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 $T_\alpha : S^1 \to S^1$.

3. (due Sept. 03, 2009; done) Provide an example of a topological dynamical system $T : X \to X$ that has infinitely many periodic points.

4. (due Sept. 08, 2009; done) Provide an example of a topological dynamical system $T : X \to X$ 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 $T : X \to X$ 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 $E_k : S^1 \to S^1$ 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 $E_k : S^1 \to S^1$ 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 $T : X \to X$ 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 $T : X \to X$ be a topological transitive dynamical system. Suppose that $f : X \to \mathbb{R}$ 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 $T : X \to X$ 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 $E_2 : S^1 \to S^1$ 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 $2 \times 2$ 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 $T : X \to X$ is a distance expanding map and $X$ is a compact connected metric space. Is then the map $T : X \to X$ topologically transitive?

27. (due Nov. 10, 2009) Show that (1,2,3"') implies (1,2,3).

28. (due Nov. 10, 2009) Assume that $T : X \to X$ and $S : X \to X$ are two open topological dynamical systems having Markov partitions $\mathcal{R}$ and $\mathcal{S}$ respectively. Show that $\mathcal{R} \alpha \mathcal{S} = \{\mathcal{R} \times \mathcal{S} : \mathcal{R} \in \mathcal{R}, \mathcal{S} \in \mathcal{S}\}$ 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 $T : X \to X$. 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 $T : X \to X$. Show that $T^{-n}(\mathcal{R})$ does not have to be a Markov partition for $T$ but $\mathcal{R} \vee T^{-1}(\mathcal{R}) \vee \ldots \vee T^{-n}(\mathcal{R})$ must be.