Mathematics 172

Quiz #7 Name: Key

You must show your work to get full credit.

Assume a population of guppies (a type of small fast breading fish) are in a polluted pond. A group of students form a biology class studies the effects of the pollution on the size of the guppy population. Let N be the number of guppies in the pond t weeks after they start the study. In this setting it is not unreasonable to assume N the satisfies the equation $N' = rN$ where r is the per capita growth rate. The students find $N(0) = 640$ and $N(2) = 590$.

1. Find the per capita growth rate r. $r =$ $-.04067$

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

$= 640 e^{rt}$

$N(2) = 640 e^{2r} = 590$

$e^{2r} = 590/640$

$2r = \ln(590/640)$

$r = \ln(590/640)/2 =$

2. Give a formula for $N(t)$. $N(t) = 640 e^{-.04067t}$

3. How long until the population of the guppies is just 10% of of its original value of $N(0)$.

$640 e^{-.04067t} = .1(640)$ Time to 10% 56.62 weeks

$e^{-.04067t} = .1$

$-.04067t = \ln(.1)$

$t = \ln(.1)/(-.04067) = 56.62$