

Exercise 275

For the following exercises, use properties of logarithms to write the expressions as a sum, difference, and/or product of logarithms.

$$\ln\left(\frac{6}{\sqrt{e^3}}\right)$$

Solution

There are three properties of logarithms to know.

$$\ln(ab) = \ln a + \ln b \quad (1)$$

$$\ln\left(\frac{a}{b}\right) = \ln a - \ln b \quad (2)$$

$$\ln a^b = b \ln a \quad (3)$$

Use properties (2) and (3).

$$\begin{aligned}\ln\left(\frac{6}{\sqrt{e^3}}\right) &= \ln 6 - \ln \sqrt{e^3} \\ &= \ln 6 - \ln e^{3/2} \\ &= \ln 6 - \frac{3}{2} \ln e \\ &= \ln 6 - \frac{3}{2}(1) \\ &= \ln 6 - \frac{3}{2}\end{aligned}$$

Note that $\ln e = \log_e e = 1$ because $e^1 = e$.