

MATH 4780/6780: MATHEMATICAL BIOLOGY

Online Assignment 2

The assignment is due **Tuesday 4/7 by 9pm**. Please e-mail your solution to ocaner@uga.edu with Subject line “online assignment”.

1. Consider the following predator-prey model that you analyzed in a previous assignment by hand.

$$\begin{aligned}x' &= x^2(1 - x) - xy \\ y' &= xy - ay\end{aligned}$$

- (a) Write an ODE file for this system. Set the initial condition as $x = 0.5, y = 0.1$. Install XPP and run your model. Set one of the sliders to parameter a , so that you can control its value easily.
- (b) For $a = 0.49$, Draw the nullclines, the scaled direction field, and the solution with the initial condition $x = 0.5, y = 0.1$. Take a screenshot and include with your solutions.
- (c) Repeat (b) for $a = 0.6, a = 0.9$ and $a = 1.05$.
- (d) For each of the four a values, describe the long term behavior of the system. Does u or v win? Can they co-exist? Does the outcome depend on the initial condition?