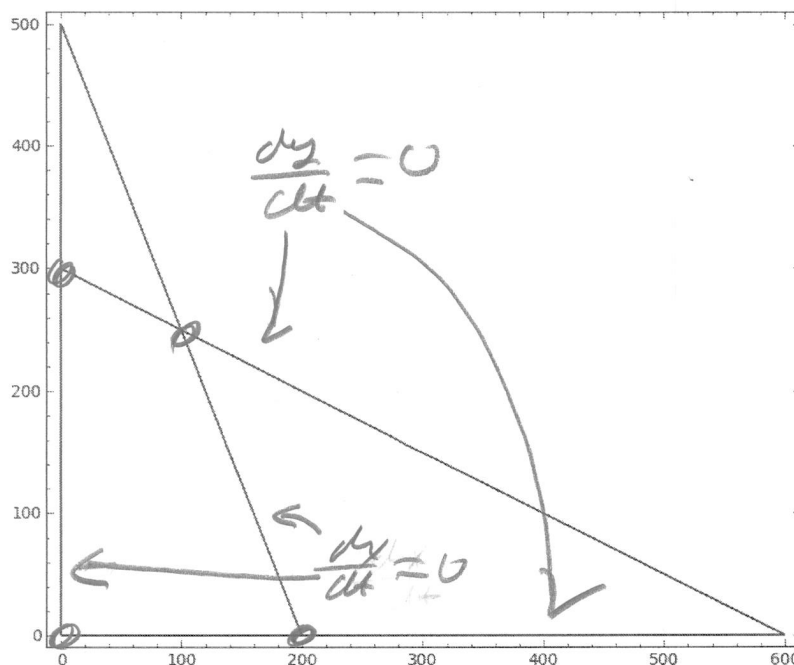Quiz # 24   Name: _____ Key _____

You must show your work to get full credit.

Consider the system of differential equations

$$\frac{dx}{dt} = .4x(200 - x - .4y)$$

$$\frac{dy}{dt} = .3y(300 - .5x - y)$$

1. Label the two lines where $\dfrac{dx}{dt} = 0$.

2. Label the two lines where $\dfrac{dy}{dt} = 0$.

3. What are the equilibrium points? That is what are the points where both $\dfrac{dx}{dt} = 0$ and $\dfrac{dy}{dt} = 0$. (The answers are points, that is ordered pairs (x, y).)

$$X + .4y = 200 \quad (1)$$
$$.5X + y = 300 \quad (2)$$
$$\times 2 \left[\rightarrow X + 2y = 600 \quad (3) \right.$$
$$1.6y = 400 \quad (3)-(2)$$
$$y = \frac{400}{1.6} = 250$$

(1) Equilibrium points are $(0,0), (200,0), (0,300),$

$(100,250)$

$$X = 200 - .4y$$
$$= 200 - (.4)(250)$$
$$= 100$$