Mathematics 172

Quiz #21 Name: Key

You must show your work to get full credit.

Consider the system

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

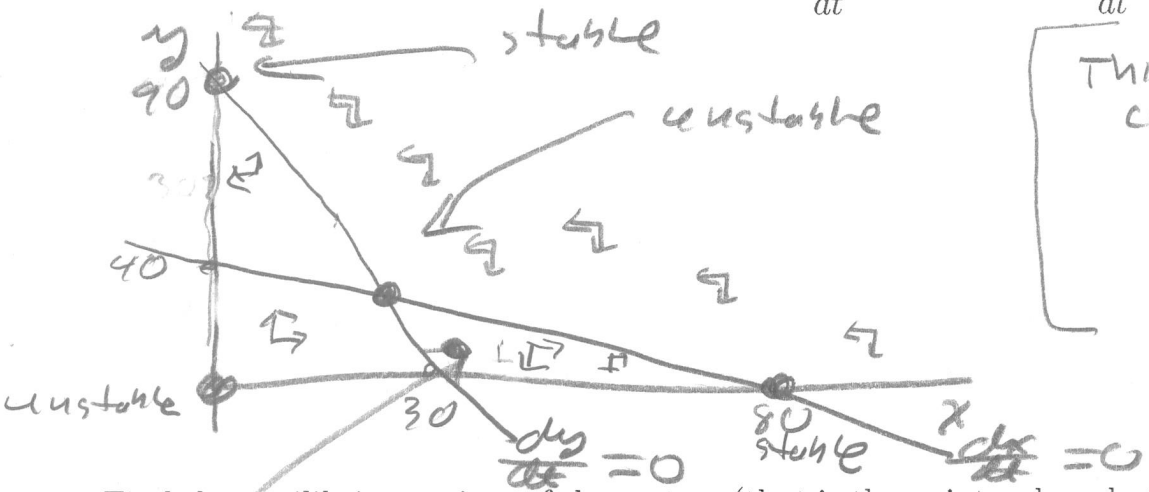
$$\frac{dy}{dt} = .2y\left(\frac{90 - y - 3x}{80}\right)$$

$80 - x - 2y = 0$
x-intercept = (80, 0)
y-intercept = (0, 40)

$90 - y - 3x = 0$
x intercept = (30, 0)
y intercept = (0, 90)

of two rate equations.

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



This is competitive exclusion

2. Find the equilibrium points of the system (that is the points where both $\frac{dx}{dt} = 0$ and $\frac{dy}{dt} = 0$.

The equilibrium points (0,0), (80, 0), (0,90) (20,30)

(0,0), (80,0), (0,90) from picture.

For the fourth
Y1 = (80 − X)/2
Y2 = 90 − 3X

Xmin = 0
Xmax = 30
2nd calc 5: intersect
X = 20, Y = 30

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

$x(100) \approx$ 80 $y(100) \approx$ 0