2.1 Compositions of Functions   Name: _____
PreAP Pre-Calculus

In Exercises 1, find (a) $g \circ f(3)$**, (b)** $f \circ g(1)$**, and (c)** $f \circ f(0)$

1. $f(x) = 3x - 2$ $g(x) = x^2$

In Exercises 2-5, write and simplify an equation for $f \circ g$ **and** $g \circ f$ **and find the domain of each.**

2. $f(x) = x^2$ $g(x) = x + 3$ 3. $f(x) = \dfrac{1}{x}$ $g(x) = \sqrt{x}$

4. $f(x) = x^2 - 5$ $g(x) = \sqrt{4x - 5}$ 5. $f(x) = \dfrac{1}{x-2}$ $g(x) = x + 3$

6. Sometimes it is easier to break a function down in order to see how it behaves. This will be an important strategy for you in Calculus.
   - In order to practice this skill, decompose each function, (x) , below into a composition of two functions, $g(x)$ and $h(x)$. In other words, you want $g \circ h \ (x) = (x)$.
   - After you define (x) and $h(x)$, solve $g \circ h(x)$ to verify that it equals $f(x)$.
   - Justify with a sentence why you made the choices for (x) and $h(x)$ that you did.
   - You may NOT use $h(x) = x$ or $g(x) = x$. (Construct an explanation for why using x would make this exercise too easy).

   a. $f(x) = (x+4)^3$ b. $f(x) = \sqrt{x^2 + 7x}$ c. $f(x) = x^3 + 4$