

Mathematics 172

Quiz #32

Name: Key

*You must show your work to get full credit.*

1. A pond contains both bluegills (victims) and bass (prey).  $V$  be the number of blue gill and  $P$  the number of bass. Let the  $f(V, P)$  be the number of times a day that there is an encounter between a bass and a bluegill. It is reasonable to assume that if the number of bass is doubled then  $f(V, P)$  is doubled. And if the number of bass is tripled, then the number  $f(V, P)$  is tripled. We can made similar claims about doubling and tripling the number of bluegill. If  $f(50, 3) = 2$  give a formula for  $f(V, P)$ .

The conditions imply  $f(V, P) = \underline{.01333 VP}$

$f(V, P) = CVP$  for some constant  $C$ .

To find  $C$  use  $f(50, 3) = 2$ . so

$$f(50, 3) = C(50)(3) = 2$$

$$C = \frac{2}{(50)(3)} = .01333$$

2. The weight in pounds,  $w$ , of a bass is proportional to the cube of its length in inches  $l$ . If a 14 in bass weights 1.2 lbs, then what is the length of a 2 pound bass?

We know there is a constant  $C$  such that Length is 16.60 in.

a constant  $C$  such that

$$w = Cl^3$$

using that when  $l = 14$ ,  $w = 1.2$  we find

$$1.2 = C(14)^3$$

$$C = \frac{1.2}{(14)^3}$$

Thus

$$w = \frac{1.2 l^3}{(14)^3}$$

when  $w = 2$

$$2 = \frac{(1.2) l^3}{(14)^3}$$

$$l^3 = \frac{2(14)^3}{1.2}$$

$$l = \left( \frac{2(14)^3}{1.2} \right)^{\frac{1}{3}} = \left( \frac{2}{1.2} \right)^{\frac{1}{3}} (14)$$

$$= 16.598$$