Quiz 22   Name: _____Key_____

You must show your work to get full credit.

Consider the system for two competing species

$$\frac{dx}{dt} = .2x\left(\frac{80 - x - 2y}{80}\right)$$
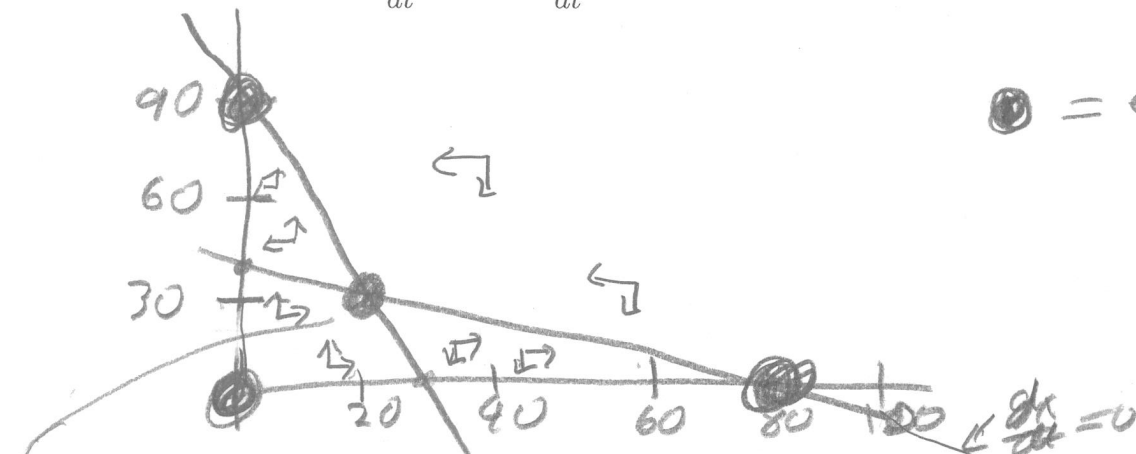
$$\frac{dy}{dt} = .3y\left(\frac{90 - y - 3x}{90}\right)$$

$80 - x - 2y = 0$

x-intercept (80, 0)

y-intercept (0, 40)

$3x + y = 90$

x-intercept (30, 0)

y-intercept (0, 90)

1. Draw the lines where $\frac{dx}{dt} = 0$ and $\frac{dy}{dt} = 0$.

⬤ = equm. pt.

2. Find the equilibrium points.   The points are (0,0), (80,0), (0,90)
                                                                (20, 30)

$\frac{dy}{dt} = 0$

$x + 2y = 80$ $y = (80 - x)/2$

$3x + y = 90$ $y = 90 - 3x$

$Y1 = (80 - x)/2$ → 2nd calc intersect

$Y2 = 90 - 3x$ $X = 20, Y = 30$

$Xmin = 0$

$Xmax = 80$

ZoomFit.

3. If $x(0) = 30$ and $y(0) = 5$ estimate $x(100)$ and $y(100)$

$x(100) \approx$ ____80____ $y(100) \approx$ ____0____

This is competitive exclusion.

The point (30, 5) will end up at (80, 0)