

Exercise 25

For $f(x) = \frac{1}{x}$ and $g(x) = \sqrt{x-1}$, write the domain of $(f \circ g)(x)$ in interval notation.

Solution

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

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

It's impossible to divide by zero, and it's impossible to take the square root of a negative number.

$$x - 1 \geq 0 \quad \text{and} \quad \sqrt{x-1} \neq 0$$

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Combine the two conditions.

$$x - 1 > 0$$

Solve for x .

$$x > 1$$

Therefore, the domain of $(f \circ g)(x)$ in interval notation is $(1, \infty)$.