pi_1^s = \pi_1^s(S^0)$ is $\mathbb{Z}/\mathbb{Z}2$. However, it was completely false. Give a correct proof.