MATH 4780/6780: Mathematical Biology

Problem Set 3

The assignment is due **Friday 2/21 by 4pm**. Place your assignment in the mailbox of Nicole Song, located in Boyd 434A. Show your work on all problems. Correct answers without the necessary work will not get any credit. Submit your solutions in order (do not place all codes or figures at the end.)

1. (10 + 10 pts.) Exercise 2.4.13 from textbook.

2. (10 pts.) Write a Matlab code that simulates the model in the previous problem. Run your system by setting the initial conditions equal to the positive steady-state values. Include a hard copy of your code and the time-series figure with your HW solutions. If done correctly, your figure should contain two parallel lines.

3. (5 pts.) Use your code to determine the long term behavior of A_n and B_n when the initial condition A_0 is perturbed $+1$ and -1 units. Repeat for B_0. There will be four separate cases in total. For example, assuming $(A^*, B^*) = (15, 20)$, the four initial conditions would be $(A_0, B_0) = (14, 20),\ (16, 20),\ (15, 21),\ (15, 19)$. This exercise will inform you about the stability of the fixed point (A^*, B^*), which should confirm your work in the first problem.