

## Composition of Functions Algebraically

Given the two functions, determine the composition of  $(f \circ g)(x)$  and  $(g \circ f)(x)$  and state the domain for each.

TABLE: Evaluation

$x$	$f(x)$
-5	2
-1	3
2	-6
4	5
7	7
10	-4

$x$	$g(x)$
-4	10
0	4
2	1
5	0
8	-2
9	-4

$x$	$h(x)$
-4	7
-2	3
0	9
2	0
4	-3
6	-7

- |                      |                          |                                |
|----------------------|--------------------------|--------------------------------|
| 1. $(f \circ g)(0)$  | 4. $(h^{-1} \circ f)(7)$ | 7. $(g^{-1} \circ f^{-1})(-4)$ |
| 2. $(g \circ f)(-5)$ | 5. $(g^{-1} \circ h)(0)$ | 8. $(g \circ h \circ f)(-5)$   |
| 3. $(h \circ f)(-5)$ | 6. $(f^{-1} \circ f)(5)$ |                                |

Perform the indicated composition:

1.  $(f \circ g)(x) : f(x) = 2x - 3$  and  $g(x) = -x + 2$
2.  $(g \circ f)(x) : f(x) = x^2 + 5$  and  $g(x) = x - 4$
3.  $(f \circ g^{-1})(x) : f(x) = x^2 + 2x$  and  $g(x) = 3x$
4.  $(f \circ g)(x) : f(x) = 3x^2 + x - 2$  and  $g(x) = 2x^2 - 1$
5.  $(g \circ f)(x) : f(x) = 3x^2 + x - 2$  and  $g(x) = 2x^2 - 1$
6.  $(f \circ g)(x) : f(x) = x^3$  and  $g(x) = x + 1$
7.  $(g^{-1} \circ f)(x) : f(x) = x^3$  and  $g(x) = x + 1$
8.  $(f^{-1} \circ g)(x) : f(x) = \sqrt{x}$  and  $g(x) = 4x$
9.  $(f \circ g)(x) : f(x) = x + 4$  and  $g(x) = \frac{1}{x+4}$
10.  $(g \circ f^{-1})(x) : f(x) = x^3$  and  $g(x) = x + 1$
11.  $(f \circ g)(x) : f(x) = \frac{x}{x+1}$  and  $g(x) = \frac{1}{2x}$
12.  $(f \circ g^{-1})(x) : f(x) = x^3$  and  $g(x) = x + 1$
13.  $(g \circ f)(x) : f(x) = \frac{x-1}{x-9}$  and  $g(x) = x^2$
14.  $(f \circ g)(x) : f(x) = \sqrt{2x - 5}$  and  $g(x) = \frac{1}{x+3}$
15.  $(f \circ f^{-1})(x) : f(x) = 2x - 3$
16.  $(f^{-1} \circ f)(x) : f(x) = 2x - 3$