Exercise 38

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

$$f(x) = \frac{x+3}{2}, \quad g(x) = \sqrt{1-x}$$

Solution

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

$$\begin{aligned}(f \circ g)(x) &= f(g(x)) \\ &= \frac{\sqrt{1-x}+3}{2} \\ &= \frac{1}{2}\sqrt{1-x} + \frac{3}{2}\end{aligned}$$

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

$$\begin{aligned}(g \circ f)(x) &= g(f(x)) \\ &= \sqrt{1 - \frac{x+3}{2}} \\ &= \sqrt{1 - \frac{1}{2}x - \frac{3}{2}} \\ &= \sqrt{-\frac{1}{2}x - \frac{1}{2}}\end{aligned}$$