

Homework 4.

Due Thursday, 11:59 PM Nov 14.

1. Exercise 1, 3, 4 of Chapter 6.
2. Consider the discrete dynamical system $u^{k+1} = g(u^k)$ where the function g is a continuous real value scalar function from R to R . Show that if a solution to this system converges

$$\lim_{k \rightarrow +\infty} u^k = u^*$$

then the limit u^* is a fixed point.

3. Exercise 2 of Chapter 9.
4. Write a computer program in Matlab or other languages that you prefer to reproduce the Bifurcation diagram in Figure ???. The iterative system is given by

$$x_{n+1} = rx_n(1 - x_n) \tag{1}$$

which is the so called logistic map. You may vary the values of r in $[2, 10]$.

Please submit your codes and a report!

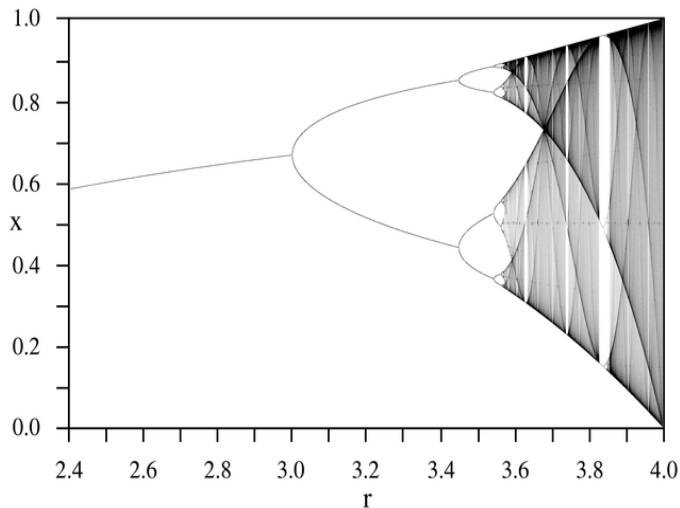


Figure 1: Bifurcation diagram of the logistic map. The attractor for any value of the parameter r is shown on the vertical line at that r .

5. By now, you should get to think of the final project for the course, it can be either individual or team projects. Teams should consist of two-three students. Please send me the topic which you or your group are planning to work on, you need also send me the names of your group members for a team project. In a separated file, I will list some possible topics and references for your consideration, you can also choose some other topics of your interests.

A brief presentation will be due at the end of the semester. Longer papers or combinations of related papers could serve as both an extra credit report and a project. In addition, groups of related problems from Tung or the recommended references may also serve as bases of projects. Reproduction of computational results from the papers is highly encouraged.