

Ma 4, Introduction to Mathematical Chaos

Spring 2006

HOMework # 3

Due Tuesday April 18, 2:30pm, 2006.

1) (10) Let R_ω be a rotation of S^1 , $R_\omega(x) = x + \omega \pmod{1}$. Which of the following rotations of S^1

$$R_{\frac{\sqrt{2}}{10}}, R_{\frac{2\sqrt{2}}{10}}, R_{\frac{\sqrt{3}}{10}}, R_{\frac{1}{10}}, R_{\frac{9}{10}}, R_{\frac{\sqrt{2}+\sqrt{3}}{10}}$$

are topologically conjugated?

2) (10) Prove that $E_2 : S^1 \rightarrow S^1$ and $E_3 : S^1 \rightarrow S^1$ are not topologically conjugated.

3) (10) Show that $E_2 : S^1 \rightarrow S^1$ has an invariant Cantor set.

4) (10) a) Prove that $\sigma : \Sigma_2^+ \rightarrow \Sigma_2^+$ is a continuous map;

b) Prove that $\sigma : \Sigma_2 \rightarrow \Sigma_2$ is a homeomorphism.

5) (10) Prove that for the expanding map $E_m : S^1 \rightarrow S^1$, $m \geq 2$, $E_2(x) = 2x \pmod{1}$, rational points are preimages of periodic points.