

1.4 – Practice Worksheet

Given the functions below, find the compositions and their domains

$$f(x) = x^2 - 3x \quad g(x) = \frac{3}{x+1} \quad h(x) = 2\sqrt{1-x} \quad k(x) = \sqrt{x+3}$$

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

2. $(h \circ g)(x)$

3. $(k \circ h)(x)$

4. $g(f(x))$

5. $f(h(x))$

6. $(g \circ k)(x)$

7. Complete the tables below using the given values of f and g.

x	f(x)
1	3
2	5
3	1
4	2
5	3

x	g(x)
1	5
2	4
3	4
4	3
5	2

A)

x	$(g \circ f)(x)$
1	
2	
3	
4	
5	

B)

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

C)

x	$f(f(x))$
1	
2	
3	
4	
5	

D)

x	$(g \circ g)(x)$
1	
2	
3	
4	
5	

Decompose the following functions Write the given functions as the composite of two functions, neither of which is the identity function. (There may be more than one possible answer)

8. $f(x) = \sqrt[3]{x^2 + 2}$

9. $g(x) = \sqrt{x+3} - \sqrt[3]{x+3}$

10. $f(x) = \sqrt[3]{(7x-3)^2}$

11. $f(x) = \frac{1}{3x^2 + 5x - 7}$

A function is **one to one** if for every x there is only one y and for every y there is only one x .
*****It must pass **both** the vertical line test and the horizontal line test.*****

Be able to explain why a function that is always decreasing or always increasing, must be one to one.

Find the inverse of the following functions and give the domain of the inverse function, including any restrictions from inherited from f .

12. $f(x) = |x|$

14. $f(x) = \sqrt{x+2}$

13. $f(x) = \frac{x+3}{x-2}$

15. $f(x) = x^2 + 6$

The inverse Composition Rule

$$(f^{-1} \circ f)(x) = x$$

$$(f \circ f^{-1})(x) = x$$

Verify that the following functions are inverses of property.

16. $f(x) = \frac{1}{x+1}$

$$g(x) = \frac{1-x}{x}$$

17. $f(x) = 2x - 6$

$$g(x) = \frac{x}{2} + 3$$