Homework # 4
Due Oct. 16 at the beginning of class

Comp. Exp. 3.1 You can combine bits of code from Homework 1 and from Comp. Exp. 2.2 from last homework to make this Lyapunov exponent vs. a plot. Use fine steps in a, e.g., 10^{-3}, to see the jagged quality. Only once you are happy with your plot, compare with one on pg. 237.

Hints: Look at the hw1_iter_sol.m code I provided on the homework webpage. You notice it plots the difference of two nearby orbits on a *log* scale. If you take the *ln* of this difference, the slope of the resulting graph is literally h, the Lyapunov exponent (as explained on pg. 107). So you could measure the slope of this graph using, for example, 25 iterations (but do not use too many iterations otherwise it stops growing). Since h can be negative, I suggest you do not start at 10^{-15} difference (since it could get smaller but you would not be able to see it due to round off error). Instead choose a number between 10^{-15} and 1 so that you can detect positive or negative exponents.

T3.2 This is an easy problem but make sure to compute the Lyapunov *exponent* not *number*.

T3.3 This problem is a good recap of a proof technique from before.

3.1 Hint: In part (d), the key word is attracting. Factor out the roots as one, not separately, and look for the product of the roots later. For part (e), sketch the graph and $y = x$. Then think about conjugacy.

T3.8 Please show why the C' evaluations cancel out.

T3.10 A lovely result with very little effort, now you have the machinery.

3.4

3.5

3.7

3.10