Math 8062 Homework 8

Due by 12:00 noon on Friday, 5/3/13

1. Do problem 14–5(a) on page 383 of Lee.

2. Do problem 15–3 page 407 of Lee.

3. Do problem 15–6 page 408 of Lee.

4. Do problem 15–11 page 408 of Lee.

5. Do problem 16–1 page 431 of Lee.

6. (Extra credit) Let M be a compact, oriented 3–manifold with boundary. Recall that $H_1(\partial M, \mathbb{R}) \cong \mathbb{R}^{2g}$, where g is the sum of the genera of all the boundary components.

Use Poincaré duality and the long exact sequence of the pair $(M, \partial M)$ to show that the inclusion $i : \partial M \hookrightarrow M$ induces a homology map

$$i_* : H_1(\partial M, \mathbb{R}) \to H_1(M, \mathbb{R})$$

where $\ker i_* \cong \mathbb{R}^g$. (This statement is used so often in 3–dimensional topology that it goes by the shorthand name "half lives, half dies," meaning "half the dimensions live, and half die.")