

Differentiation Formulas

Suppose f and g are differentiable functions.

$$\text{Constant Rule: } \frac{d}{dx}(c) = 0$$

$$\text{Power Rule: } \frac{d}{dx}(x^n) = nx^{n-1} \text{ for any real number } n$$

$$\text{Constant Multiple Rule: } \frac{d}{dx}[cf(x)] = cf'(x) \text{ for any constant } c$$

$$\text{Sum Rule: } \frac{d}{dx}[f(x) + g(x)] = f'(x) + g'(x)$$

$$\text{Difference Rule: } \frac{d}{dx}[f(x) - g(x)] = f'(x) - g'(x)$$

$$\text{Product Rule: } \frac{d}{dx}[f(x)g(x)] = f(x)g'(x) + g(x)f'(x)$$

$$\text{Quotient Rule: } \frac{d}{dx} \left[\frac{f(x)}{g(x)} \right] = \frac{g(x)f'(x) - f(x)g'(x)}{[g(x)]^2}$$

$$\text{Derivative of } e^x: \frac{d}{dx}(e^x) = e^x$$

Exercises

Differentiate each of the following functions.

1. $y = x^{-2/5}$

2. $V(r) = \frac{4}{3}\pi r^3$

3. $y = 4\pi^2$

4. $y = \frac{x^2 + 4x + 3}{\sqrt{x}}$

5. $v = t^2 - \frac{1}{\sqrt[4]{t^3}}$

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

7. $h(x) = \frac{x+2}{x-1}$

8. $y = \frac{t^2}{3t^2 - 2t + 1}$

9. $y = \frac{v^3 - 2v\sqrt{v}}{v}$