Queen Mary
University of London

MAS424/MTHM021 Introduction to Dynamical Systems

Key Objectives (preliminary, Sept. 2007) **Fall 2007**

The following topics are intended as a list of objectives to be mastered in order to be reasonably sure of passing the examination in Dynamical Systems with a reasonable grade.

1. **Simple examples of dynamical systems:** harmonic oscillator, driven nonlinear pendulum, kicked rotor, standard map, Bernoulli shift, tent map, logistic map, rotation on the circle, piecewise linear maps
2. **time-discrete maps in one dimension:** homeomorphism, cobweb plots, (prime) periodic points, eventually periodic points, periodic orbits, stability analysis, expanding/contracting maps, hyperbolicity, topological transitivity, minimality, sensitive dependence on initial conditions, Markov graphs
3. **Frobenius-Perron equation:** derivation and solutions, Frobenius-Perron operator, partition, Markov partition, topological transition matrix, invariant measure, probability measure, absolute continuity, SRB measure
4. **Assessing chaos:** Poincaré-Bendixson theorem, different definitions of chaos, Ljapunov exponents, ergodicity, mixing

The **rubric** will state: The duration of the examination is 3 hours. You should attempt all questions. Marks awarded are shown next to the questions. Calculators are **not** permitted in this examination.