Quiz 26   Name:_____Key_____

You must show your work to get full credit.

For the predator-victim system

$$\frac{dV}{dt} = .1V\left(1 - \frac{V}{500}\right) - .01VP$$

$$\frac{dP}{dt} = -.2P + .002VP$$

where V is the size of the victim population, and P is size of the predator population.

1. What is per capita growth rate of then victim population. $r =$ ___.1___

2. What is the carrying capacity of the victim population if there are no predators.

    If $P = 0$ $\frac{dV}{dt} = .1V\left(1 - \frac{V}{500}\right)$ $K =$ ___500___

    logistic with $K = 500$

3. What is the per capita death rate of the predator population if there are no victim?

    If $V = 0$

    $\frac{dP}{dt} = -.2P$ exponential decay with rate $-.2$ Rate is ___.2___

4. Find the rest points of the system.   Rest points are: ___(0,0), (500,0), (100, 8)___

$\frac{dV}{dt} = V\left(.1\left(1 - \frac{V}{500}\right) - .01P\right) = 0$

    so $V = 0$ or

(*) $.1\left(1 - \frac{V}{500}\right) - .01P = 0$

$\frac{dP}{dt} = P(-.2 + .002V) = 0$

    $P = 0$ or $V = \frac{.2}{.002} = 100$

If $P = 0$ we set $V = 0$ or

        $.1\left(1 - \frac{V}{500}\right) = 0$

        $V = 500$

    so (0,0), (500,0). are rest points

If $V = 100$, use this in (*)

    $.1\left(1 - \frac{100}{500}\right) - .01P =$

        $P = 8$