

# DYNAMICAL SYSTEMS, MATH 117, HW#5

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Exercises 11.2, 11.4, 11.6, 11.7, and the following problems:

## Problem 1.

Consider the map  $f : [0, 1] \rightarrow [0, 1]$ ,  $f(x) = \begin{cases} 1/2 + x, & \text{if } x \in [0, 1/2]; \\ 2 - 2x, & \text{if } x \in [1/2, 1]. \end{cases}$

Periodic points of what periods does this map have?

## Problem 2.

Let  $\sigma_A : \Sigma_A \rightarrow \Sigma_A$  be a topological Markov chain with the matrix

$$A = \begin{pmatrix} 1 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 1 \end{pmatrix}.$$

Find  $\lim_{n \rightarrow \infty} \frac{1}{n} \log (\#Per_n(\sigma_A))$ , where  $\#Per_n(\sigma_A)$  is the number of periodic points of (not necessarily minimal) period  $n$ .

## Problem 3.

a) Is it possible to find a continuous map  $f : [0, 1] \rightarrow [0, 1]$  such that  $f^2$  has a periodic point of prime period 20, but  $f^3$  has no periodic points of prime period 34?

b) Is it possible to find a continuous map  $f : [0, 1] \rightarrow [0, 1]$  such that  $f^2$  has a periodic point of prime period 15, but  $f^3$  has no periodic points of prime period 28?