Topic: Laws of natural logs

Question: Use the product rule to simplify the expression.

$$\ln 2 + \ln 3 + \ln 4$$

Answer choices:

A $\ln 24$

B $\ln 21$

C $\ln 18$

D $\ln 15$

Solution: A

The product rule for natural logs is

$$\ln(xy) = \ln x + \ln y$$

Applying the product rule to the sum of the first two terms in the given expression:

$$\ln 2 + \ln 3 + \ln 4$$

$$\ln(2 \cdot 3) + \ln 4$$

$$\ln 6 + \ln 4$$

Applying the product rule again, we get

$$\ln(6 \cdot 4)$$

$$\ln 24$$

Topic: Laws of natural logs

Question: Use laws of natural logs to simplify the expression.

$$2\ln 8 - 6\ln 2$$

Answer choices:

A 0

B $2\ln 32$

C 16

D $-4\ln 4$

Solution: A

The power rule for natural logs is

$$n \ln x = \ln(x^n)$$

Applying the power rule to each term in the the given expression:

$$2 \ln 8 - 6 \ln 2$$

$$\ln(8^2) - \ln(2^6)$$

$$\ln 64 - \ln 64$$

$$0$$

Topic: Laws of natural logs

Question: Use laws of natural logs to simplify the expression.

$$\ln 32 - \ln 16$$

Answer choices:

A 2

B $\ln 2$

C $\ln 8$

D $\ln 16$

Solution: B

The quotient rule for natural logs is

$$\ln\left(\frac{x}{y}\right) = \ln x - \ln y$$

Applying the quotient rule to the given expression:

$$\ln 32 - \ln 16$$

$$\ln\left(\frac{32}{16}\right)$$

$$\ln 2$$