9. [12 points]

a. [6 points] Let $f(y)$ be the length of a trout (in inches) that is y years old and $g(d)$ be the weight (in lbs) of a trout of length d inches. Suppose that both f and g are invertible functions. Find a practical interpretation for the following mathematical expressions:

i) $g(17) = 3$

Solution: A trout that measures 17 inches weighs 3 lbs.

ii) $f^{-1}(7)$

Solution: The age of a trout in years that measures 7 inches.

iii) $g(f(7))$

Solution: The weight of a trout in lbs that is 7 in years old.

b. [6 points] Let $A(t)$ and $B(t)$ be the number of apple and pear trees in Michigan t years after 2005. Let $C(t)$ be the average harvest yield of apples per tree (in pounds per tree) in Michigan t years after 2005. Similarly, define $D(t)$ to be the average harvest yield of pears per tree (in pounds per tree) in Michigan t years after 2005. Find mathematical expressions using the functions $A(t)$, $B(t)$, $C(t)$ and $D(t)$ for each of the following quantities:

i) The number of apple and pear trees in Michigan in 2013.

Solution: $A(8) + B(8)$

ii) The total number of pounds of apple harvested in Michigan in 2005.

Solution: $A(0)C(0)$

iii) The average harvest yield of pears per tree (in pounds per tree) in Michigan k **decades after 2010** (1 decade = 10 years).

Solution: $D(5 + 10k)$