

Mathematics 172

Quiz #18

Name: Key

*You must show your work to get full credit.*

Consider the predator-prey system

$$R' = .05R - .01RC$$

$$C' = -.4C + .02RC$$

where  $R = R(t)$  is the number of prey (the **resource**) and  $C = C(t)$  is the number of predators (the **consumers**).

Find the two equilibrium points of this system.

$$\underline{(R, C) = (0, 0)} \quad 1 \text{ pt}$$

We want to solve

$$\underline{(R, C) = (20, 5)} \quad 1 \text{ pt}$$

$$\begin{array}{l} 2 \text{ pts} \\ \text{for} \\ \text{setup} \end{array} \left\{ \begin{array}{l} .05R - .01RC = R(.05 - .01C) = 0 \\ -.4C + .02RC = C(-.4 + .02R) = 0 \end{array} \right. \begin{array}{l} 1 \text{ pt} \\ \text{for factoring} \end{array}$$

From the first we get

$$R = 0 \quad \text{or} \quad C = \frac{.05}{.01} = 5$$

From the second

$$C = 0 \quad \text{or} \quad R = \frac{.4}{.02} = 20$$