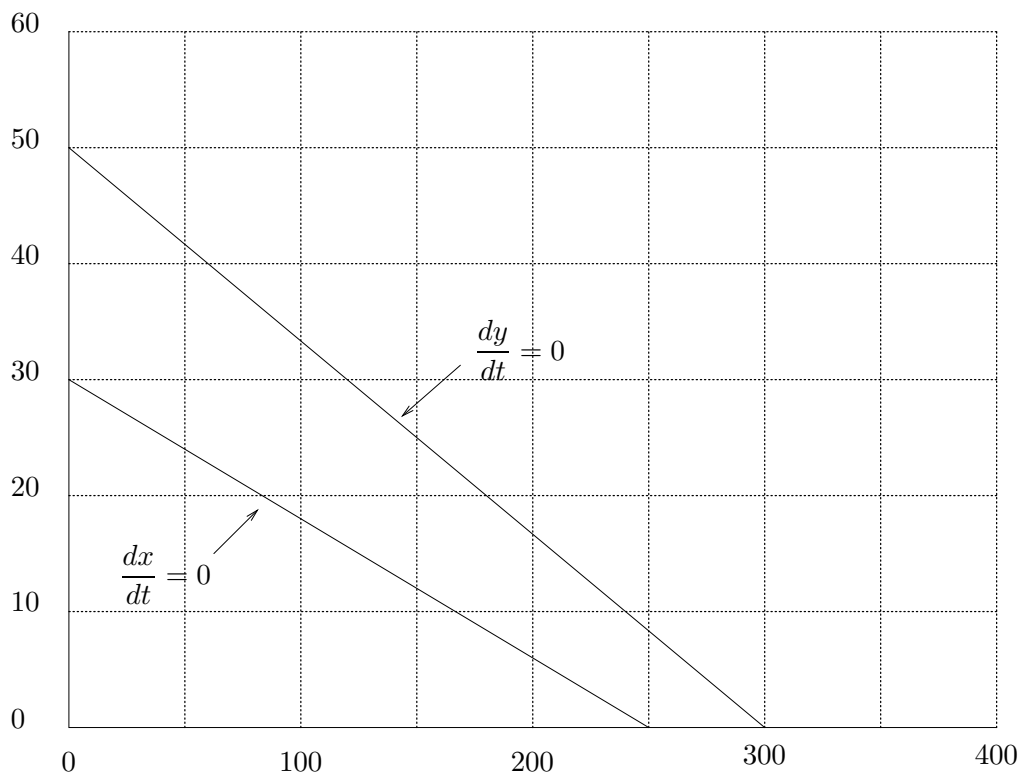


Homework assigned Friday, October 29

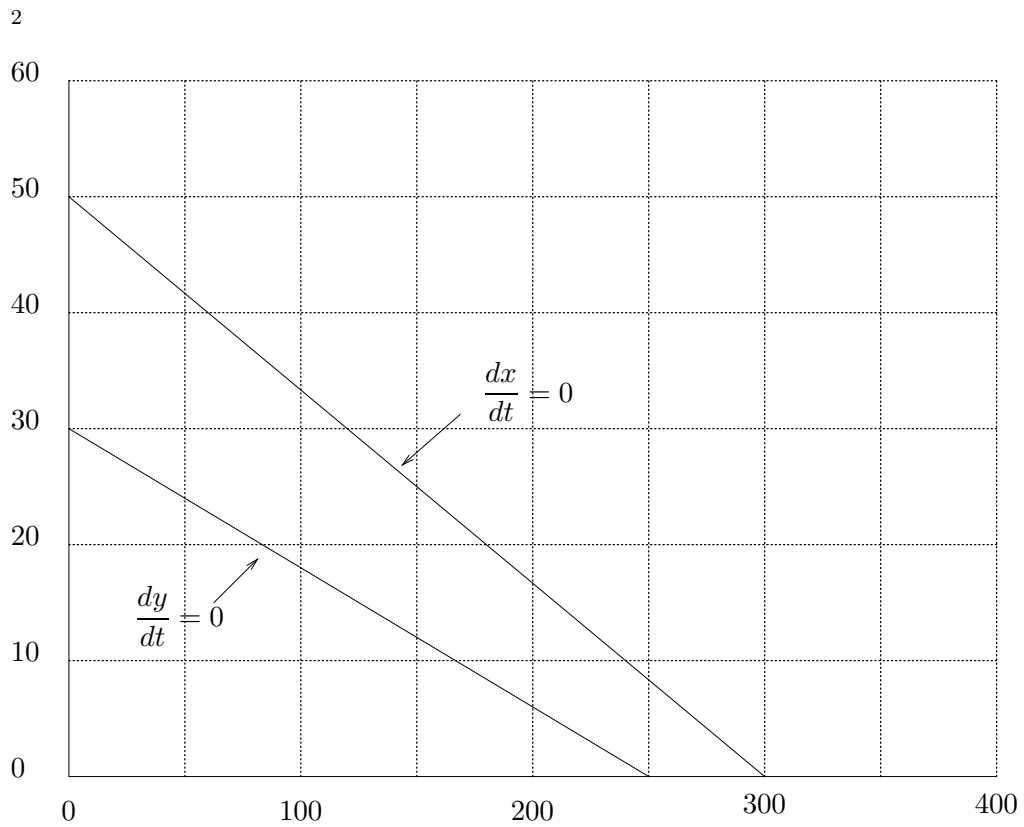
In the following problems we have the equations

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

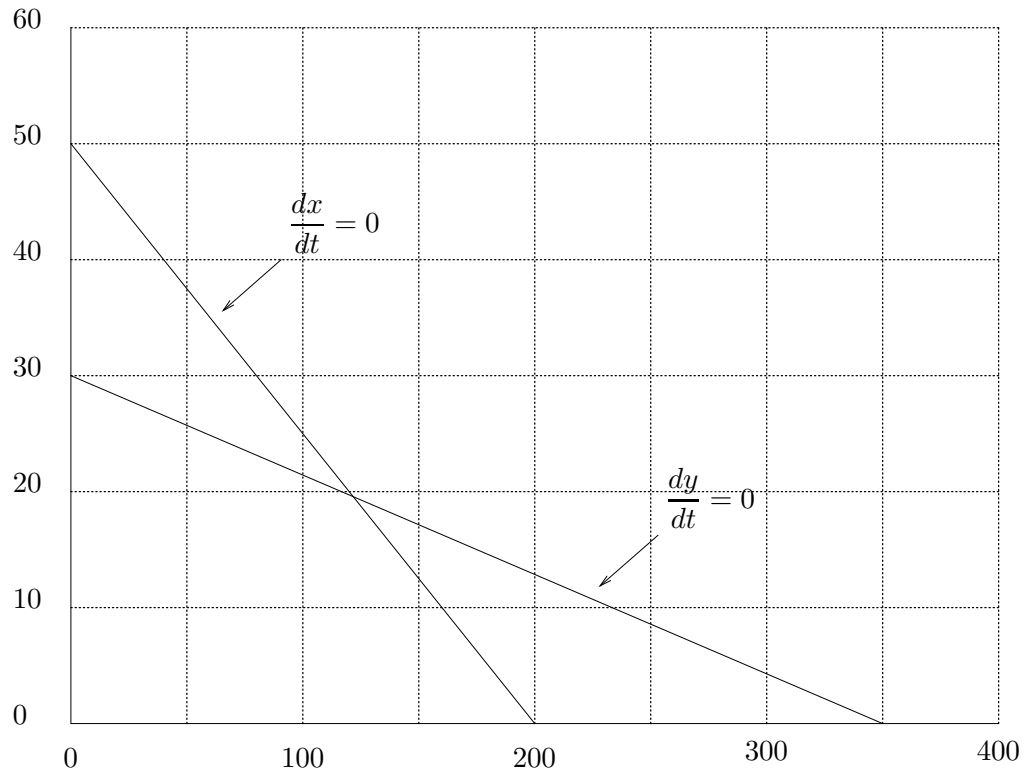
for competition between two species. Answer the questions based on the following pictures.



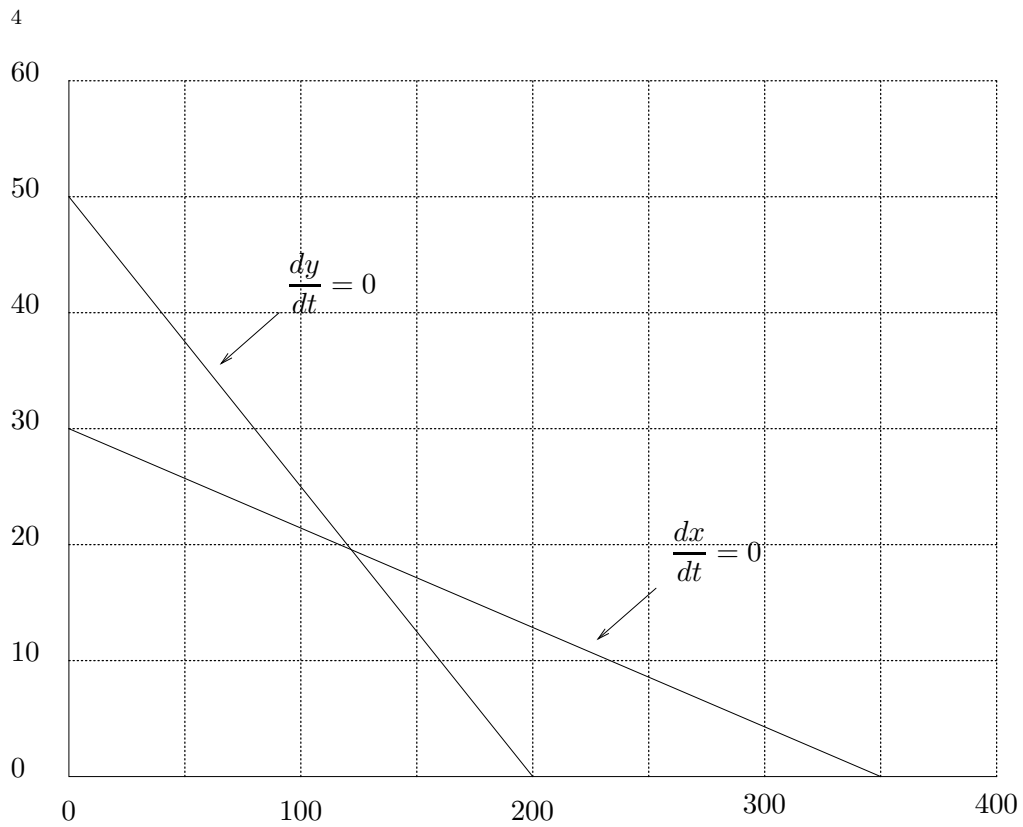
- (1) What is the carrying capacity for the x -species with the absence of the y -species?
- (2) What is the carrying capacity for the y -species with the absence of the x -species?
- (3) Draw in arrows in the figure showing the directions that x and y are changing.
- (4) If $x(0) = 10$ and $y(0) = 20$ estimate $x(100)$ and $y(100)$.



- (1) What is the carrying capacity for the x -species with the absence of the y -species?
- (2) What is the carrying capacity for the y -species with the absence of the x -species?
- (3) Draw in arrows in the figure showing the directions that x and y are changing.
- (4) If $x(0) = 10$ and $y(0) = 20$ estimate $x(100)$ and $y(100)$.



- (1) What is the carrying capacity for the x -species with the absence of the y -species?
- (2) What is the carrying capacity for the y -species with the absence of the x -species?
- (3) Draw in arrows in the figure showing the directions that x and y are changing.
- (4) If $x(0) = 80$ and $y(0) = 5$ estimate $x(100)$ and $y(100)$.



- (1) What is the carrying capacity for the x -species with the absence of the y -species?
- (2) What is the carrying capacity for the y -species with the absence of the x -species?
- (3) Draw in arrows in the figure showing the directions that x and y are changing.
- (4) If $x(0) = 300$ and $y(0) = 5$ estimate $x(100)$ and $y(100)$.
- (5) If $x(0) = 5$ and $y(0) = 45$ estimate $x(100)$ and $y(100)$.