

Topic: Product rule

Question: Find the derivative.

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

Answer choices:

A $y' = 5x^3 + 6x + 2$

B $y' = x^4 + 12x^2 + 2x$

C $y' = 5x^4 + 6x^2 + 2x$

D $y' = 5x^4 - 6x^2 + 2x$

Solution: C

Remember that the product rule is

$$\frac{d}{dx} [f(x) \cdot g(x)] = f'(x)g(x) + f(x)g'(x)$$

If we say that $f(x) = x^2 + 2$ and that $g(x) = x^3 + 1$, then we get

$$y' = (2x)(x^3 + 1) + (x^2 + 2)(3x^2)$$

$$y' = 2x^4 + 2x + 3x^4 + 6x^2$$

$$y' = 5x^4 + 6x^2 + 2x$$

Topic: Product rule

Question: Find the derivative.

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

Answer choices:

A $y' = 18x^4 + 10x^3 - 27x^2 - 6x + 2$

B $y' = 10x^5 + 27x^4 - 27x^2 - 6x + 2$

C $y' = 18x^5 + 10x^4 + 27x^2 - 6x + 2$

D $y' = 18x^5 + 10x^4 - 27x^2 - 6x + 2$

Solution: D

Product rule tells us that the derivative of our function will be

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

$$y' = (3x^2 + 2x) (4x^3 - 3) + (x^4 - 3x + 1) (6x + 2)$$

$$y' = (12x^5 - 9x^2 + 8x^4 - 6x) + (6x^5 + 2x^4 - 18x^2 - 6x + 6x + 2)$$

$$y' = 12x^5 - 9x^2 + 8x^4 - 6x + 6x^5 + 2x^4 - 18x^2 - 6x + 6x + 2$$

$$y' = 18x^5 + 10x^4 - 27x^2 - 6x + 2$$