Quiz 31   Name:_____Key_____

You must show your work to get full credit.

In the predator-victim system

$$\frac{dV}{dt} = .3V\left(1 - \frac{V}{200}\right) - 2VP = V\left(.3V\left(1 - \frac{V}{200}\right) - 2P\right)$$

$$\frac{dP}{dt} = -5P + .02VP = P(-5 + .02V)$$

1. If there are no predators present, then what is the carrying capacity of the victims?

When $P = 0$

$\frac{dV}{dt} = .3V\left(1 - \frac{V}{200}\right)$ The carrying capacity is _____200_____

which is bounded with $K = 200$

2. Draw the phase space and use it to explain why in this system the predators always die out.

First find where $\frac{dV}{dt} = V\left(.3\left(1 - \frac{V}{200}\right) - 2P\right) = 0$

This gives $V = 0$ or $.3\left(1 - \frac{V}{200}\right) - 2P = 0$

The second of this has V intercept (ie where $P = 0$)

when $.3\left(1 - \frac{V}{200}\right) = 0$. That is $(V,P) = (200, 0)$
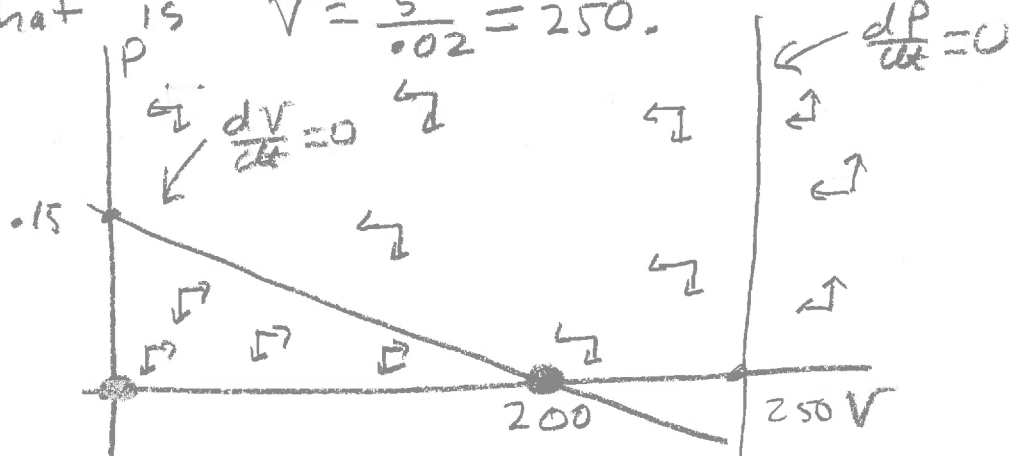
is one intercept. For the other intercept,

$V = 0$ so $.3 - 2P = 0$ $P = \frac{.3}{2} = .15$

For the second equation

$\frac{dP}{dt} = P(-5 + .02V) = 0$ so $P = 0$ or $-5 + .02V = 0$

That is $V = \frac{5}{.02} = 250$.

So the only stable equ. pt is $(200, 0)$.
Thus P will end up at zero. That
is the predator dies out.