

Let  $f(x) = x^2 + 1$  and let  $g(x) = \sqrt{x - 1}$ . Find both composite functions  $f \circ g$  and  $g \circ f$ .

**Solution:** First,  $f \circ g(x) = f(g(x)) = f(\sqrt{x - 1}) = (\sqrt{x - 1})^2 + 1 = x$  when  $x \geq 1$ . On the other hand,  $g \circ f(x) = g(f(x)) = g(x^2 + 1) = \sqrt{x^2 + 1 - 1} = |x|$ .