

Quiz #10

Name: Key

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

Fish are being raised in a polluted such that the intrinsic rate of growth is  $r = -0.2$  (fish/fish)/month. Let  $N(t)$  be the number of fish in the pond after  $t$  months. As  $r$  is negative this is decreasing exponentially. To keep the fish from dieing out he pond is stocked are a rare of 100 fish/month.

1. Write the rate equation satisfied by  $N$  if there is no stocking

$$\frac{dN}{dt} = rN = -0.2N \qquad \frac{dN}{dt} = \underline{-0.2N}$$

2. Write the rate equation satisfied by  $N$  if there there stocking at a continuous rate of 100 fish/month.

$$\frac{dN}{dt} = -0.2N + 100 \qquad \frac{dN}{dt} = \underline{-0.2N + 100}$$

3. Which stocking what is the stable population size?

Stable population size is 500

solve

$$\begin{aligned} \frac{dN}{dt} &= -0.2N + 100 = 0 \\ -0.2N &= -100 \\ N &= \frac{100}{0.2} = 500 \end{aligned}$$

