Topic: Quotient rule

Question: Find the derivative.

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

Answer choices:

A $y' = \dfrac{6x^2 - 20x + 3}{(3x + 5)^2}$

B $y' = \dfrac{6x^2 + 20x + 3}{3x + 5}$

C $y' = \dfrac{6x^2 + 20x + 3}{(3x + 5)^2}$

D $y' = \dfrac{6x^2 + 10x + 3}{(3x + 5)^2}$

Solution: C

Apply the quotient rule to find the derivative.

$$y' = \frac{f'(x)g(x) - f(x)g'(x)}{[g(x)]^2}$$

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

Simplify the derivative.

$$y' = \frac{(12x^2 + 20x) - (6x^2 - 3)}{(3x + 5)^2}$$

$$y' = \frac{12x^2 + 20x - 6x^2 + 3}{(3x + 5)^2}$$

$$y' = \frac{6x^2 + 20x + 3}{(3x + 5)^2}$$

Topic: Quotient rule

Question: Find the derivative.

$$y = \frac{x^2 - x + 1}{x^2 + 1}$$

Answer choices:

A $y' = \dfrac{x^2 - 1}{(x^2 + 1)^2}$

B $y' = \dfrac{x - 1}{(x^2 + 1)^2}$

C $y' = \dfrac{x^2 - 1}{x^2 + 1}$

D $y' = \dfrac{x^2}{(x^2 + 1)^2}$

Solution: A

Apply the quotient rule to find the derivative.

$$y' = \frac{f'(x)g(x) - f(x)g'(x)}{[g(x)]^2}$$

$$y' = \frac{(2x - 1)(x^2 + 1) - (x^2 - x + 1)(2x)}{(x^2 + 1)^2}$$

Simplify the derivative.

$$y' = \frac{(2x^3 + 2x - x^2 - 1) - (2x^3 - 2x^2 + 2x)}{(x^2 + 1)^2}$$

$$y' = \frac{2x^3 + 2x - x^2 - 1 - 2x^3 + 2x^2 - 2x}{(x^2 + 1)^2}$$

$$y' = \frac{x^2 - 1}{(x^2 + 1)^2}$$

Topic: Quotient rule

Question: Find the derivative.

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

Answer choices:

A $\quad y' = -\dfrac{6x}{(3x^2 + 1)^2}$

B $\quad y' = \dfrac{6x}{(3x^2 + 1)^2}$

C $\quad y' = -\dfrac{6x}{3x^2 + 1}$

D $\quad y' = -\dfrac{6}{(3x^2 + 1)^2}$

Solution: A

Apply the quotient rule to find the derivative.

$$y' = \frac{f'(x)g(x) - f(x)g'(x)}{[g(x)]^2}$$

$$y' = \frac{(0)(3x^2 + 1) - (1)(6x)}{(3x^2 + 1)^2}$$

Simplify the derivative.

$$y' = \frac{-6x}{(3x^2 + 1)^2}$$

$$y' = -\frac{6x}{(3x^2 + 1)^2}$$