

6.1 Practice Problems

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

a. $(f \circ g)(1) = 3$

$$\begin{aligned} f(g(1)) &= f(1+1) \\ &= f(2) \\ &= 2(2)^2 - 3(2) + 1 \\ &= 8 - 6 + 1 = 2 + 1 = 3 \end{aligned}$$

c. $(f \circ f)(1) = 6$

$$\begin{aligned} f(f(1)) &= f(2-3+1) \\ &= f(-2+1) \\ &= f(-1) \\ &= 2(-1)^2 - 3(-1) + 1 \\ &= 2(1) + 3 + 1 \\ &= 6 \end{aligned}$$

b. $(g \circ f)(-2) = 16$

$$\begin{aligned} (g \circ f)(-2) &= g(f(-2)) \\ &= g(2(-2)^2 - 3(-2) + 1) \\ &= g(2(4) + 6 + 1) \\ &= g(15) = 16 \end{aligned}$$

d. $(g \circ g)(2) = 4$

$$\begin{aligned} g(g(2)) &= g(2+1) \\ &= g(3) \\ &= 4 \end{aligned}$$

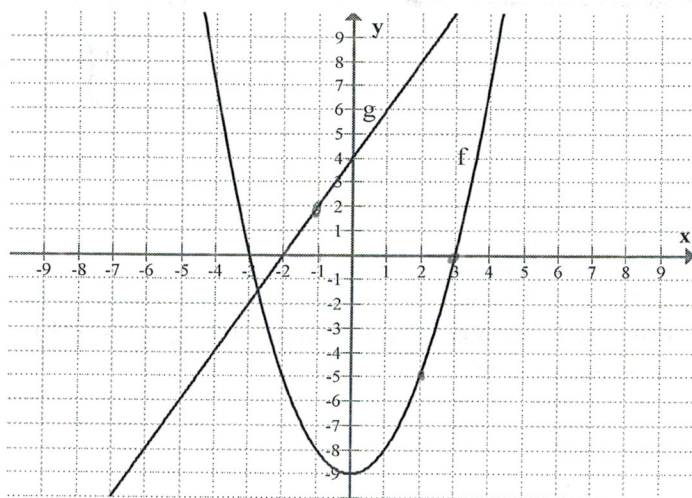
2. Use the graph on the right to find the following.

a. $(f \circ g)(-1) = -5$

$$f(g(-1)) = f(2) = -5$$

b. $(g \circ f)(3) = 4$

$$g(f(3)) = g(0) = 4$$



3. Find the composite function and state the domain. $f(x) = 2x + 3$ And $g(x) = 4 - 5x$

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

$$\begin{aligned} &= 2(4 - 5x) + 3 \\ &= 8 - 10x + 3 \\ &= -10x + 11 \end{aligned}$$

Domain: $(-\infty, \infty)$

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

$$= 4 - 5(2x + 3)$$

Domain $(-\infty, \infty)$

$$= 4 - 10x - 15$$

$$= -10x - 11$$

4. Find the composite function and state the domain. $f(x) = \frac{1}{x+5}$ And $g(x) = \frac{3}{x-2}$

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

$$= \frac{1}{\frac{3}{x-2} + 5} = \frac{1(x-2)}{3(x-2) + 5(x-2)} = \frac{x-2}{3+5x-10} = \frac{x-2}{5x-7}$$

Domain
 $\{x \mid x \neq 2, \frac{7}{5}\}$

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

$$= \frac{3}{\frac{1}{x+5} - 2} = \frac{3(x+5)}{\frac{1(x+5)}{x+5} - 2(x+5)} = \frac{3x+15}{1-2x-10} = \frac{3x+15}{-2x-9}$$

Domain
 $\{x \mid x \neq -5, -\frac{9}{2}\}$

5. Determine if $(f \circ g)(x) = (g \circ f)(x)$ and ~~g and f~~ determine whether each pair of functions f and g are inverses of each other. $f(x) = 2x - 5$ and $g(x) = \frac{x+5}{2}$

$$\begin{aligned} (f \circ g)(x) &= 2\left(\frac{x+5}{2}\right) - 5 \\ &= x+5-5 \\ &= x \end{aligned}$$

$$(g \circ f)(x) = \frac{2x-5+5}{2} = \frac{2x}{2} = x$$

6. Find the functions f and g so that $(f \circ g)(x) = H(x)$

a. $H(x) = (4x-3)^2$

$$g(x) = 4x-3$$

$$f(x) = x^2$$

b. $H(x) = \sqrt{x^2+3x-9}$

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

$$f(x) = \sqrt{x}$$

c. $H(x) = |9-x|$

$$g(x) = 9-x$$

$$f(x) = |x|$$