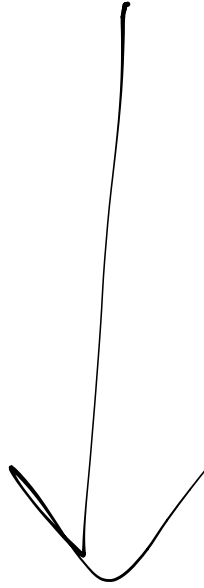


# 4.3 Operations with Functions App



## 4.3 Operations with Functions

## APPLICATION

For 1-2, use  $f(x) = \sqrt{x+3}$  and  $g(x) = \frac{3}{x}$

1. Find  $g(f(2))$ .

$$g(f(2)) = \frac{3}{f(2)}$$

$$= \frac{3}{\sqrt{(2)+3}}$$

$$g(f(2)) = \frac{3}{\sqrt{5}}$$

2. Find  $g(f(x))$  and state its domain.

$$g(f(x)) = \frac{3}{f}$$

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

D of f

$$\begin{array}{l} \text{RADICAND} \geq 0 \\ x+3 \geq 0 \\ x \geq -3 \end{array}$$

D of  $g(f(x))$

$$\begin{array}{l} \text{Denom} \neq 0 \\ \sqrt{x+3} \neq 0 \\ x+3 \neq 0 \\ x \neq -3 \end{array}$$

D:  $(-3, \infty)$

3. Given  $f(x) = 2x$  and  $g(x) = x+4$  and  $h(x) = 5-x^3$  find the following.

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

$$= 2(2) + (2) + 4$$

$$= 4 + 6$$

$$(f+g)(2) = 10$$

b.  $h(g(2)) = 5 - (g(2))^3$

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

$$= 5 - (6)^3$$

$$= 5 - 216$$

$$h(g(2)) = -211$$

c.  $(f \cdot g)(2) = f(2)g(2)$

$$= [2(2)][(2)+4]$$

$$= (4)(6)$$

$$(f \cdot g)(2) = 24$$

d.  $\left(\frac{h}{g}\right)(2) = \frac{h(2)}{g(2)}$

$$= \frac{5 - (2)^3}{(2)+4}$$

$$= \frac{5 - 8}{6}$$

$$= \frac{-3}{6}$$

$$\left(\frac{h}{g}\right)(2) = -\frac{1}{2}$$

4. Suppose  $f(x) = x^2 + bx - 3$  and  $f(2) = -9$ . Find  $b$ .

$$-9 = (2)^2 + b(2) - 3$$

$$-9 = 4 + 2b - 3$$

$$-9 = 1 + 2b$$

$$-10 = 2b$$

$$-5 = b$$

5. Given  $f(x) = 5x - 2b$  while  $g(x) = 4bx$ . If  $f(g(1)) = 36$  what is  $g(f(1))$ ?

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

$$36 = 5(4b(1)) - 2b$$

$$36 = 5(4b) - 2b$$

$$36 = 20b - 2b$$

$$36 = 18b$$

$$2 = b$$

$$g(f(1)) = 4b(f(1))$$

$$= 4(2)(5(1) - 2(2))$$

$$= 8(5 - 4)$$

$$= 8(1)$$

$$g(f(1)) = 8$$

6. Given that  $f(x) = cx - 3$  and  $g(x) = cx + 5$  are both defined on the set of all real numbers and  $c$  is a constant, what is the value of  $c$  if  $(f \circ g)(x) = (g \circ f)(x)$  for all values of  $x$ ?

$$f(g(x)) = g(f(x))$$

$$c \cdot g - 3 = c \cdot f + 5$$

$$c(cx + 5) - 3 = c(cx - 3) + 5$$

$$c^2x + 5c - 3 = c^2x - 3c + 5$$

$$8c = 8$$

$$c = 1$$

7. Use the two tables given to fill in the incomplete table.

$x$	$f(x)$
-2	1
-1	-2
0	4
1	5
2	-1
3	0
4	3
5	2

$x$	$g(x)$
-2	-1
-1	0
0	3
1	2
2	-2
3	4
4	5
5	1

$x$	$(f+g)(x)$
-2	0
-1	-2
0	7
1	7
2	-3
3	4
4	8
5	3

8. Fill in the following table, given that  $h(x) = (f \circ g)(x)$

$x$	$g(x)$	$f(x)$	$h(x)$
-3	0	7	3
-2	-2	-4	-4
-1	-3	-1	7
0	1	3	0
1	2	0	4
2	2	4	4
3	0	9	3