

Exercise 61

If $F(x) = f(g(x))$, where $f(-2) = 8$, $f'(-2) = 4$, $f'(5) = 3$, $g(5) = -2$, and $g'(5) = 6$, find $F'(5)$.

Solution

Take the derivative of $F(x)$.

$$\begin{aligned} F'(x) &= \frac{d}{dx} f(g(x)) \\ &= f'(g(x)) \cdot g'(x) \end{aligned}$$

Set $x = 5$.

$$\begin{aligned} F'(5) &= f'(g(5)) \cdot g'(5) \\ &= f'(-2) \cdot (6) \\ &= (4) \cdot (6) \\ &= 24 \end{aligned}$$