

Exercise 63

A table of values for f , g , f' , and g' is given.

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
1	3	2	4	6
2	1	8	5	7
3	7	2	7	9

(a) If $h(x) = f(g(x))$, find $h'(1)$.

(b) If $H(x) = g(f(x))$, find $H'(1)$.

Solution

Take the derivative of $h(x)$.

$$h'(x) = f'(g(x)) \cdot g'(x)$$

Evaluate it at $x = 1$.

$$\begin{aligned} h'(1) &= f'(g(1)) \cdot g'(1) \\ &= f'(2) \cdot (6) \\ &= (5) \cdot (6) \\ &= 30 \end{aligned}$$

Take the derivative of $h'(x)$.

$$H'(x) = g'(f(x)) \cdot f'(x)$$

Evaluate it at $x = 1$.

$$\begin{aligned} H'(1) &= g'(f(1)) \cdot f'(1) \\ &= g'(3) \cdot (4) \\ &= (9) \cdot (4) \\ &= 36 \end{aligned}$$