

COSC: 4320: System Modeling and Simulation

Spring 2020

Programming Assignment 05

Total points: 08

Due Date: 05/02/2020

Instructions:

- For tasks 1 and 2, you should submit the calculation details with result in a pdf format (Hand written/compose).
- For task 3 and 4, you should submit the python code. You can code them in one or multiple python files. No code images or doc will be accepted.

Question:

A logistic Model is given as

$$x_t = r x_{t-1} (1 - x_{t-1})$$

Do the following:

1. (1 point) Conduct a bifurcation analysis of this model to find the critical thresholds of r at which Bifurcation occurs
2. (2 points) Study stability of each equilibrium point in each parameter range and summarize the result in a table
3. (3 points) Simulate The model with several selected values of r to confirm the result analysis.
4. (2 points) Plot a Bifurcation diagram of this model for $0 < r < 4$