

Exercise 18

In Exercises 17 and 18, (a) write formulas for $f \circ g$ and $g \circ f$ and (b) find the domain of each.

$$f(x) = x^2, g(x) = 1 - \sqrt{x}$$

Solution**Part (a)**

Calculate $f \circ g$ first.

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

Only the square root of a nonnegative number can be taken, so the domain for $f \circ g$ is $[0, \infty)$.

Part (b)

Calculate $g \circ f$ first.

$$\begin{aligned} g \circ f &= g(f(x)) \\ &= g(x^2) \\ &= 1 - \sqrt{x^2} \\ &= 1 - |x| \end{aligned}$$

Any number can be plugged in for x , so the domain for $g \circ f$ is $(-\infty, \infty)$.