Complete the even problems for the following 3 worksheets. The key is at the bottom of each one. Quiz on Friday over this material!

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

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

Kuta Software - Infinite Calculus Name Key

Differentiation - Power, Constant, and Sum Rules

Date_____ Period____

Differentiate each function with respect to x.

1) $y = 5$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

17) $y = 5c$

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

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

Name_____

Differentiation - Product Rule

Date_____ Period____

Differentiate each function with respect to *x*.

1) $y = -x^3(3x^4 - 2)$

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

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

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

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

6) $f(x) = (-3 + x^{-3})(-4x^3 + 3)$

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

8) $y = (x^4 + 3)(-4x^5 + 5x^4 + 5)$

9) $y = (5x^4 - 3x^2 - 1)(-5x^2 + 3)$

10) $f(x) = \left(-10x^2 - 7\sqrt[5]{x^2} + 9\right)(2x^3 + 4)$

11) $y = (5 + 3x^{-2})(4x^5 + 6x^3 + 10)$

12) $y = (-6x^4 + 2 + 6x^{-4})(6x^4 + 7)$

13) $f(x) = \left(-7x^4 + 10x^{\frac{2}{5}} + 8\right)(x^2 + 10)$

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Name_____ Key

Date_____ Period____

Differentiation - Product Rule

Differentiate each function with respect to x.

1) $y = -x^3(3x^4 - 2)$

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

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

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

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

$f'(x) = (2x^4 - 3) \cdot 2x + (x^2 + 1) \cdot 8x^3$

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

6) $f(x) = (-3 + x^{-3})(-4x^3 + 3)$

$f'(x) = (-3 + x^{-3}) \cdot -12x^2 + (-4x^3 + 3) \cdot -3x^{-4}$

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

8) $y = (x^4 + 3)(-4x^5 + 5x^4 + 5)$

$\frac{dy}{dx} = (x^4 + 3)(-20x^4 + 20x^3) + (-4x^5 + 5x^4 + 5) \cdot 4x^3$

9) $y = (5x^4 - 3x^2 - 1)(-5x^2 + 3)$

10) $f(x) = \left(-10x^2 - 7\sqrt[5]{x^2} + 9\right)(2x^3 + 4)$

$f'(x) = \left(-10x^2 - 7x^{\frac{2}{5}} + 9\right) \cdot 6x^2 + (2x^3 + 4)\left(-20x - \frac{14}{5}x^{-\frac{3}{5}}\right)$

11) $y = (5 + 3x^{-2})(4x^5 + 6x^3 + 10)$

12) $y = (-6x^4 + 2 + 6x^{-4})(6x^4 + 7)$

$\frac{dy}{dx} = (-6x^4 + 2 + 6x^{-4}) \cdot 24x^3 + (6x^4 + 7)(-24x^3 - 24x^{-5})$

13) $f(x) = \left(-7x^4 + 10x^{\frac{2}{5}} + 8\right)(x^2 + 10)$

 Name_____

Differentiation - Quotient Rule

Date_____ Period____

Differentiate each function with respect to *x*.

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

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

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

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

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

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

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

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

9) $y = \dfrac{x^3 - x^2 - 3}{x^5 + 3}$

10) $y = \dfrac{x^4 + 6}{3 - 4x^{-4}}$

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

Kuta Software - Infinite Calculus

Name _____

Date _____ Period____

Key

Differentiation - Quotient Rule

Differentiate each function with respect to *x*.

1) $y = \dfrac{2}{2x^4 - 5}$

2) $f(x) = \dfrac{2}{x^5 - 5}$

$f'(x) = -\dfrac{2 \cdot 5x^4}{(x^5 - 5)^2}$

3) $f(x) = \dfrac{5}{4x^3 + 4}$

4) $y = \dfrac{4x^3 - 3x^2}{4x^5 - 4}$

$\dfrac{dy}{dx} = \dfrac{(4x^5 - 4)(12x^2 - 6x) - (4x^3 - 3x^2) \cdot 20x^4}{(4x^5 - 4)^2}$

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

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

$\dfrac{dy}{dx} = \dfrac{(3x^4 + 5)(20x^4 + 4x) - (4x^5 + 2x^2) \cdot 12x^3}{(3x^4 + 5)^2}$

7) $y = \dfrac{4x^5 + x^2 + 4}{5x^2 - 2}$

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

$\dfrac{dy}{dx} = \dfrac{(2x^4 - 4)(12x^3 + 15x^2) - (3x^4 + 5x^3 - 5) \cdot 8x^3}{(2x^4 - 4)^2}$

9) $y = \dfrac{x^3 - x^2 - 3}{x^5 + 3}$

10) $y = \dfrac{x^4 + 6}{3 - 4x^{-4}}$

$\dfrac{dy}{dx} = \dfrac{\left(3 - 4x^{-4}\right) \cdot 4x^3 - \left(x^4 + 6\right) \cdot 16x^{-5}}{\left(3 - 4x^{-4}\right)^2}$

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