

## Review Exercise Set 17

Exercise 1: Given that  $f(x) = x^3$  and  $g(x) = \sqrt{x}$ , find  $(f + g)(x)$ .

Exercise 2: Given that  $f(x) = \sqrt{1+x}$  and  $g(x) = \sqrt{1-x}$ , find  $(fg)(x)$ .

Exercise 3: If  $f(x) = x^2$  and  $g(x) = x - 3$ , find  $(f \circ g)(x)$  and its domain.

Exercise 4: If  $f(x) = \sqrt{2-x}$  and  $g(x) = \sqrt{x}$ , find  $(g \circ f)(x)$  and its domain.

Exercise 5: If  $f(x) = -3x + 2$  and  $g(x) = x^2 - 1$ , find  $(f \circ g)(-1)$ .

## Review Exercise Set 17 Answer Key

Exercise 1: Given that  $f(x) = x^3$  and  $g(x) = \sqrt{x}$ , find  $(f + g)(x)$ .

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

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

Exercise 2: Given that  $f(x) = \sqrt{1+x}$  and  $g(x) = \sqrt{1-x}$ , find  $(fg)(x)$ .

$$\begin{aligned}(fg)(x) &= f(x) \times g(x) \\ &= \sqrt{1+x} \times \sqrt{1-x} \\ &= \sqrt{(1+x)(1-x)} \\ &= \sqrt{1-x^2}\end{aligned}$$

Exercise 3: If  $f(x) = x^2$  and  $g(x) = x - 3$ , find  $(f \circ g)(x)$  and its domain.

$$\begin{aligned}(f \circ g)(x) &= f[g(x)] \\ &= f[x-3] \\ &= (x-3)^2\end{aligned}$$

Domain: All real numbers

Exercise 4: If  $f(x) = \sqrt{2-x}$  and  $g(x) = \sqrt{x}$ , find  $(g \circ f)(x)$  and its domain.

$$\begin{aligned}(g \circ f)(x) &= g[f(x)] \\ &= g[\sqrt{2-x}] \\ &= \sqrt{\sqrt{2-x}} \\ &= \sqrt[4]{2-x}\end{aligned}$$

Since the index of the root is even, the radicand must be greater than or equal to zero. So to find the domain we will set the radicand greater than or equal to zero and solve for  $x$ .

$$2 - x \geq 0$$

$$-x \geq -2$$

$$x \leq 2$$

**Domain: All real numbers less than or equal to two**

Exercise 5: If  $f(x) = -3x + 2$  and  $g(x) = x^2 - 1$ , find  $(f \circ g)(-1)$ .

First, find  $(f \circ g)(x)$

$$\begin{aligned}(f \circ g)(x) &= f[g(x)] \\ &= f[x^2 - 1] \\ &= -3(x^2 - 1) + 2 \\ &= -3x^2 + 3 + 2 \\ &= -3x^2 + 5\end{aligned}$$

Now, find  $(f \circ g)(-1)$

$$\begin{aligned}(f \circ g)(x) &= -3x^2 + 5 \\ (f \circ g)(-1) &= -3(-1)^2 + 5 \\ &= -3(1) + 5 \\ &= -3 + 5 \\ &= 2\end{aligned}$$