Mathematics 172

Quiz # 15 Name: Key

You must show your work to get full credit.

A pet shop owner breeds mice to feed to her reptiles. When the colony of nice is started it grows logistically with an intrinsic growth rate of $r = .2$ (mice/month)/mouse and a carrying carrying capacity of $K = 100$. Let $N(t)$ be the number of mice after t months.

1. What is the rate equation $N(t)$?

$$\frac{dN}{dt} = .2N\left(1 - \frac{N}{100}\right)$$

2. Once the colony is established she starts harvesting the mice at a continuous rate of 3 mice/month.

(a) What is the new rate equation satisfied by N?

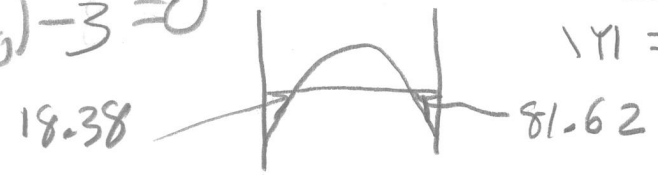
$$\frac{dN}{dt} = .2N\left(1 - \frac{N}{100}\right) - 3$$

(b) What are the equilibrium points of this equation?

Solve $.2N(1 - \frac{N}{100}) - 3 = 0$

Equilibrium points are: 18.38, 81.62

$Y1 = .2X(1 - X/100) - 3$



(c) What is the new stable population size of the mouse colony?

Stable population size is: 81.62