Differentiation (… Practice Set 1)

Differentiation - Power, Constant, and Sum Rules

Differentiate each function with respect to x.

1) $y = 5$

2) $f(x) = 5x^{18}$

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

4) $f(x) = 4x^4 - 5x - 3$

5) $y = 3x^{\frac{5}{4}}$

6) $y = \frac{5}{4}x^{\frac{2}{3}}$

7) $y = -4x^{-5}$

8) $y = \frac{3}{x^3}$

9) $y = x^{\frac{2}{3}}$

10) $f(x) = -2\sqrt[4]{x}$

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

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

Differentiation (… Practice Set 1)

Answers

Differentiate each function with respect to x.

1) $y = 5$

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

2) $f(x) = 5x^{18}$

$$f'(x) = 90x^{17}$$

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

$$\frac{dy}{dx} = 20x^4 + 1$$

4) $f(x) = 4x^4 - 5x - 3$

$$f'(x) = 16x^3 - 5$$

5) $y = 3x^{\frac{5}{4}}$

$$\frac{dy}{dx} = \frac{15x^{\frac{1}{4}}}{4}$$

6) $y = \frac{5}{4}x^{\frac{2}{3}}$

$$\frac{dy}{dx} = \frac{5}{6}x^{-\frac{1}{3}}$$
$$= \frac{5}{6x^{\frac{1}{3}}}$$

7) $y = -4x^{-5}$

$$\frac{dy}{dx} = 20x^{-6}$$
$$= \frac{20}{x^6}$$

8) $y = \frac{3}{x^3}$

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

9) $y = x^{\frac{2}{3}}$

$$\frac{dy}{dx} = \frac{2}{3}x^{-\frac{1}{3}}$$
$$= \frac{2}{3x^{\frac{1}{3}}}$$

10) $f(x) = -2\sqrt[4]{x}$

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

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

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

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

$$\frac{dy}{dx} = -2x^3 + 5x^{\frac{2}{3}} + 2$$

Differentiation (… Practice Set 1)

Differentiate each function with respect to the given variable.

13) $y = -3r^5 - 5r^2$

14) $f(s) = -\frac{3}{s^2} - \frac{4}{s^4}$

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

16) $h(s) = \sqrt{2} \cdot \sqrt[3]{s} + \sqrt{2} \cdot \sqrt[5]{s}$

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

17) $y = 5c$

18) $y = 4ax^{3a} - bx^{3c}$

Differentiation (… Practice Set 1)

Answers

Differentiate each function with respect to the given variable.

13) $y = -3r^5 - 5r^2$

$\frac{dy}{dr} = -15r^4 - 10r$

14) $f(s) = -\frac{3}{s^2} - \frac{4}{s^4}$

$f'(s) = 6s^{-3} + 16s^{-5}$

$= \frac{6}{s^3} + \frac{16}{s^5}$

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

$f'(x) = x^{\frac{1}{2}} - \frac{9}{20}x^{-\frac{2}{5}}$

$= x^{\frac{1}{2}} - \frac{9}{20x^{\frac{2}{5}}}$

16) $h(s) = \sqrt{2} \cdot \sqrt[3]{s} + \sqrt{2} \cdot \sqrt[5]{s}$

$h'(s) = \frac{1}{3}s^{-\frac{2}{3}}\sqrt{2} + \frac{1}{5}s^{-\frac{4}{5}}\sqrt{2}$

$= \frac{\sqrt{2}}{3s^{\frac{2}{3}}} + \frac{\sqrt{2}}{5s^{\frac{4}{5}}}$

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

17) $y = 5c$

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

18) $y = 4ax^{3a} - bx^{3c}$

$\frac{dy}{dx} = 12a^2x^{3a-1} - 3bcx^{3c-1}$