Mathematics 172

Quiz 8 Name: Key

You must show your work to get full credit.

A population of guppies is introduced into a small backyard pond. If $N(t)$ is the number of guppies after t months, then population grows according to a modified logistic equation

$$\frac{dN}{dt} = .3N\left(1 - \left(\frac{N}{500}\right)^2\right)$$

Once the population size becomes stable, the children of the household decide to make some money by selling some the guppies to a pet store. What is the maximum rate they can harvest the guppies without killing off the population of guppies. (Describe briefly what you did on the calculator to get the answer.)

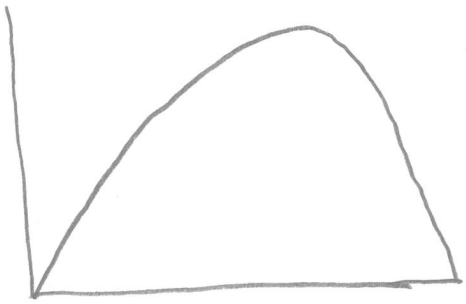
Maximum harvesting rate is: 57.735

First graph $\frac{dN}{dt}$ as a function of N.

$Y_1 = .3X(1-(X/500)^2)$

$X_{min} = 0$

$X_{max} = 500$



Now Find the maximum of $\frac{dN}{dt} = .3N\left(1-\left(\frac{N}{500}\right)^2\right)$

2nd Calc

4: maximum

Set a left bound a right bound and a Guess. This gives a max of $Y = 57.735$