Math 518: HW 3 due Wednesday, September 17, 2014.

1. Problem 3-8 of Lee on page 76.

2. For each of the following injective smooth immersions, determine whether not they are smooth embeddings and prove your conclusion in either case. Include sketches of the images of these immersions in your answer.

   (a) $F\colon (2\pi, \infty) \to \mathbb{R}^2$ given by $F(t) = \left(\dfrac{1}{t}\cos t, \dfrac{1}{t}\sin t\right)$.

   (b) $G\colon (2\pi, \infty) \to \mathbb{R}^2$ given $G(t) = \left(\dfrac{t+1}{t}\cos t, \dfrac{t+1}{t}\sin t\right)$.

   (c) Let M be the smooth 1-manifold which is the disjoint union of $M_0 = \mathbb{R}$ and $M_1 = (0, \infty)$. Consider $H\colon M \to \mathbb{R}^2$ given by $H(s \in M_0) = (0, s)$ and $H(t \in M_1) = (t, \sin(1/t))$.

3. Prove or disprove: If S is an embedded submanifold of a smooth manifold M then every $f \in C^\infty(S)$ is the restriction of some $F \in C^\infty(M)$.

4. Problem 4-10 of Lee on page 96.

5. Problem 4-4 of Lee on page 96.

6. Problem 4-5 part (a) of Lee on page 96.