

**Exercise 36**

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

$$f(x) = x^2 + 2x, \quad g(x) = 5x + 1$$

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**Solution**

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

$$\begin{aligned}(f \circ g)(x) &= f(g(x)) \\ &= (5x + 1)^2 + 2(5x + 1) \\ &= (25x^2 + 10x + 1) + 10x + 2 \\ &= 25x^2 + 20x + 3\end{aligned}$$

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

$$\begin{aligned}(g \circ f)(x) &= g(f(x)) \\ &= 5(x^2 + 2x) + 1 \\ &= 5x^2 + 10x + 1\end{aligned}$$