Mathematics 172

Quiz # 10 Name: Key

You must show your work to get full credit.

A small pond has a population of bluegill. Let $N(t)$ be the number of bluegill after t years. Due to fishing pressure and predation by bass the intrinsic growth rate of the bluegill population has an intrinsic growth rate of $r = -.1$.

1. What is the rate equation satisfied by $N(t)$? (Note a rate equation is an equation, so it will have an equal sign in it) and have a rate (i.e. derivative) in it.

Rate equation is $\frac{dN}{dt} = -.1N$

2. The farmer that owns the pond, decides to stock the pond with bluegill to keep the population from dying out. If she stocks at a rate for S fish/year what is the new rate equation satisfied by N?

New rate equation is $\frac{dN}{dt} = -.1N + S$

3. At what rate (that is what is the value of S) should the farmer stock the pond to have a stable population of 1,000 bluegill?

Set $-.1N + S = 0$

solve for N

$N = \frac{S}{.1}$

we want this to be 1000

so $\frac{S}{.1} = 1000$

$S = (.1)(1000) = 100$

$S =$ 100