Mathematics 172

Quiz 24 Name: Key

You must show your work to get full credit.

For the predator-prey system

$$\frac{dx}{dt} = .1\left(1 - \frac{x}{200}\right) - .02xy \quad = x\left(.1\left(1-\frac{x}{200}\right) - .02y\right)$$

$$\frac{dy}{dt} = -.3y + .02xy \quad = y(-.3 + .02x)$$

1. What are the carrying capacity and per capita growth rate for the prey species?

$K =$ 200 $r =$ .1

2. What is the per capita death rate for the predator species.

The rate is .3

3. Find all the rest points. The rest points are (0,0), (200,0), (15, 4.625)

We know from the biology from (0,0), (200,0) are rest points.

To get the third solve

$-.3 + .02x = 0$ (1)

$.1\left(1 - \frac{x}{200}\right) - .02y = 0$ (2)

From (1) $x = \frac{.3}{.02} = 15$

use this in (2) $.1\left(1 - \frac{15}{200}\right) - .02y = 0$

$$y = \frac{.1\left(\frac{185}{200}\right)}{.02} = 4.625$$

4. Draw the phase space: