Mathematics 172

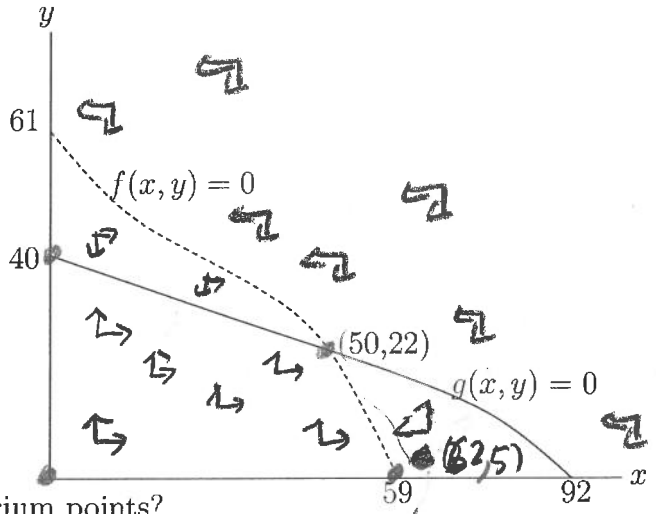
Quiz 21 Name: Key

You must show your work to get full credit.

The x-species and y-species are competing for common resources. This competition is modeled by the following system of differential equations

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

The phase diagram of this system is given by



1. What are the equilibrium points?

The equilibrium points are: (0,0), (59,0), (0,40), (50,22)

2. Draw in the arrows showing which way points are moving in each of the regions of the phase diagram.

3. What are the stable equilibrium points?

The stable equilibrium points are: (50,22)

4. If $x(0) = 62$ and $y(0) = 5$ estimate $x(100)$ and $y(100)$.

$x(100) \approx$ 50 $\quad$ $y(100) \approx$ 22

Starting at (62,5) the point gets pushed into the stable point (50,22)