

**Calculus Practice: Calculating Derivatives 1b****Differentiate each function with respect to  $x$ .**

1)  $f(x) = 3x^3$

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

3)  $f(x) = 2x^3 - 3x + 5$

4)  $f(x) = 1$

5)  $y = -3x^4 + 2$

6)  $y = \frac{4}{3}x^2 + \frac{1}{3}$

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

8)  $y = \frac{1}{2}x^5 - \frac{3}{4}x^2 + \frac{5}{3}$

9)  $y = \frac{4}{3}$

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

$$11) y = 4x^{-4}$$

$$12) f(x) = -x^{-1} - x^{-3} + x^{-5}$$

$$13) y = x^{-2} + 3x^{-5}$$

$$14) f(x) = 3x^{-1}$$

$$15) y = 4x^{-2} + 4x^{-5}$$

$$16) f(x) = \frac{1}{3}x^{-2} - \frac{1}{5}x^{-5}$$

$$17) f(x) = \frac{5}{3}x^{-3}$$

$$18) f(x) = -\frac{3}{5}x^{-1} - \frac{1}{3}x^{-4}$$

$$19) y = -\frac{1}{5}x^{-4}$$

$$20) f(x) = -\frac{5}{3}x^{-2} - \frac{1}{4}x^{-4}$$

## Calculus Practice: Calculating Derivatives 1b

Differentiate each function with respect to  $x$ .

1)  $f(x) = 3x^3$

$$f'(x) = 9x^2$$

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

$$f'(x) = 8x^3 + 9x^2 - 6x$$

3)  $f(x) = 2x^3 - 3x + 5$

$$f'(x) = 6x^2 - 3$$

4)  $f(x) = 1$

$$f'(x) = 0$$

5)  $y = -3x^4 + 2$

$$\frac{dy}{dx} = -12x^3$$

6)  $y = \frac{4}{3}x^2 + \frac{1}{3}$

$$\begin{aligned}\frac{dy}{dx} &= \frac{8}{3}x \\ &= \frac{8x}{3}\end{aligned}$$

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

$$\begin{aligned}f'(x) &= 2x^4 + \frac{3}{2}x \\ &= 2x^4 + \frac{3x}{2}\end{aligned}$$

8)  $y = \frac{1}{2}x^5 - \frac{3}{4}x^2 + \frac{5}{3}$

$$\begin{aligned}\frac{dy}{dx} &= \frac{5}{2}x^4 - \frac{3}{2}x \\ &= \frac{5x^4}{2} - \frac{3x}{2}\end{aligned}$$

9)  $y = \frac{4}{3}$

$$\frac{dy}{dx} = 0$$

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

$$\begin{aligned}f'(x) &= -\frac{8}{3}x^3 \\ &= -\frac{8x^3}{3}\end{aligned}$$

$$11) y = 4x^{-4}$$

$$\begin{aligned}\frac{dy}{dx} &= -16x^{-5} \\ &= -\frac{16}{x^5}\end{aligned}$$

$$13) y = x^{-2} + 3x^{-5}$$

$$\begin{aligned}\frac{dy}{dx} &= -2x^{-3} - 15x^{-6} \\ &= -\frac{2}{x^3} - \frac{15}{x^6}\end{aligned}$$

$$15) y = 4x^{-2} + 4x^{-5}$$

$$\begin{aligned}\frac{dy}{dx} &= -8x^{-3} - 20x^{-6} \\ &= -\frac{8}{x^3} - \frac{20}{x^6}\end{aligned}$$

$$17) f(x) = \frac{5}{3}x^{-3}$$

$$\begin{aligned}f'(x) &= -5x^{-4} \\ &= -\frac{5}{x^4}\end{aligned}$$

$$19) y = -\frac{1}{5}x^{-4}$$

$$\begin{aligned}\frac{dy}{dx} &= \frac{4}{5}x^{-5} \\ &= \frac{4}{5x^5}\end{aligned}$$

$$12) f(x) = -x^{-1} - x^{-3} + x^{-5}$$

$$\begin{aligned}f'(x) &= x^{-2} + 3x^{-4} - 5x^{-6} \\ &= \frac{1}{x^2} + \frac{3}{x^4} - \frac{5}{x^6}\end{aligned}$$

$$14) f(x) = 3x^{-1}$$

$$\begin{aligned}f'(x) &= -3x^{-2} \\ &= -\frac{3}{x^2}\end{aligned}$$

$$16) f(x) = \frac{1}{3}x^{-2} - \frac{1}{5}x^{-5}$$

$$\begin{aligned}f'(x) &= -\frac{2}{3}x^{-3} + x^{-6} \\ &= -\frac{2}{3x^3} + \frac{1}{x^6}\end{aligned}$$

$$18) f(x) = -\frac{3}{5}x^{-1} - \frac{1}{3}x^{-4}$$

$$\begin{aligned}f'(x) &= \frac{3}{5}x^{-2} + \frac{4}{3}x^{-5} \\ &= \frac{3}{5x^2} + \frac{4}{3x^5}\end{aligned}$$

$$20) f(x) = -\frac{5}{3}x^{-2} - \frac{1}{4}x^{-4}$$

$$\begin{aligned}f'(x) &= \frac{10}{3}x^{-3} + x^{-5} \\ &= \frac{10}{3x^3} + \frac{1}{x^5}\end{aligned}$$