Exercise 12

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

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

Solution

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

$$f(g(x)) = \left(\sqrt{x+2}\right)^2 + 1$$
$$= (x+2) + 1$$
$$= x + 3$$

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

$$g(f(x)) = \sqrt{(x^2 + 1) + 2}$$
$$= \sqrt{x^2 + 3}$$