**Mathematics 172**

**Quiz #5** Name: Key

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

Due to fishing pressure, the intrinsic rate of growth for a population of bass in a lake is $r = -.05$. The South Carolina Department of Natural Resources would like to have a stable population of 10,000 fish in the lake. At what rate should the lake be stocked?

Rate of stocking = 500

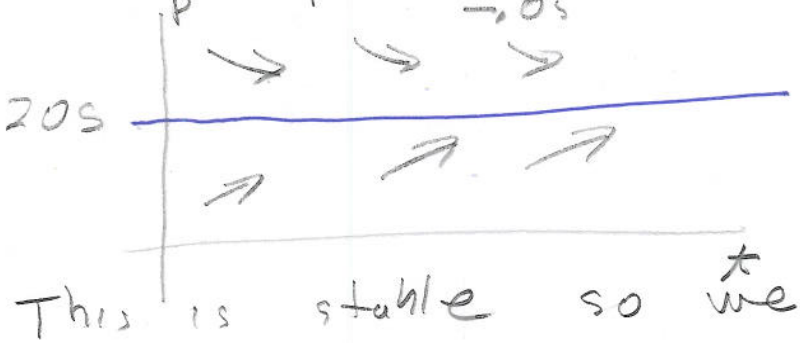
Let $P(t)$ = size of fish population after $t$ years.

Let $S$ = rate lake is stocked (given in fish/year)

Then the rate equation for $P(t)$ is

$$\frac{dP}{dt} = -.05P + S$$

To find the equilibrium points set $-.05P + S = 0$ and solve for $P$. This gives $P = \frac{-S}{-.05} = 20S$




This is stable so we want

$20S = 10{,}000$

$S = \frac{10{,}000}{20} = \underline{\underline{500}}$ fish/year.