

x	1	2	3	4	5	6
$f(x)$	2	4	4	6	3	1
$g(x)$	1	1	1	5	2	5
$h(x)$	4	4	3	1	2	2

1. Using the table above, evaluate the following:

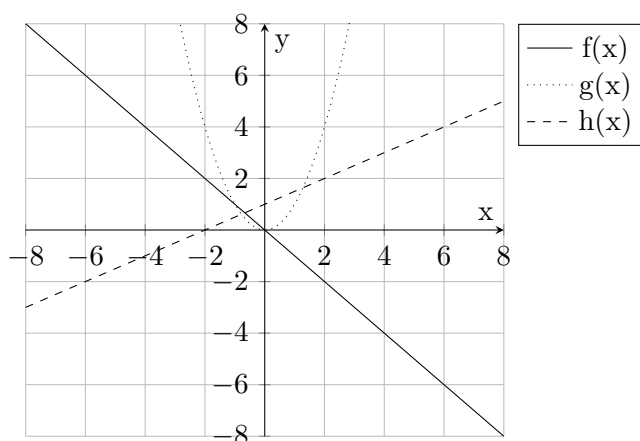
(a)  $f(h(f(1))) \div (f \circ g)(2)$

(c)  $g(f(3)) - h(h(2))$

(b)  $(h \circ g \circ f)(5)$

(d)  $(f \circ g)(h(f(4)))$

2. From the graphs of  $f$ ,  $g$ , and  $h$  below, estimate the values of  $g(f(h(x)))$  for  $\{x \in \mathbb{Z} \mid -3 \leq x \leq 3\}$ .



3. From  $f$  and  $g$  defined below, evaluate each expression or state why it is undefined.

$$f(x) = -|x + 2| - 3, \quad g(x) = \begin{cases} -x & \text{if } x < 0 \\ x^2 & \text{if } x \geq 0 \end{cases}$$

(a)  $(f \circ g)(3) - g(f(2))$

(c)  $(f \circ f)(-3) \div g(2)$

(b)  $(fg)(-2) + g(-6)$

(d)  $\left(\frac{f}{g}\right)(0)$

4. For each part, find the following functions and their domains:  $(f \circ g)$ ,  $(g \circ f)$ ,  $(f \circ f)$ , and  $(g \circ g)$ .

(a)  $f(x) = x^2$ ,  $g(x) = 2x - 1$

(b)  $f(x) = \sqrt{x^2 - \frac{1}{2}}$ ,  $g(x) = \sin(x)$

5. Find  $f \circ g \circ h$ .

(a)  $f(x) = \sqrt{\frac{1}{1-x^2}}$ ,  $g(x) = e^{2x}$ ,  $h(x) = \sin(x)$

(b)  $f(x) = \tan(x)$ ,  $g(x) = \tan^{-1}(x)$ ,  $h(x) = e^x$

6. Express each function in the form  $f \circ g$ :

(a)  $A(x) = \ln\left(\frac{1}{x^{\frac{1}{x}}}\right)$

(b)  $B(x) = \frac{(x^2-2x+1)(x+1)^2}{(x^2-1)(x^2)}$