Homework assigned Wednesday, October 27

A pond contains two types of small fish, guppies and swordtails are released in a pond.

$$x(t) = \text{Number of guppies after } t \text{ months after release.}$$
$$y(t) = \text{Number of swordtails after } t \text{ months after release.}$$

Assume these satisfy the **Lotka-Volterra** equations:

$$\frac{dx}{dt} = .7x \left(\frac{900 - x - .8y}{900} \right)$$
$$\frac{dy}{dt} = .4x \left(\frac{600 - y - .5x}{600} \right)$$

Based on these equations answer the following

(1) What is the carrying capacity for the guppies, if there are no swordtails present?

(2) What is the carrying capacity for the swordtails, if there are no guppies present?

(3) Make a graph x, y space showing the lines where $\dfrac{dx}{dt} = 0$ and $\dfrac{dy}{dt} = 0$.

(4) Find the point where these lines intersect.

(5) Put in arrows showing the direction that things are moving as we did in class.

(6) Try to figure out what happens to $x(t)$ and $y(t)$ when t is large. What is $x(100)$ and $y(100)$.