

1. Suppose  $f(x) = 3 - 2x^2$  and  $g(x) = 9 - 6x$ . Find the following:

a.  $(f + g)(2)$

d.  $\left(\frac{f}{g}\right)(-1)$

b.  $(f - g)(2)$

e.  $\left(\frac{g}{f}\right)(1)$

c.  $(f \cdot g)(-3)$

2. Suppose  $f(x) = \frac{1}{(x+2)(x-3)}$  and  $g(x) = \frac{1}{x^2 + 3x + 2}$ . Find  $\left(\frac{g}{f}\right)(x)$ . What are the domains of  $f$ ,  $g$ , and  $g/f$ ?

3. Suppose  $f(x) = 2x^2 - x + 3$ . Find the following:

a.  $f(2)$

b.  $f(2 + h)$

c.  $f(x + h)$

d.  $f(x + h) - f(x)$

4. Given the following functions, find  $\frac{f(x+h) - f(x)}{h}$ .

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

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

5. Suppose that  $f(x) = 2x^2 - 3$  and  $g(x) = 4x$ . Find the following:

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

d.  $(f \circ f)(-2)$

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

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

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

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

6. Suppose that  $f(x) = \frac{2}{x-2}$  and  $g(x) = \frac{4}{2x-5}$ . Find  $(f \circ g)(x)$  and state its domain.
7. Suppose that  $f(x) = \frac{1}{x+2}$  and  $g(x) = \frac{4}{x-1}$ . Find  $(g \circ f)(x)$  and state its domain .

8. 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.

9. Find functions  $f$  and  $g$  such that  $f \circ g = H$  if  $H(x) = \frac{2}{(x+1)^2} + 3$ . Again, find multiple solutions to this exercise.