Mathematics 172

Quiz 26 **Name:** Key

You must show your work to get full credit.

We have two completing species whose populations sizes are modeled by

$$\frac{dx}{dt} = xf(x,y)$$
$$\frac{dy}{dt} = yg(x,y)$$

In the two figures below the curve with the dashed line - - - - is where $f(x,y) = 0$ and the dotted line ..... is where $g(x,y) = 0$. Both f and g are negative above their zero curve and positive below the curve.

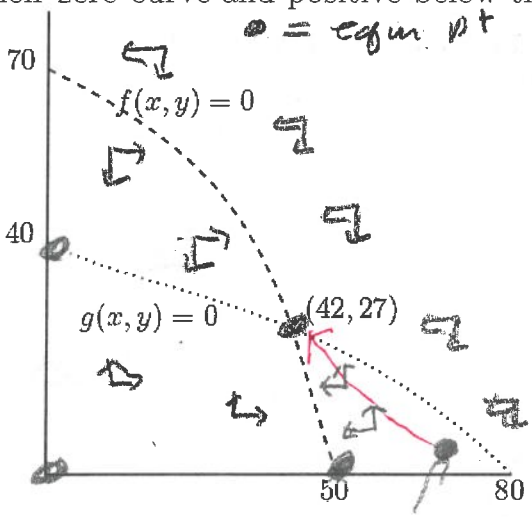

Figure 1 (70, 5)

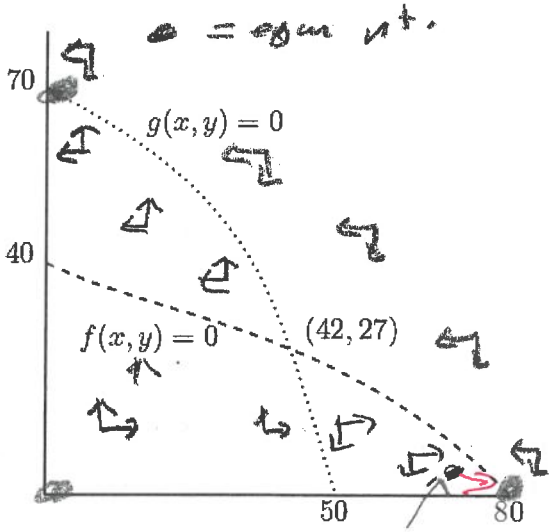

Figure 2 (70, 5)

Answer each of the following questions for both of the figures.

1. What are the equilibrium points?
   Figure 1 (0,0), (50,0), (0,40), (42,27) Figure 2 (0,0), (80,0), (0,70), (42,27)
2. What are the stable equilibrium points?
   Figure 1 (42, 27) Figure 2 (0, 80), (70, 7)
3. What is the x-species carrying capacity if there are no y-species present?
   Figure 1 50 Figure 2 80
4. What is the y-species carrying capacity if there are no x-species present?
   Figure 1 40 Figure 2 70
5. If $x(0) = 70$ and $y(0) = 5$ estimate $x(100)$ and $y(100)$
   Figure 1 (42, 27) Figure 2 (80, 0)
6. If $x(0) = 70$ and $y(0) = 0$ estimate $x(100)$ and $y(100)$
   Figure 1 50 Figure 2 80