Homework Assignment 5

March 11, 2008

1. Let $x$ be a fixed point of a diffeomorphism. Prove that $\{x\}$ is a hyperbolic set if and only if $x$ is a hyperbolic fixed point. Identify the constants $C$ and $\lambda$.

2. Prove that the horseshoe is a hyperbolic set.

3. Let $\Lambda_i$ be a hyperbolic set for $f_i \in \text{Diff}(M_i)$ for $i = 1, 2$. Prove that $\Lambda_1 \times \Lambda_2$ is a hyperbolic set for $f_1 \times f_2$.

4. What are necessary and sufficient conditions for a periodic point to be a hyperbolic set? Prove these.

5. Prove that if $x$ is a homoclinic point, then $x$ is non-wandering, but not recurrent.