Name: _____ Date: _____ IB Math A&A SL

Lesson 1.7 – Combinations of Functions

Operations with Functions	**Composition of Functions**
Addition: *Subtraction:* *Multiplication:* *Division:*	*Composition:* *For example:* Let $f(x) = 2(x-14)^2$ and $g(x) = \|x+4\|$ $f\big(g(x)\big) =$ $g(f(x)) =$ $g(g(x)) =$

1. Given $f(x) = 2x^2 - 18$ and $g(x) = x + 3$, find the following. Simplify your answers.
   a. $(f+g)(x)$

   b. $(fg)(x)$

   c. $(\frac{f}{g})(x)$

   d. $f \circ g(x)$

   e. $g \circ f(x)$

   f. $f \circ f(x)$

2. Given $f(x) = x^2 + 1$ and $g(x) = \sqrt{x}$, find the following. Also state the domain.
   a. $(f + g)(x)$

   b. $(fg)(x)$

   c. $(\frac{f}{g})(x)$

   d. $f \circ g(x)$

   e. $g \circ f(x)$

   f. $f \circ f(x)$

3. Use the charts to the right to evaluate the following:

x	$f(x)$	$g(x)$
-4	3	10
-3	-4	-1
-2	0	4
-1	1	3
0	10	2
1	5	1
2	2	0
3	8	-5
4	-2	-2

a. $f \circ g(-2)$

b. $f(g(2))$

c. $g \circ g \circ g(-2)$

d. $f(4) + f(3)$

e. $g(f(-1))$

f. $f \circ f(-1)$

g. $f \circ g \circ f(-1)$

h. $f(0) - g(-2)$

i. $f \circ g(0) - f(1)$

4. Let $f(x) = 2 - x^2$, $g(x) = x + 1$. And $h(x) = \frac{2}{x}$. Evaluate the following functions:
   a. $f(g(3))$

   b. $(f - g)(-1)$

   c. $g \circ f(0)$

   d. $f \circ h(3t)$

   e. $g(g(2x - 1))$

   f. $f(g(h(1)))$

5. Find two functions "f" and "g" such that $f \circ g(x) = h(x)$. *(Answers may vary).*
   a. $h(x) = \frac{1}{(x+3)^3}$

   b. $h(x) = \sqrt{x^2 - 3}$

   c. $h(x) = 3(x - 2)^2$

6. Let $d(t)$ be the number of dogs in the United States in the year t, and let $c(t)$ be the number of cats in the United States in the year t, where $t = 0$ corresponds to 2000.
    a. Find the function $p(t)$ that represents the total number of dogs and cats in the United States.
    b. Interpret the value $p(5)$. (Write a verbal explanation).
    c. Let $n(t)$ represent the human population of the US in the year t, where $t = 0$ corresponds to 2000. Find and interpret $h(t) = \frac{p(t)}{n(t)}$.