

Exercise 48

For the following exercises, for each pair of functions, find a. $(f \circ g)(x)$ and b. $(g \circ f)(x)$ Simplify the results. Find the domain of each of the results.

$$f(x) = |x + 1|, g(x) = x^2 + x - 4$$

[**TYPO: Place a period before the word, "simplify."**]

Solution

$$(f \circ g)(x) = f(g(x)) = f(x^2 + x - 4) = |(x^2 + x - 4) + 1| = |x^2 + x - 3| \quad \text{Domain: } \{x \mid -\infty < x < \infty\}$$

$$\begin{aligned}(g \circ f)(x) &= g(f(x)) = g(|x + 1|) = |x + 1|^2 + |x + 1| - 4 \\ &= (x + 1)^2 + |x + 1| - 4 \\ &= (x^2 + 2x + 1) + |x + 1| - 4 \\ &= x^2 + 2x - 3 + |x + 1| \quad \text{Domain: } \{x \mid -\infty < x < \infty\}\end{aligned}$$