

9. [12 points] Patrick has an aquarium that has fish of different colors. He has noticed that the lengths of each type of fish are related. Let  $B(z)$  be the length, in centimeters, of a blue fish that is  $z$  months old.

- a. [4 points] The length of a pink fish is always 25 percent shorter than the length of a blue fish of its same age. Let  $P(w)$  be the length, in centimeters, of a pink fish that is  $w$  **years** old. Find a formula for  $P(w)$  in terms of the function  $B$ .

*Solution:*

$$P(w) = 0.75B(12w)$$

- b. [4 points] The length of a green fish is equal to the length of a blue fish that is 4 months older. Let  $G(y)$  be the length of a green fish, **in millimeters**, that is  $y$  months old. Find a formula for  $G(y)$  in terms of the function  $B$ . *Note: 1 centimeter=10 millimeters.*

*Solution:*

$$G(y) = 10B(y + 4)$$

- c. [4 points] Patrick took some measurements of the lengths, in centimeters, of a blue and a black fish. Consider the following tables of values of the functions  $B(z)$  and  $F(z)$ , where  $F(z)$  is the length, in centimeters, of a black fish that is  $z$  months old.

$z$	2	4	6	8
$B(z)$	5	7	10	15

$z$	4	8	12	16
$F(z)$	2	4	7	12

Find a formula for  $F(z)$  in terms of the function  $B$ .

*Solution:*

$$F(z) = B\left(\frac{z}{2}\right) - 3$$