Exercise 205

For the following exercises, use composition to determine which pairs of functions are inverses.

$$f(x) = x^2 + 2x + 1,\ x \geq -1, \quad g(x) = -1 + \sqrt{x},\ x \geq 0$$

Solution

Simplify $f(x)$ first.

$$f(x) = (x+1)^2$$

Take the composition of f and g and see if it results in x.

$$f \circ g = f(g(x)) = f\left(-1 + \sqrt{x}\right) = \left[\left(-1 + \sqrt{x}\right) + 1\right]^2 = \left(\sqrt{x}\right)^2 = x$$

Therefore, f and g are inverses; they are reflections of one another about the line $y = x$.