Kuta Software - Infinite Calculus

Name_____

Differentiation - Power, Constant, and Sum Rules

Date_____ Period____

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

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

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

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