

Exercise 63

- (a) If $g(x) = 2x + 1$ and $h(x) = 4x^2 + 4x + 7$, find a function f such that $f \circ g = h$. (Think about what operations you would have to perform on the formula for g to end up with the formula for h .)
- (b) If $f(x) = 3x + 5$ and $h(x) = 3x^2 + 3x + 2$, find a function g such that $f \circ g = h$.
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Solution**Part (a)**

Notice that $4x^2 + 4x$ comes from squaring $g(x)$. To get 7, add 6.

$$f \circ g = f(g(x)) = (2x + 1)^2 + 6 = 4x^2 + 4x + 7$$

Therefore,

$$f(x) = x^2 + 6.$$

Part (b)

$$f \circ g = h$$

$$f(g(x)) = h(x)$$

$$3g(x) + 5 = 3x^2 + 3x + 2$$

Solve for g .

$$3g(x) = 3x^2 + 3x - 3$$

Therefore,

$$g(x) = x^2 + x - 1.$$