

Mathematics 172

Quiz #11

You must show your work to get full credit.

A population grows logistically with  $r = .5$  and  $K = 1,000$ . At some time the population is harvested at a rate of 100.

(1) What is the new rate equation?

$$\frac{dN}{dt} = \underbrace{.5N\left(1 - \frac{N}{1000}\right)}_{\text{logistic part}} - \underbrace{100}_{\text{harvesting rate}}$$

(2) What is the new stable population size?

First solve

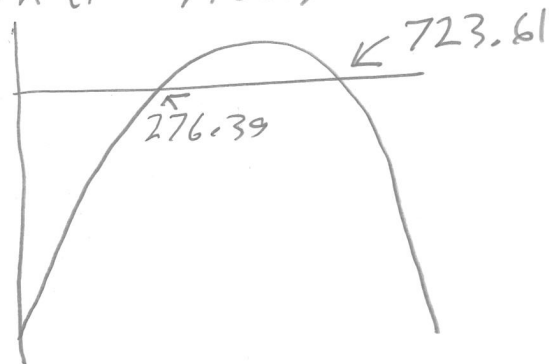
$$\frac{dN}{dt} = .5N\left(1 - \frac{N}{1000}\right) - 100 = 0.$$

by setting  $y = .5x(1 - x/1000) - 100$

$$x_{\min} = 0$$

$$x_{\max} = 1000$$

using ~~zero~~ ~~fit~~  
to set



Use 2nd calc: zero to set the roots  $N = 276.39$  and  $N = 723.61$

