Mathematics 172

Quiz 28 Name: K-ey

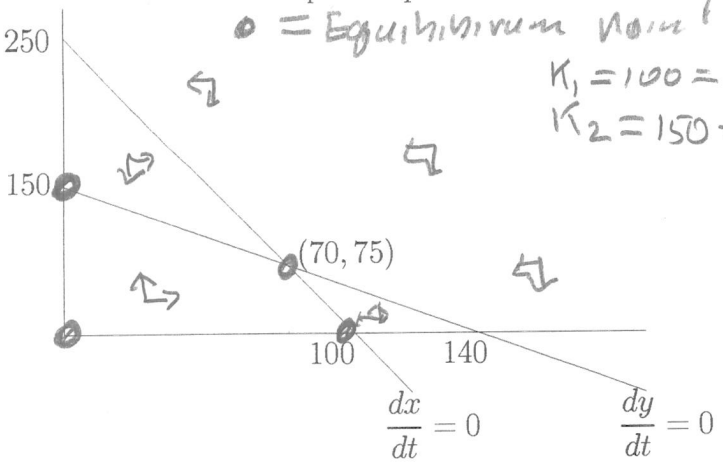
You must show your work to get full credit.

The problems below refer to a system of two completing species modeled by the rate equation

$$\frac{dx}{dt} = r_1 x\left(\frac{K_1 - x - \alpha y}{K_1}\right)$$
$$\frac{dy}{dt} = r_2 y\left(\frac{K_2 - \beta x - y}{K_2}\right)$$

If $x(0) = 90$, $y(0) = 40$ then $x(1000) \approx 70$, $y(1000) \approx 75$

1. Assume that the phase space looks like:



• = Equilibrium point

$K_1 = 100$ = x-carrying capacity

$K_2 = 150$ = y-carrying capacity

Put in arrows showing which way points in each of the four regions are moving.

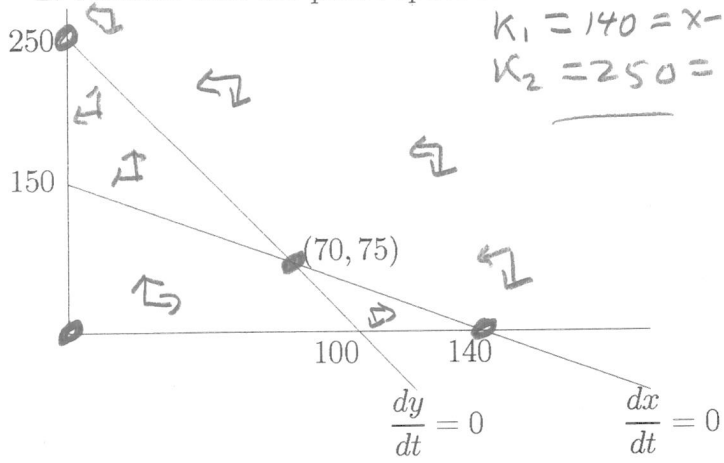
(a) What are the equilibrium points?

(0,0), (100,0), (0,150), (70,75)

The Stable equilibrium points are: (70,75)

Is this **competitive coexistence** or **competitive exclusion**? Circle one.

2. Assume that the phase space looks like:



$K_1 = 140$ = x-carrying capacity

$K_2 = 250$ = y-carrying capacity

If $x(0) = 145$, $y(0) = 3$ then $x(1000) \approx 140$, $y(1000) \approx 0$

Put in arrows showing which way points in each of the four regions are moving.

(a) What are the equilibrium points?

(0,0), (140,0), (0,250), (70,75)

The Stable equilibrium points are: (140,0), (0,250)

Is this **competitive coexistence** or **competitive exclusion**? Circle one.