Math 111 WS 6 Composite Functions

Name: _____

1. Suppose $f(x) = 3 - 2x^2$ and $g(x) = 9 - 6x$. Find $(f+g)(2)$, $(f-g)(2)$, $(f \cdot g)(-3)$, $\left(\frac{f}{g}\right)(-1)$ and $\left(\frac{g}{f}\right)(1)$.

2. Suppose $f(x) = 2x^2 + 3$ and $g(x) = \sqrt{-3x+1}$. Find $(f+g)(x)$ and $\left(\frac{f}{g}\right)(x)$. State the domain of each.

3. Suppose $f(x) = \frac{1}{\sqrt{2x+1}}$ and $g(x) = \frac{1}{5x^2+1}$. Find $(f-g)(x)$ and $\left(\frac{g}{f}\right)(x)$. State the domain of each.

4. Suppose $f(x) = 2x^2 - x + 3$. Find $f(2)$, $f(2+h)$, $f(2+h) - f(2)$, $f(a)$, $f(a+1)$, $f(x+h)$, and $f(x+h) - f(x)$.

5. Given the following functions, find $\dfrac{f(1+h) - f(1)}{h}$ and $\dfrac{f(x+h) - f(x)}{h}$.

   a. $f(x) = 3x - 4$

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

6. Suppose that $f(x) = 2x^2 - 3$ and $g(x) = 4x$. Find$(f \circ g)(1)$, $(g \circ f)(1)$, $(f \circ f)(-2)$, and $(g \circ g)(-1)$.

7. Suppose that $f(x) = x^2 + 3x - 1$ and $g(x) = 2x + 3$. Find $(f \circ g)(x)$ and $(g \circ f)(x)$.

8. Suppose that $f(x) = \dfrac{2}{x-2}$ and $g(x) = \dfrac{4}{2x-5}$. Find $(f \circ g)(x)$ and $(f \circ f)(x)$ and state the domain of each.

9. Suppose that $f(x) = \dfrac{1}{x+2}$ and $g(x) = \dfrac{4}{x-1}$. Find $f \circ g$ and $g \circ g$ and state the domain of each.

10. Find functions f and g such that $f \circ g = H$ if $H(x) = (x^2 + 1)^{50}$. In fact, find multiple solutions to this exercise.

11. Find functions f and g such that $f \circ g = H$ if $H(x) = \dfrac{1}{x+1}$. Again, find multiple solutions to this exercise.

12. The price p, in dollars, of a certain commodity and the quantity x sold obey the demand equation

$$p = -\frac{1}{5}x + 200 \qquad 0 \leq x \leq 1000$$

Suppose that the cost $C = \dfrac{\sqrt{x}}{10} + 400$

Assuming that all items produced are sold, find the cost C as a function of the price p.