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

If L = length, W = weight, then $W = kL^3$ for some k.
When $L=6$, $W=.2$ so
$.2 = k(6)^3$
Thus $W = \frac{.2}{6^3} = .00092593$

Thus $W = .00092593 L^3$.
When $L=20$ this gives
$W = .00092593(20)^3$
$= 7.407$

(b) Estimate the length of a 15 pound carp. Length ≈ 27.85 in

From (a) we have
$W = .00092593 L^3$
Let $W=15$ and solve for L
$20 = .00092593 L^3$
$L^3 = 20/(.00092593)$

$L = (20/(.00092593))^{(1/3)}$
$= 27.85$ in

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:

$P_1 = P_0 + .3P_0\left(1 - \frac{P_0}{800}\right)$
$= 200 + .3(200)\left(1 - \frac{200}{800}\right)$
$= 295$

$P_1 =$ 295

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

$P_2 =$ 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