(1) $\dfrac{d}{dx}[f(x)g(x)] =$

(2) $\dfrac{d}{dx}\left[\dfrac{f(x)}{g(x)}\right] =$

Examples

Example 3.5.1. *Find $f'(x)$ if $f(x) = (x^2 + 2x + 1)(3x^4 - 2x^2 + 4)$*

Example 3.5.2. *Find* $g'(t)$ *if* $g(t) = 5t^4(\sqrt[3]{t} + 1)$

Example 3.5.3. *Find* $f'(w)$ *if* $f(w) = \dfrac{w^2 + 5w + 5}{3w^4 + w^2 - 1}$

Example 3.5.4. *Find $h'(x)$ if $h(x) = \dfrac{\sqrt{x}+1}{\sqrt{x}-1}$*

Example 3.5.5. *Find $\dfrac{d}{dx}(3 - 5x^{1/5})(4x^{-1/2} - 3)$*

Example 3.5.6. *Find the equation of the line tangent to the graph of* $f(x) = \dfrac{x-4}{x+2}$
at $(-1, -5)$.

Example 3.5.7. *Suppose* $f(-3) = 4$, $f'(-3) = -1$, $g(-3) = -2$, *and* $g'(-3) = 5$.
Find

(1) $h'(-3)$ *if* $h(x) = f(x) + g(x)$
(2) $(fg)'(-3)$
(3) $h'(-3)$ *if* $h(x) = \dfrac{f(x)}{g(x)}$
(4) $h'(-3)$ *where* $h(x) = \dfrac{x^2 g(x)}{f(x)}$

Example 3.5.8. *In the early days os quantitative learning theory (around 1917), L. L. Thurstone found that a given person successfully accomplished $N(x)$ acts after x practice acts, as given by*

$$N(x) = \frac{100x + 200}{x + 32}$$

(1) *Find the average rate of change of the number of acts accomplished, $N(x)$, from 1 practice acts to 3 practice acts.*

(2) *Find the instantaneous rate of change of $N(x)$ at $x = 1$.*

(3) *Find the instantaneous rate of change of $N(x)$ at $x = 3$.*

Homework: 3.5 p. 194 # 1-37 eoo, 47-55 eoo, 65, 69, work e-grade practice at least 2 times.