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.


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

   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.”)