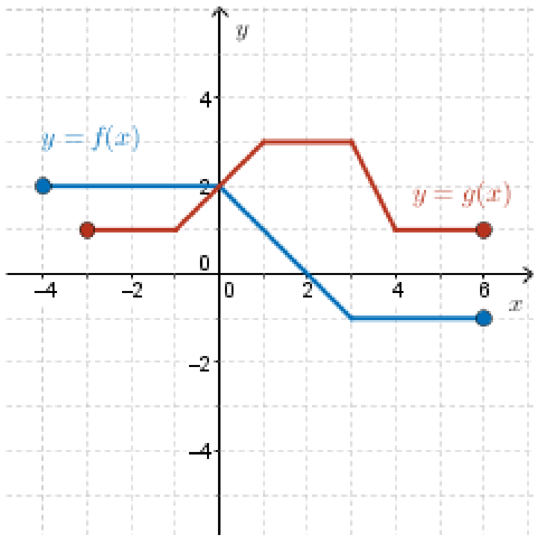
First Name:____________________ Last Name: __________________ Student ID: ________

Operations on Functions

1. Given the graphs of $y=f(x)$ and $y=g(x)$:



a. Draw the graph of $y= (f+ g)(x)$. State the domain and range.

b. Draw the graph of $y= (g−f)(x)$. State the domain and range.

2. If $f(x) = ax^2+ax−1$, $g(x) = bx^2+3x−5$ and $(f−g)(x) = 4x^2−ax+c$, determine the values of a, b, and c.

3. Given $f(x) = \sqrt{x}$ and $g(x) = 2x-4$:

a. Determine $(f \cdot g)(x)$, $(\frac{f}{g})(x)$, and $(\frac{g}{f})(x)$.

b. State the domain of $f(x)$, $g(x)$, $(f \cdot g)(x)$,$(\frac{f}{g})(x)$, and $(\frac{g}{f})(x)$.

4. Given $f(x) = \log_3(x+6)$ and $g(x) = x^2-4x$:

a. Determine $(f \cdot g)(x)$, $(\frac{f}{g})(x)$, and $(\frac{g}{f})(x)$, and state the domain of each function.

b. Evaluate $(f \cdot g)(-3)$ and $(f/g)(3)$.

c. Determine the x -intercepts of $y=(f \cdot g)(x)$ and $y=(g/f)(x)$

5. Given $f(x)=(\frac{1}{3})^{1-x}$, $g(x)=1-\log_3 x$, and $h(x)=\sqrt{2-x}$

a. Evaluate $h(g(1))$ and $f(g(2))$.

b. Find $(g \circ f)(x)$, $(h \circ g)(x)$, and $(g \circ h)(x)$ in simplest form and state the domain of each function.

c. Find x if $(f \circ h)(x)=9$

6. Consider the functions $f(x)=3x+3$ and $g(x) = \frac{5x+1}{2x-3}$,

Determine :

i. $(g \circ f)(x)$

ii. $(f \circ g)(x)$

iii. $f^{-1}(x)$

iv. $g^{-1}(x)$

v. $(g \circ g^{-1})(x)$

7.

a. Determine a possible function $g(x)$ given $f(x) = x^2+3x$ and $(f \circ g)(x) = 4x^2+2x-2$.

b. Determine a possible function $f(x)$ given $g(x) = x+1$ and $(f \circ g)(x) = x^2-6x+5$

8. Consider the function $h(x) = \sqrt{4-x} + 2\sqrt{x} - 4$.

a. State the domain of the function.

b. Determine the x -intercepts of the function.

c. Using the graphs of $f(x) = \sqrt{4-x}$ and $g(x) = 2\sqrt{x}-4$ sketch the graph of $y = h(x)$.