

LT 2C - Product and Quotient Rule

Date _____ Period _____

Differentiate each function with respect to x .

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

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

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

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

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

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

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

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

$$9) y = \frac{5x^5 - 2}{4x^5 + 5}$$

$$10) y = \frac{3x^3}{3x^4 + 4}$$

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

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

Answers to LT 2C - Product and Quotient Rule (ID: 1)

$$1) \frac{dy}{dx} = (-2x^4 + 1) \cdot 15x^4 + 3x^5 \cdot -8x^3 \\ = -54x^8 + 15x^4$$

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

$$5) \frac{dy}{dx} = (-x^4 + 1) \cdot 20x^3 + (5x^4 - 4) \cdot -4x^3 \\ = -40x^7 + 36x^3$$

$$7) \frac{dy}{dx} = \frac{(5x^5 - 4) \cdot 25x^4 - (5x^5 - 1) \cdot 25x^4}{(5x^5 - 4)^2} \\ = -\frac{75x^4}{25x^{10} - 40x^5 + 16}$$

$$9) \frac{dy}{dx} = \frac{(4x^5 + 5) \cdot 25x^4 - (5x^5 - 2) \cdot 20x^4}{(4x^5 + 5)^2} \\ = \frac{165x^4}{16x^{10} + 40x^5 + 25}$$

$$11) \frac{dy}{dx} = \frac{(2x^3 - 5) \cdot 20x^4 - (4x^5 - 2) \cdot 6x^2}{(2x^3 - 5)^2} \\ = \frac{16x^7 - 100x^4 + 12x^2}{4x^6 - 20x^3 + 25}$$

$$12) \frac{dy}{dx} = \frac{(2x^3 - 4)(12x^3 + 15x^2 + 6x) - (3x^4 + 5x^3 + 3x^2) \cdot 6x^2}{(2x^3 - 4)^2} \\ = \frac{3x^6 - 3x^4 - 24x^3 - 30x^2 - 12x}{2x^6 - 8x^3 + 8}$$

$$2) \frac{dy}{dx} = (-3x^5 + 3) \cdot -16x^3 + (-4x^4 + 5) \cdot -15x^4 \\ = 108x^8 - 75x^4 - 48x^3$$

$$4) \frac{dy}{dx} = -5x^5 \cdot -15x^2 + (-5x^3 - 3) \cdot -25x^4 \\ = 200x^7 + 75x^4$$

$$6) \frac{dy}{dx} = (x^5 + 2) \cdot -20x^4 + (-4x^5 + 4) \cdot 5x^4 \\ = -40x^9 - 20x^4$$

$$8) \frac{dy}{dx} = \frac{(x^2 + 5) \cdot 10x^4 - 2x^5 \cdot 2x}{(x^2 + 5)^2} \\ = \frac{6x^6 + 50x^4}{x^4 + 10x^2 + 25}$$

$$10) \frac{dy}{dx} = \frac{(3x^4 + 4) \cdot 9x^2 - 3x^3 \cdot 12x^3}{(3x^4 + 4)^2} \\ = \frac{-9x^6 + 36x^2}{9x^8 + 24x^4 + 16}$$