

Topic: Logarithmic derivatives**Question:** Find the derivative of the logarithmic function.

$$y = \ln(x^2 - 5x)$$

Answer choices:

A $y' = \frac{2x + 5}{x^2 + 5x}$

B $y' = \frac{2x - 5}{x^2 - 5}$

C $y' = \frac{5 - 2x}{x^2 - 5x}$

D $y' = \frac{2x - 5}{x^2 - 5x}$



Solution: D

Let $u = x^2 - 5x$ and $u' = 2x - 5$. Then the function is

$$y = \ln u$$

and the derivative is

$$y' = \frac{1}{u} \cdot u'$$

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

$$y' = \frac{2x - 5}{x^2 - 5x}$$



Topic: Logarithmic derivatives**Question:** Find the derivative of the logarithmic function.

$$y = \ln \sqrt[3]{2x^3 - 5}$$

Answer choices:

A $y' = \frac{2x}{2x^3 - 5}$

B $y' = \frac{x^2}{2x^3 - 5}$

C $y' = \frac{2x^2}{2x^3 + 5}$

D $y' = \frac{2x^2}{2x^3 - 5}$



Solution: D

Let $u = \sqrt[3]{2x^3 - 5}$ and

$$u' = \frac{1}{3}(2x^3 - 5)^{-\frac{2}{3}}(6x^2)$$

$$u' = 2x^2(2x^3 - 5)^{-\frac{2}{3}}$$

Then the function is

$$y = \ln u$$

and the derivative is

$$y' = \frac{1}{u} \cdot u'$$

$$y' = \frac{1}{\sqrt[3]{2x^3 - 5}} \cdot 2x^2(2x^3 - 5)^{-\frac{2}{3}}$$

$$y' = \frac{2x^2}{(2x^3 - 5)^{\frac{2}{3}}\sqrt[3]{2x^3 - 5}}$$

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

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

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



Topic: Logarithmic derivatives**Question:** Find the derivative of the logarithmic function.

$$f(x) = 4 \ln x$$

Answer choices:

A $f'(x) = \frac{4}{x}$

B $f'(x) = 4x$

C $f'(x) = 4$

D $f'(x) = x$



Solution: A

The derivative is

$$f'(x) = 4 \left(\frac{1}{x} \right)$$

$$f'(x) = \frac{4}{x}$$

