MATH G4307 PROBLEM SET 11
DUE DECEMBER 6, 2011.

INSTRUCTOR: ROBERT LIPSHITZ

Exercises to turn in:

(E1) In class we defined the cap product in terms of the slant product, which in turn came from the Künneth theorem. Verify using this definition that $[\overline{B}^n] \cap \cdot$ gives an isomorphism $H^k(\overline{B}^n, \partial\overline{B}^n) \to H_{n-k}(\overline{B}^n)$. (Hint: the proof should be short.)

(E2) Hatcher 3.3.8 (p. 258). Note the relationship to Brouwer degree.

(E3) Hatcher 3.3.11 (p. 258). Do this two ways: the way Hatcher intends, using the previous exercise (which you don't have to do), and completely avoiding π_1, by using the cup product.

(E4) Hatcher 3.3.17 (p. 259). (We used this in class.)

(E5) Hatcher 3.3.21 (p. 259)

(E6) Hatcher 3.3.24 (p. 259).

Problems to think about but not turn in:

(P1) Read through the remaining problems in this section, and do any that seem difficult, surprising or interesting.

E-mail address: `lipshitz@math.columbia.edu`