MATH 3451 Review Sheet for midterm

The sections of Devaney we've covered are 1.1 through 1.7. Unless otherwise stated, you will need to prove/justify all answers. Most of these will be shorter proofs (i.e. significantly shorter than HW problems), with maybe one or two longer ones at the end. I also may include some problems which are computational or do not require you to show proof; please read the directions carefully!

Here's a list of definitions and types of problems which you should know how to do. I've attempted to list as many as possible, but this list may not be absolutely comprehensive.

Dynamical terms with which you should be familiar: continuous, homeomorphism, orbit, fixed, periodic, eventually fixed, eventually periodic, least period, stable set, hyperbolic/attracting/repelling periodic point, topologically conjugate, Cantor set, quadratic map $f_\mu(x) = \mu x(1-x)$, symbolic coding (for the quadratic map, when $\mu > 2+\sqrt{5}$), shift map σ.

Each of the following bullet points WILL be represented on the test somewhere:

• Describing the orbits of points under a given map $f : \mathbb{R} \to \mathbb{R}$, including finding fixed/periodic points and describing their stable sets. Usually this will be done via some kind of monotonicity/induction argument.

• Using the fact that the symbolic coding $s : \Lambda \to \Sigma_2$ defined in class for $\mu > 2+\sqrt{5}$ is a topological conjugacy to find/prove existence of points of Λ with certain properties (e.g. periodic, dense orbit).

• One or both of the following: using the Intermediate Value Theorem to prove existence of fixed/periodic points in an interval OR using the Mean Value Theorem to show that points in an interval get further apart or closer together when a function f is applied, if you have a bound on $|f'(x)|$ in that interval.