**MATH 315**

**Mathematical Modeling**

***Assignment 12***

*Due Wednesday, October 23*

**Read** Section 7.3 “Competing Species” in Chapter 7*: Nonlinear Differential Equations and Stability* of Brannan and Boyce *Differential Equations.*

**Problems**

## **7.3 Bifurcation Exercises:** **12, 15, 17**

**(Read Introductions/Instructions Which Precede Exercises)**

**NOTE: There is a typographical error in the equation for** $y’$ **in Problem 12.**

**It should read** $y’ = -4x + y +x^{2}$**.**

Pictures Below: *Direction Fields Near (2,2) for System*

$$x^{'}=x\left(4-x-y\right) $$

$$y^{'}=y(2+2a-y-ax)$$

|  |  |
| --- | --- |
| *a* = 3/4 Chart, scatter chart  Description automatically generated | *a* = 5/4 |