Topic: Logarithmic derivatives

Question: Find the derivative of the logarithmic function.

$$y = 9x^2 + 2e^x \ln x$$

Answer choices:

A $y' = 18x + 2e^x \ln x + \frac{2}{x}$

B $y' = 18x + \frac{2e^x}{x}$

C $y' = 18x + 2e^x \ln x$

D $y' = 18x + 2e^x \ln x + \frac{2e^x}{x}$

Solution: D

We need to take the derivative one term at a time, applying the derivative formulas for the natural log. We'll also need to apply product rule to the second term.

$$y' = 18x + 2e^x \ln x + 2e^x \left(\frac{1}{x}\right)$$

$$y' = 18x + 2e^x \ln x + \frac{2e^x}{x}$$

Topic: Logarithmic derivatives

Question: Find the derivative of the logarithmic function.

$$y = 2^x - 3\log_2 x$$

Answer choices:

A $y' = 2^x \ln 2 - \dfrac{3}{x}$

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

C $y' = \dfrac{2^x}{\ln 2} - \dfrac{3}{x \ln 2}$

D $y' = 2^x \ln 2 - \dfrac{3}{x \ln 2}$

Solution: D

We need to take the derivative one term at a time, applying the derivative formulas for the natural log.

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

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

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

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

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