

## Practicing with Derivatives

Differentiate each function with respect to  $x$ . Problems may contain constants  $a$ ,  $b$ , and  $c$ .

1)  $f(x) = \frac{2}{3}\sqrt[3]{x^2}$

A)  $f'(x) = \frac{4}{9x^{\frac{1}{3}}}$

B)  $f'(x) = \frac{4x}{9}$

C)  $f'(x) = \frac{4x^{\frac{2}{3}}}{9}$

D)  $f'(x) = \frac{2}{3x^{\frac{1}{3}}}$

2)  $y = -\frac{4}{9}x^2$

A)  $\frac{dy}{dx} = -4x^2$

C)  $\frac{dy}{dx} = -\frac{8x^2}{9}$

B)  $\frac{dy}{dx} = -\frac{4x}{9}$

D)  $\frac{dy}{dx} = -\frac{8x}{9}$

3)  $y = -\frac{10c}{x^2}$

A)  $\frac{dy}{dx} = -\frac{10c}{x^3}$

C)  $\frac{dy}{dx} = \frac{20c}{x^3}$

B)  $\frac{dy}{dx} = \frac{20c}{x^2}$

D)  $\frac{dy}{dx} = 20cx$

4)  $y = -\frac{7}{3}\sqrt[5]{x}$

A)  $\frac{dy}{dx} = -\frac{7}{3x^{\frac{4}{5}}}$

B)  $\frac{dy}{dx} = -\frac{7x}{15}$

C)  $\frac{dy}{dx} = -\frac{7}{15x^{\frac{4}{5}}}$

D)  $\frac{dy}{dx} = -\frac{7x^{\frac{1}{5}}}{15}$

$$5) f(x) = 5a\sqrt[3]{x}$$

$$A) f'(x) = \frac{5ax^{\frac{1}{3}}}{3}$$

$$B) f'(x) = \frac{5a}{2 \cdot 3x^{\frac{2}{3}}}$$

$$C) f'(x) = \frac{5a}{2 \cdot x^{\frac{2}{3}}}$$

$$D) f'(x) = \frac{5ax}{3}$$

$$6) y = -\frac{5}{2}\sqrt[4]{x}$$

$$A) \frac{dy}{dx} = -\frac{5}{2 \cdot 4x^{\frac{3}{4}}}$$

$$B) \frac{dy}{dx} = -\frac{5x^{\frac{1}{4}}}{8}$$

$$C) \frac{dy}{dx} = -\frac{5}{8x^{\frac{3}{4}}}$$

$$D) \frac{dy}{dx} = -\frac{5x}{8}$$

**Differentiate each function with respect to  $x$ .**

$$7) y = (4x^4 + 1) \cdot -2x^5$$

$$A) \frac{dy}{dx} = 4x^4 + 16x^3 + 1$$

$$B) \frac{dy}{dx} = -32x^8$$

$$C) \frac{dy}{dx} = -8x^9 - 160x^7 - 2x^5$$

$$D) \frac{dy}{dx} = -72x^8 - 10x^4$$

$$8) f(x) = 3x^2(x^3 + 2)$$

$$A) f'(x) = 3x^5 + 18x^3 + 6x^2$$

$$B) f'(x) = 3x^2 + 6x$$

$$C) f'(x) = x^3 + 3x^2 + 2$$

$$D) f'(x) = 15x^4 + 12x$$

9)  $y = (x^4 + 5) \cdot -3x^2$

A)  $\frac{dy}{dx} = -12x^5$

B)  $\frac{dy}{dx} = -3x^6 - 24x^4 - 15x^2$

C)  $\frac{dy}{dx} = -18x^5 - 30x$

D)  $\frac{dy}{dx} = 4x^7 + 38x^3$

10)  $f(x) = (4x^5 + 3)(4x^3 + 3)$

A)  $f'(x) = 16x^8 + 240x^6 + 12x^5 + 12x^3 + 9$

B)  $f'(x) = 128x^7 + 60x^4 + 36x^2$

C)  $f'(x) = 80x^7 + 60x^4$

D)  $f'(x) = 4x^5 + 20x^4 + 3$

11)  $f(x) = (5x^3 + 3)(x^3 + 1)$

A)  $f'(x) = 5x^3 + 15x^2 + 3$

B)  $f'(x) = 5x^6 + 45x^4 + 8x^3 + 3$

C)  $f'(x) = x^3 + 3x^2 + 1$

D)  $f'(x) = 30x^5 + 24x^2$

12)  $y = (3x^4 + 4) \cdot -4x^3$

A)  $\frac{dy}{dx} = -12x^7 - 144x^5 - 16x^3$

B)  $\frac{dy}{dx} = 3x^4 + 12x^3 + 4$

C)  $\frac{dy}{dx} = -84x^6 - 48x^2$

D)  $\frac{dy}{dx} = -48x^6$

13)  $y = (-4x^4 + 1)(-2x^4 + 5)$

A)  $\frac{dy}{dx} = 8x^8 + 128x^6 - 22x^4 + 5$

B)  $\frac{dy}{dx} = -4x^4 - 16x^3 + 1$

C)  $\frac{dy}{dx} = 64x^7 - 88x^3$

D)  $\frac{dy}{dx} = -2x^4 - 8x^3 + 5$

14)  $f(x) = (3x^2 + 2)(2x^4 + 3x^3 - 1)$

A)  $f'(x) = 6x^6 + 9x^5 + 52x^4 + 60x^3 - 3x^2 - 2$

B)  $f'(x) = 16x^7 + 42x^6 + 27x^5 + 10x^3 - 9x^2 + 12x$

C)  $f'(x) = 12x^5 + 18x^4 - 6x$

D)  $f'(x) = 36x^5 + 45x^4 + 16x^3 + 18x^2 - 6x$

15)  $y = (x^5 + 3x^4 + 4)(3x^2 + 5)$

A)  $\frac{dy}{dx} = x^5 + 8x^4 + 12x^3 + 4$

B)  $\frac{dy}{dx} = 21x^6 + 54x^5 + 25x^4 + 60x^3 + 24x$

C)  $\frac{dy}{dx} = 3x^7 + 9x^6 + 35x^5 + 87x^4 + 12x^2 + 20$

D)  $\frac{dy}{dx} = 3x^2 + 6x + 5$

16)  $y = 3x^4(4x^2 + 4)$

A)  $\frac{dy}{dx} = 3x^4 + 12x^3$

B)  $\frac{dy}{dx} = 4x^2 + 8x + 4$

C)  $\frac{dy}{dx} = 72x^5 + 48x^3$

D)  $\frac{dy}{dx} = 12x^6 + 108x^4$

17)  $y = (x^5 + 5)(2x^4 + 3)$

A)  $\frac{dy}{dx} = 10x^8 + 15x^4$

B)  $\frac{dy}{dx} = 18x^8 + 15x^4 + 40x^3$

C)  $\frac{dy}{dx} = 2x^4 + 8x^3 + 3$

D)  $\frac{dy}{dx} = 2x^9 + 40x^7 + 3x^5 + 10x^4 + 15$

$$18) y = (2x^3 + 5)(2x^5 + 2)$$

$$A) \frac{dy}{dx} = 32x^7 + 50x^4 + 12x^2$$

$$B) \frac{dy}{dx} = 2x^3 + 6x^2 + 5$$

$$C) \frac{dy}{dx} = 20x^9 + 12x^5 + 20x^4 + 30x^2$$

$$D) \frac{dy}{dx} = 4x^8 + 60x^6 + 10x^5 + 4x^3 + 10$$

$$19) f(x) = \frac{2x^4 - x^2}{3x^3 + 4}$$

$$A) f'(x) = \frac{6x^6 + 3x^4 + 32x^3 - 8x}{9x^6 + 24x^3 + 16}$$

$$B) f'(x) = 18x^6 - 9x^4$$

$$C) f'(x) = \frac{6x^5 + 3x^3 + 32x^2 - 8}{4x^7 - 4x^5 + x^3}$$

$$D) f'(x) = \frac{8x^3 - 9x^2 - 2x}{9x^6 + 24x^3 + 16}$$

$$20) y = \frac{3x^3 + 5}{2x^3 + 2}$$

$$A) \frac{dy}{dx} = -12x^2$$

$$B) \frac{dy}{dx} = -\frac{12x^2}{9x^6 + 30x^3 + 25}$$

$$C) \frac{dy}{dx} = 18x^5 + 30x^2$$

$$D) \frac{dy}{dx} = -\frac{3x^2}{x^6 + 2x^3 + 1}$$

$$21) f(x) = \frac{4x^4 + 5x^3}{3x^3 - 2}$$

$$A) f'(x) = \frac{12x^4 - 32x - 30}{16x^6 + 40x^5 + 25x^4}$$

$$B) f'(x) = \frac{12x^6 - 32x^3 - 30x^2}{9x^6 - 12x^3 + 4}$$

$$C) f'(x) = 36x^6 + 45x^5$$

$$D) f'(x) = \frac{12x^6 - 32x^3 - 30x^2}{3x^3 - 2}$$

$$22) f(x) = \frac{5x^5 + 2}{5x^2 + 4}$$

$$A) f'(x) = 75x^6 + 100x^4 - 20x$$

$$B) f'(x) = \frac{25x^4 - 10x}{25x^4 + 40x^2 + 16}$$

$$C) f'(x) = \frac{75x^6 + 100x^4 - 20x}{25x^4 + 40x^2 + 16}$$

$$D) f'(x) = \frac{75x^6 + 100x^4 - 20x}{25x^{10} + 20x^5 + 4}$$

$$23) f(x) = \frac{x^2 - 1}{2x^3 + 5}$$

$$A) f'(x) = \frac{-6x^2 + 2x}{4x^6 + 20x^3 + 25}$$

$$B) f'(x) = \frac{-2x^4 + 6x^2 + 10x}{x^4 - 2x^2 + 1}$$

$$C) f'(x) = \frac{-2x^4 + 6x^2 + 10x}{4x^6 + 20x^3 + 25}$$

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

$$24) f(x) = \frac{2x^3 - 2x^2}{2x^3 - 3}$$

$$A) f'(x) = \frac{4x^4 - 18x^2 + 12x}{4x^6 - 12x^3 + 9}$$

$$B) f'(x) = 12x^5 - 12x^4$$

$$C) f'(x) = \frac{2x^3 - 9x + 6}{2x^5 - 4x^4 + 2x^3}$$

$$D) f'(x) = 4x^4 - 18x^2 + 12x$$

$$25) y = \frac{x^2 + 3}{5x^3 + 5}$$

$$A) \frac{dy}{dx} = \frac{-5x^4 - 45x^2 + 10x}{x^4 + 6x^2 + 9}$$

$$B) \frac{dy}{dx} = \frac{-x^4 - 9x^2 + 2x}{5x^6 + 10x^3 + 5}$$

$$C) \frac{dy}{dx} = 15x^4 + 45x^2$$

$$D) \frac{dy}{dx} = \frac{-15x^2 + 2x}{25x^6 + 50x^3 + 25}$$