

1. (due Sept. 03, 2009; done) Show that for every $n \geq 1$ the number of periodic points of prime period n is not a complete set of invariants for topological conjugacy.
2. (due Sept. 03, 2009; done) Find a complete set of invariants for topological conjugacy of rotations $T_\alpha : S^1 \rightarrow S^1$.
3. (due Sept. 03, 2009; done) Provide an example of a topological dynamical system $T : X \rightarrow X$ that has infinitely many periodic points.
4. (due Sept. 08, 2009; done) Provide an example of a topological dynamical system $T : X \rightarrow X$ such that for some points x , $\omega(x) \neq \overline{\mathcal{O}_+(x)}$ and $\omega(x) \neq \mathcal{O}_+(x)^d$
5. (due Sept. 08, 2009; done) Prove that if $T : X \rightarrow X$ is a minimal system and the space X is infinite, then X is perfect. Conclude that $\#X$ is continuum.
6. (due Sept. 08, 2009; done) Show that minimality is not a complete invariant for infinite system.
7. (due Sept. 10, 2009; done) Show that the tent map of the interval $[0, 1]$ is transitive.
8. (due Sept. 10, 2009; done) For every integer k with $|k| \geq 2$ let $E_k : S^1 \rightarrow S^1$ be the map given by the formula $E_k(z) = z^k$. Show that the map E_k is transitive.
9. (due Sept. 17, 2009; done) Show that the tent map of the interval $[0, 1]$ is topologically exact.
10. (due Sept. 17, 2009; done) For every integer k with $|k| \geq 2$ let $E_k : S^1 \rightarrow S^1$ be the map given by the formula $E_k(z) = z^k$. Show that the map E_k is topologically exact.
11. (due Sept. 17, 2009; done) Show that each topologically exact map is topologically transitive.
12. (due Sept. 17, 2009; done) Let $T : X \rightarrow X$ be a topological dynamical system. Suppose that for every non-empty open set $U \subset X$ there exists $n \geq 0$ such that $\overline{T^n(U)} = X$. Prove that T is topologically exact.
13. (due Sept. 17, 2009; done) Let $T : X \rightarrow X$ be a topological transitive dynamical system. Suppose that $f : X \rightarrow \mathbb{R}$ is a continuous function such that $f(T(x)) \leq f(x)$ for all $x \in X$. Prove that f is constant.
14. (due Sept. 22, 2009; done) Provide an example of a topologically transitive dynamical system which is not topologically exact.
15. (due Oct. 06, 2009; done) 3.4.2; 3.4.3; 3.4.4; 3.4.6; 3.4.8; 3.4.12; 3.4.15.
16. (due Oct. 13, 2009; done) Show that each expanding repeller is an open distance expanding map.
17. (due Oct. 13, 2009; done) Show that if $T : X \rightarrow X$ is a global distance expanding map, then X is a singleton.
18. (due Oct. 13, 2009; done) Find a metric, compatible with the Euclidean topology, with respect to which the map $E_2 : S^1 \rightarrow S^1$ is not expanding.
19. (due Oct. 13, 2009; done) Prove that the Cartesian product of two expanding maps is expanding.
20. (due Oct. 13, 2009) Show that the toral map induced by the diagonal matrix $a_{11} = 2, a_{22} = 3, a_{12} = a_{21} = 0$ is distance expanding.

21. (due Oct. 13, 2009) Find a 2×2 non-diagonal integral matrix such that the corresponding endomorphism of the 2-dimensional torus is distance expanding.
22. (due Oct. 20, 2009) 4.5.2-4.5.5
23. (due Nov. 03, 2009; done) Show that the tent map satisfies the shadowing property but not the unique shadowing property.
24. (due Nov. 03, 2009; done) Show that any rotation of the circle fails to satisfy the shadowing property.
25. (due Nov. 03, 2009) 4.6.4
26. (due Nov. 03, 2009; done) Suppose that $T : X \rightarrow X$ is a distance expanding map and X is a compact connected metric space. Is then the map $T : X \rightarrow X$ topologically transitive?
27. (due Nov. 10, 2009) Show that (1,2,3''') implies (1,2,3).
28. (due Nov. 10, 2009) Assume that $T : X \rightarrow X$ and $S : X \rightarrow X$ are two open topological dynamical systems having Markov partitions \mathcal{R} and \mathcal{S} respectively. Show that $\mathcal{R} \times \mathcal{S} = \{\mathcal{R} \times \mathcal{S} : \mathcal{R} \in \mathcal{R}, \mathcal{S} \in \mathcal{S}\}$ is a Markov partition for $T \times S$.
29. (due Nov. 10, 2009; done) Assume that \mathcal{R} and \mathcal{S} are Markov partitions for a topological dynamical system $T : X \rightarrow X$. Show that $\mathcal{R} \vee \mathcal{S}$ is a Markov partition for T .
30. (due Nov. 10, 2009) Can an open distance expanding map have a countable infinite Markov partition?
31. (due Nov. 19, 2009) Assume that \mathcal{R} is a Markov partitions for an open expanding topological dynamical system $T : X \rightarrow X$. Show that $T^{-n}(\mathcal{R})$ does not have to be a Markov partition for T but $\mathcal{R} \vee T^{-1}(\mathcal{R}) \vee \dots \vee T^{-n}(\mathcal{R})$ must be.
32. (due Nov. 24, 2009) Express expansiveness in topological terms.
33. (due Nov. 24, 2009) Show that the Cartesian product of two expansive maps is expansive.
34. (due Nov. 24, 2009) Show that the disjoint union of finitely many expansive maps is expansive.
35. (due Nov. 24, 2009) Show that the one-point (Alexandrov) compactification of a countable disjoint union of expansive maps is not expansive (5.6.6).
36. (due Nov. 24, 2009) Show that any subsystem of an expansive map is expansive.
37. (due Nov. 24, 2009) Show that the composition of two expanding maps with respect to the same metric ρ is expanding with respect to ρ .
38. (due Nov. 24, 2009) Is the composition of any two expansive maps expansive?