Mathematics 172

Quiz 4 Name: Key

You must show your work to get full credit.

Largemouth bass breed once a year. Thus without constraints on the growth rate we would expect the size of a population of bass to grow in a discrete exponential manner.

A pond is stocked with 50 largemouth bass. Two years later the number of bass in the pond is 200.

(1) Find a formula for the number of bass, N_t, in the pond t years after the initial stocking.

The formula for discrete exponential growth is $N_t = N_0 \lambda^t$.

In our case $N_0 = 50$ so $N_t = 50\lambda^t$

But $N_2 = 50\lambda^2 = 200$

so $\lambda^2 = \frac{200}{50} = 4$

Thus $\lambda = 2$

$N_t =$ $N_t = 50(2^t)$

(2) What is the yearly percent increase of the bass population in the pond?

$N_{t+1} = 50(2)^{t+1}$

$= 2 \cdot 50(2)^t$

$= 2N_t$

Thus the population doubles each year

Thus the percent increase is 100%

Percent increase = 100%

(3) How many years until the size of the bass population in the pond is 3,200?

We want to solve

$N_t = 50(2^t) = 3200$

$2^t = 3200/50$

$t \ln(2) = \ln(3200/50)$

$t = \ln(3200/50)/\ln(2) = 6$

$t =$ 6 years.