

**Calculus Practice: Differentiating Products and Quotients of Functions 2b****Differentiate each function with respect to  $x$ .**

1)  $f(x) = \left(3x^{\frac{2}{5}} + 5\right)(2x^5 + 3)$

2)  $y = (\sqrt[5]{x} + 3)(2x^3 + 2)$

3)  $y = (2\sqrt[5]{x^2} + 2)(x^2 - 2)$

4)  $f(x) = (-3\sqrt[3]{x} + 3)(3x^2 - 4)$

5)  $y = \left(4 + \frac{3}{x^4}\right)(x^5 + 2)$

6)  $y = \frac{2}{x^3}(5x^5 - 3)$

7)  $y = (3\sqrt[4]{x} + 3)(x^4 + 5)$

8)  $y = \left(2 + \frac{3}{x^5}\right) \cdot 3x^3$

## Calculus Practice: Differentiating Products and Quotients of Functions 2b

Differentiate each function with respect to  $x$ .

1)  $f(x) = \left(3x^{\frac{2}{5}} + 5\right)(2x^5 + 3)$

$$f'(x) = \left(3x^{\frac{2}{5}} + 5\right) \cdot 10x^4 + (2x^5 + 3) \cdot \frac{6}{5}x^{-\frac{3}{5}}$$

$$= \frac{162x^{\frac{22}{5}}}{5} + 50x^4 + \frac{18}{5x^{\frac{3}{5}}}$$

2)  $y = (\sqrt[5]{x} + 3)(2x^3 + 2)$

$$\frac{dy}{dx} = \left(x^{\frac{1}{5}} + 3\right) \cdot 6x^2 + (2x^3 + 2) \cdot \frac{1}{5}x^{-\frac{4}{5}}$$

$$= \frac{32x^{\frac{11}{5}}}{5} + 18x^2 + \frac{2}{5x^{\frac{4}{5}}}$$

3)  $y = (2\sqrt[5]{x^2} + 2)(x^2 - 2)$

$$\frac{dy}{dx} = \left(2x^{\frac{2}{5}} + 2\right) \cdot 2x + (x^2 - 2) \cdot \frac{4}{5}x^{-\frac{3}{5}}$$

$$= \frac{24x^{\frac{7}{5}}}{5} + 4x - \frac{8}{5x^{\frac{3}{5}}}$$

4)  $f(x) = (-3\sqrt[3]{x} + 3)(3x^2 - 4)$

$$f'(x) = \left(-3x^{\frac{1}{3}} + 3\right) \cdot 6x + (3x^2 - 4) \cdot -\frac{2}{3}$$

$$= -21x^{\frac{4}{3}} + 18x + \frac{4}{x^{\frac{2}{3}}}$$

5)  $y = \left(4 + \frac{3}{x^4}\right)(x^5 + 2)$

$$\frac{dy}{dx} = \left(4 + 3x^{-4}\right) \cdot 5x^4 + (x^5 + 2) \cdot -12x^{-5}$$

$$= 20x^4 + 3 - \frac{24}{x^5}$$

6)  $y = \frac{2}{x^3}(5x^5 - 3)$

$$\frac{dy}{dx} = 2x^{-3} \cdot 25x^4 + (5x^5 - 3) \cdot -6x^{-4}$$

$$= 20x + \frac{18}{x^4}$$

7)  $y = (3\sqrt[4]{x} + 3)(x^4 + 5)$

$$\frac{dy}{dx} = \left(3x^{\frac{1}{4}} + 3\right) \cdot 4x^3 + (x^4 + 5) \cdot \frac{3}{4}x^{-\frac{3}{4}}$$

$$= \frac{51x^{\frac{13}{4}}}{4} + 12x^3 + \frac{15}{4x^{\frac{3}{4}}}$$

8)  $y = \left(2 + \frac{3}{x^5}\right) \cdot 3x^3$

$$\frac{dy}{dx} = \left(2 + 3x^{-5}\right) \cdot 9x^2 + 3x^3 \cdot -15x^{-6}$$

$$= 18x^2 - \frac{18}{x^3}$$