Mathematics 172

Quiz 16 Name: Key

You must show your work to get full credit.

A population of 50 mosquito fish are released in a deserted swimming pool. Let $P(t)$ be the number of mosquito fish in the pool t weeks after it is stocked. Assume the population grows logistical by the equation

$$\frac{dP}{dt} = .2P\left(1 - \frac{P}{800}\right) = rP\left(1 - \frac{P}{K}\right)$$

(a) What is the intrinsic growth rate? Be sure to give units.

$r =$ (.2 fish/fish)/week

(b) What is the carrying capacity? Give units.

$K =$ 800 fish

(c) Estimate how many fist are in the pool 3 days after the it is stocked. *Hint:* 3 days is $3/7 = .429$ weeks.

$P(0) = 50$ 50

$P'(0) = .2P(0)\left(1 - \frac{P(0)}{800}\right)$

$= .2 * 50(1 - 50/800)$

$= 9.375$

$P(.429) \approx P(0) + P'(0)(.429)$

$= 50 + (9.375)(.429)$

$= 54.116$

$P(.429) \approx$ 54.116 fish

(d) Estimate how many fish are in the pond after 3 months (= 90 days).

After this length of time the population should have settled down to the the carrying capacity $K = 800$

$P(90) \approx$ 800 fish