MASTERMATH

Homework Dynamical Systems
November 2015

All exercises count equally

1. Let f be the horseshoe map and let Λ be the horseshoe set of f. Let Λ_0^N be the subset of Λ given by the points whose coding contains at least N 0's between any pair of 1's, and let Λ_0 be the subset of points whose coding contains at most a single 1. Prove that every Λ_0^N is a locally maximal hyperbolic set for f, and that Λ_0 is a hyperbolic set for f which is not locally maximal.

2. Show that for any closed invariant subset S of the invariant set Λ in the horseshoe set and any open neighborhood U of S there is a locally maximal compact invariant subset $\tilde{S}$ with $S \subset \tilde{S} \subset U$.

3. Consider a matrix $L : \mathbb{R}^n \to \mathbb{R}^n$ with integer entries and without eigenvalues of absolute value one. Then L defines a hyperbolic torus endomorphism F_L on the torus $\mathbb{T}^n = \mathbb{R}^n/\mathbb{Z}^n$. Show that the periodic points of F_L are dense.

4. Brin & Stuck 5.12.2

5. Brin & Stuck 7.2.1 and Brin & Stuck 7.2.2