

Name \_\_\_\_\_

Student I.D. \_\_\_\_\_

**Math 2250-1**  
**Quiz 13**  
**December 7, 2012**

Here is a system of two differential equations, which could be modeling two competing species:

$$x'(t) = 12x - 3x^2 - 2xy$$

$$y'(t) = 9y - y^2 - 3xy$$

1) Find all equilibrium solutions for this system of differential equations, algebraically.

(4 points)

2) One of the equilibrium solutions to the system above is  $(x_*, y_*) = (2, 3)$ . Find the linearized system of differential equations at that equilibrium point, and use eigenvalues to classify the equilibrium point. The pplane picture below may help inspire your work. If you had more time, I would maybe have asked you to sketch what the solutions to the linearized system look like, based on the linearization, eigenvalues, and eigenvectors.

(6 points)

