

Exercise 15

For the following exercises, use each pair of functions to find $f(g(x))$ and $g(f(x))$. Simplify your answers.

$$f(x) = \sqrt[3]{x}, \quad g(x) = \frac{x+1}{x^3}$$

Solution

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

$$\begin{aligned} f(g(x)) &= \sqrt[3]{\frac{x+1}{x^3}} \\ &= \frac{\sqrt[3]{x+1}}{\sqrt[3]{x^3}} \\ &= \frac{\sqrt[3]{x+1}}{x} \end{aligned}$$

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

$$\begin{aligned} g(f(x)) &= \frac{(\sqrt[3]{x})+1}{(\sqrt[3]{x})^3} \\ &= \frac{\sqrt[3]{x}+1}{x} \end{aligned}$$