Computational Physics Homework Assignment #3

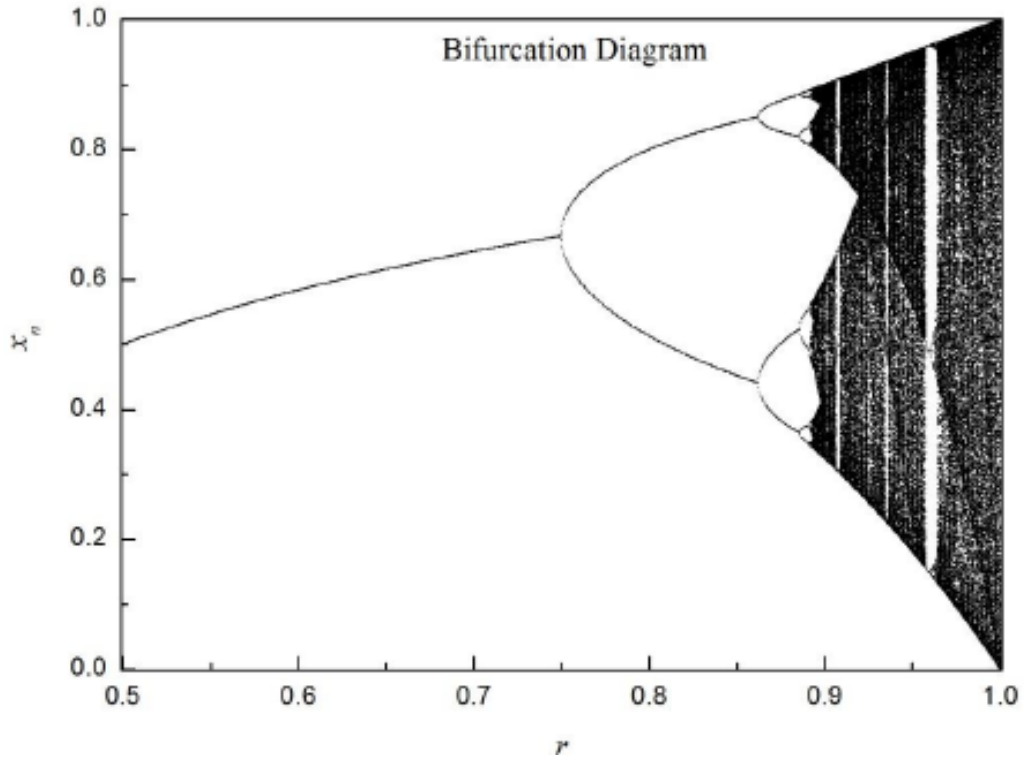
April 08, 2019; Due April 29, 2019

Reading Assignment

1. Read lecture notes and references; Study sample programs and prepare your own programs with any languages you prefer.
2. Find the 2-3 most recent review articles on nonlinear phenomena and random walks.

Laboratory Assignments (Total Points: 100; Select (1) or (2)), on April 15, 2019

1. (60 points) Write a program to generate the Bifurcation Diagram.



2. (60 points) Write a program to enumerate all possible self-avoiding random walks on square lattice at least to N=15.

3. (40 points) Find root(s) of a simple function, $0 = f(x) = \cos(x) - ax$, a = 1.0, 1/6.
   a) Use graphic method to estimate (i) number of roots; (ii) numerical value of roots to 2 significant figures.
   b) Use the bisection method to determine all roots to (i) 5 significant figures; (ii) 8 significant figures. List number of iterations in your calculations.
   c) Repeat part (b) by the method of Newton-Raphson.
   d) Repeat part (b) by the method of Secant.
   e) Repeat part (b) by the method of false position.
   f) Repeat part (b) by the method of a simple iteration scheme.