A.12: The Product and Chain Rule

Suppose $g(x)$ and $h(x)$ are both functions of x. Let $f(x) = g(x) \cdot h(x)$. Then the Product Rule says:

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

Consider $j(x) = g(h(x))$, a composite function. Then the Chain Rule says:

$$j'(x) = g'(x)h'(x)$$

e.g.

$g(x) = x^2$, $h(y) = 2y + 3$. $f(x) = h(g(x))$. What is $f'(x)$?