Computational Physics Homework Assignment #3

One-Dimensional Logistic Map

November 2 5 , 2024; Due December 9 , 2024

Reading Assignment

1. Read lecture notes and references;
2. Study sample programs, prepare your own programs with any languages you prefer or simply copy sample programs but make them work.

Lab Assignments on December 5, 2023; **(Total Points 120 = 60 + 60)**

1. **Root-Finding** (60 Points)
   Find root(s) of a simple function, $0 = f(x) = cos(x)ax$, $a = 1.09, 0.21$.
   (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.
2. **Bifurcation Diagram** (60 Points)
   Generate the following Bifurcation Diagram, together with your program.