

**Exercise 41**

For the following exercises, find  $(f \circ g)$  and the domain for  $(f \circ g)(x)$  for each pair of functions.

$$f(x) = \frac{1}{x}, \quad g(x) = \sqrt{x}$$

---

**Solution**

Calculate  $(f \circ g)(x)$  by plugging the formula for  $g(x)$  in where  $x$  is in the formula for  $f(x)$ .

$$\begin{aligned}(f \circ g)(x) &= f(g(x)) \\ &= \frac{1}{\sqrt{x}}\end{aligned}$$

The denominator of this rational function cannot be zero, and the square root of a negative number cannot be taken.

$$x \geq 0 \quad \text{and} \quad \sqrt{x} \neq 0$$

Solve for  $x$ .

$$x \geq 0 \quad \text{and} \quad x \neq 0$$

Combine the two conditions.

$$x > 0$$

Therefore, the domain of  $(f \circ g)(x)$  is

$$(0, \infty).$$