**Topic**: Logarithmic derivatives

Question: Find the derivative of the logarithmic function.

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

#### **Answer choices:**

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

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

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

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



#### 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:**

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

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

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

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



## 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:** 

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

$$\mathsf{B} \qquad f'(x) = 4x$$

$$C f'(x) = 4$$

$$D f'(x) = x$$

$$\mathsf{D} \qquad f'(x) = x$$

# Solution: A

The derivative is

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

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

