Math 120A: Homework 6

Due: November 14, 2014

1. Read sections 4.3-5 in Pressley.

2. Do problems 4.2.2, 4.2.5, 4.2.14, 4.3.1, 4.4.1, 4.4.2, 4.4.4, and 4.4.5 in Pressley.

   [For 4.2.5, please write down an atlas, not just a parametrization.]

3. Let T be the torus described in 4.2.5. Consider the map $\mathbb{R}^2 \to T$ given by $(x, y) \mapsto ((a + b\cos(2\pi x))\cos(2\pi y), a + b\sin(2\pi x)\sin(2\pi y), b\sin(2\pi x))$. Prove, using your atlas for the torus, that this map is a local diffeomorphism. (Note that $\mathbb{R}^2$ is a surface with the identity surface patch.) Draw a sketch of the preimage of a small neighborhood on the torus in the plane.