Mathematics 172

Quiz 34 Name: Key

You must show your work to get full credit.

1. A 6 inch carp weights .2 pounds.

(a) Estimate the weight of a 20 inch carp. Weight ≈ 7.407 lbs.

$W = kL^3$ for some constant k.
when $L = 6$, $W = .2$ so
$.2 = k(6)^3$
Thus $k = \frac{.2}{6^3} = .0009259$
so $W = .0009259L^3$

Let $L = 20$
$W = .0009259(20)^3$
$= 7.407$

(b) Estimate the length of a 15 pound carp. Length ≈ 25.303 lbs

From (a) Let $W = 15$ in $W = .0009259L^3$
$15 = .0009259L^3$
$L^3 = 15/.0009259$
$L = (15/.0009259)^{(1/3)} = 25.303$

2. A population of bluegill in a small pond has a discrete logistic growth rate with a per capita growth rate of .3 fish/fish and a carrying capacity of 800 fish. Let P_t be the number of fish t years after the pond is first stocked.

(a) What is the formula for P_{t+1} in terms of P_t? $P_{t+1} = P_t + .3P_t\left(1 - \frac{P_t}{800}\right)$

(b) If $P_0 = 200$ (that is the pond is originally stocked with 200 fish) compute the following:

$P_1 = P_0 + .3P_0\left(1 - \frac{P_0}{800}\right)$
$= 200 + .3(200)\left(1 - \frac{200}{800}\right)$
$= 245$

$P_1 =$ 245

$P_2 = P_1 + .3P_1\left(1 - \frac{P_1}{800}\right)$
$= 245 + .3(245)\left(1 - \frac{295}{800}\right)$
$= 295.99$

$P_2 =$ 295.99

$P_3 = P_2 + .3P_2\left(1 - \frac{P_2}{800}\right)$
$= 295.99 + .3(295.99)\left(1 - \frac{295.99}{800}\right)$
$= 351.93$

$P_3 =$ 351.93