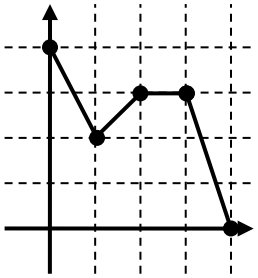
Worksheet 4 – Operations on Functions (§3.5)

1. Given the function $f = \{(-3,4), (-2,2), (-1,0), (0,1), (1,3), (2,4), (3,-1)\}$ and the function $g = \{(-3,-2), (-2,0), (-1,-4), (0,0), (1,-3), (2,1), (3,2)\}$, compute the following values.

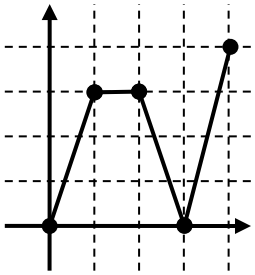
(a) $(f+g)(-3)$
(b) $(f-g)(2)$
(c) $(fg)(-1)$
(d) $(g-f)(3)$
(e) $\left(\frac{f}{g}\right)(-2)$
(f) $\left(\frac{g}{f}\right)(3)$

2. Use the graphs below to compute the following values.

(a) $(f+g)(1)$
(b) $(f-g)(2)$
(c) $(g-f)(3)$
(d) $(fg)(4)$
(e) $\left(\frac{f}{g}\right)(1)$
(f) $\left(\frac{g}{f}\right)(4)$



$f(x)$



$g(x)$

3. Compute $(f+g)(2)$, $(f-g)(-1)$, $(fg)\left(\frac{1}{2}\right)$, and $\left(\frac{f}{g}\right)(0)$.

(a) $f(x) = x^2 - x$, $g(x) = 12 - x^2$
(b) $f(x) = \sqrt{x+3}$, $g(x) = 2x - 1$
(c) $f(x) = 2x$, $g(x) = \frac{1}{2x+1}$
(d) $f(x) = x^2$, $g(x) = \frac{1}{x^2}$

4. Compute and simplify $(f+g)(x)$, $(f-g)(x)$, $(fg)(x)$, and $\left(\frac{f}{g}\right)(x)$.

(a) $f(x) = x^2$, $g(x) = 3x - 1$
(b) $f(x) = x^2 - 4$, $g(x) = 3x + 6$
(c) $f(x) = \frac{x}{2}$, $g(x) = \frac{2}{x}$
(d) $f(x) = x$, $g(x) = \sqrt{x+1}$

5. Given the function $f = \{(-3,4), (-2,2), (-1,0), (0,1), (1,3), (2,4), (3,-1)\}$ and the function $g = \{(-3,-2), (-2,0), (-1,-4), (0,0), (1,-3), (2,1), (3,2)\}$, compute the following values.

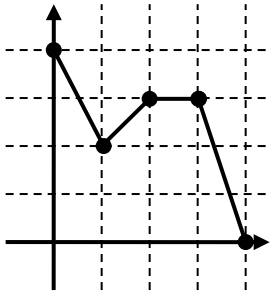
(a) $(f \circ g)(3)$ **(c)** $(g \circ f)(3)$ **(e)** $(g \circ f \circ g)(0)$

(b) $(f \circ f)(0)$ **(d)** $(g \circ g)(-2)$ **(f)** $f\left(f\left(f\left(f(f(1))\right)\right)\right)$

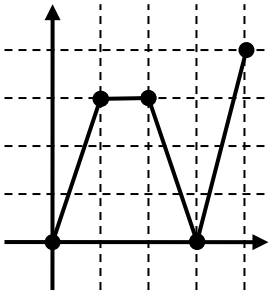
6. Use the graphs below to compute the following values.

(a) $(g \circ f)(1)$ **(c)** $(g \circ f)(2)$ **(e)** $(f \circ f)(1)$

(b) $(f \circ g)(3)$ **(d)** $(f \circ g)(0)$ **(f)** $(g \circ g)(1)$



$f(x)$



$g(x)$

7. For each given pair of functions, compute $(g \circ f)(0)$, $(f \circ g)\left(\frac{1}{2}\right)$, and $(f \circ f)(-2)$.

(a) $f(x) = 4 - 3x$, $g(x) = |x|$

(b) $f(x) = 4x + 5$, $g(x) = \sqrt{x}$

(c) $f(x) = 6 - x - x^2$, $g(x) = x\sqrt{x + 10}$

(d) $f(x) = \frac{3}{1-x}$, $g(x) = \frac{4x}{x^2+1}$

8. For each given pair of functions, compute and simplify $(g \circ f)(x)$, $(f \circ g)(x)$, and $(f \circ f)(x)$.

(a) $f(x) = 2x + 3$, $g(x) = x^2 - 9$

(b) $f(x) = x^2 - 4$, $g(x) = |x|$

(c) $f(x) = 3 - x^2$, $g(x) = \sqrt{x + 1}$

(d) $f(x) = \frac{x}{2x+1}$, $g(x) = \frac{2x+1}{x}$