Quiz 25   Name: _____Key_____

You must show your work to get full credit.

For the predator-victim system

$$\frac{dV}{dt} = .05V - .001VP \quad = V(.05 - .001P)$$

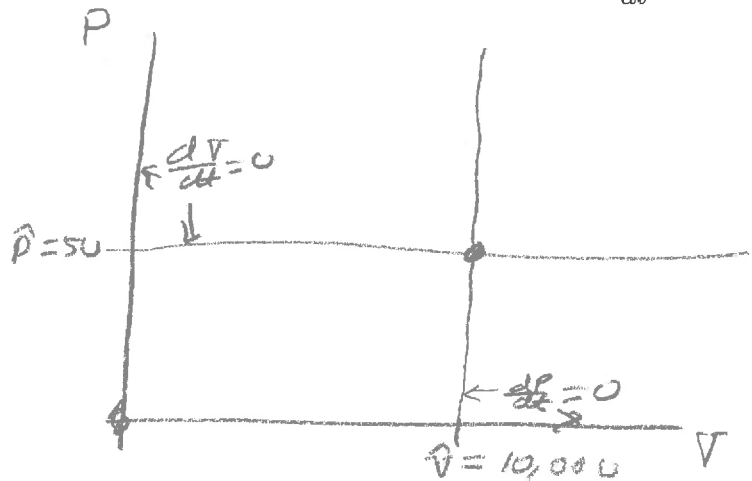$$\frac{dP}{dt} = -2P + .0002VP \quad = P(-2 + .0002V)$$

1. Draw the phase space (V on x-axis and P on y-axis), show and label the lines where $\frac{dV}{dt} = 0$ and $\frac{dP}{dt} = 0$.

$\frac{dV}{dt} = V(.05 - .001P) = 0$

$\quad V = 0 \quad P = \hat{P} = \frac{.05}{.001} = 50$

$\frac{dP}{dt} = P(-2 + .0002V) = 0$

$\quad P = 0 \quad V = \hat{V} = \frac{2}{.0002} = 10,000$

The rest points are $(0,0), (10000, 50)$

2. What are the average number of victims and predators?

$\hat{V} = $ _____10,000_____ $\hat{P} = $ _____50_____

3. What happens to the average number of victims and predator if the intrinsic growth rate of the victims is doubled?

New $\hat{V} = $ _____10,000_____   New $\hat{P} = $ _____100_____

The intrinsic growth rate is $r = .05$ and only occurs in the equation for $\frac{dV}{dt}$. Doubling to the value $2(.05) = .1$ gives $\hat{P} = \frac{.1}{.001} = 100$, The value of $\hat{V}$ stays the same.