Mathematics 172

Quiz 15 **Name:** Key

You must show your work to get full credit.

1. Define N_t by

$$N_{t+1} = 10 - .8N_t, \qquad N_0 = 12$$

Compute the following

$N_1 = 10 - .8(12) = 0.4$ $N_1 =$ 0.4

$N_2 = 10 - .8(.4) = 9.68$ $N_2 =$ 9.68

$N_3 = 10 - .8(9.68) = 2.256$ $N_3 =$ 2.256

2. A lake is over fished so that its intrinsic growth rate of the bass in the lake is $r = -.3$(bass/year)/bass.

(a) If the lake starts with a population of 6,000 bass, what is the formula for the number, $N(t)$ of bass in the lake after t years and how many are there after 10 years.

$N(t) =$ $6000\, e^{-3t}$ $N(10) =$ $298.7 \approx 299$ bass

$N(t) = N_0 e^{rt}$

$= 6000 e^{-.3t}$

$N(10) = 6000 e^{-.3(10)}$

$= 298.7$

(b) At what rate should the lake be stocked to have a stable population of 30,000 bass. Let S = stocking rate

Then $\frac{dN}{dt} = -.3N + S$ Stocking rate is 9000 bass / year

We want $N = 30{,}000$ to be an equilibrium point

So $-.3(30{,}000) + S = 0$

$S = .3(30{,}000) = 9000$