

14.3 Exercises

Exercise 14.1

Combine the terms and write your answer as one logarithm.

a) $3 \ln(x) + \ln(y)$

b) $\log(x) - \frac{2}{3} \log(y)$

c) $\frac{1}{3} \log(x) - \log(y) + 4 \log(z)$

d) $\log(xy^2z^3) - \log(x^4y^3z^2)$

e) $\frac{1}{4} \ln(x) - \frac{1}{2} \ln(y) + \frac{2}{3} \ln(z)$

f) $-\ln(x^2 - 1) + \ln(x - 1)$

g) $5 \ln(x) + 2 \ln(x^4) - 3 \ln(x)$

h) $\log_5(a^2 + 10a + 9) - \log_5(a + 9) + 2$

Exercise 14.2

Write the expressions in terms of elementary logarithms $u = \log_b(x)$, $v = \log_b(y)$, and $w = \log_b(z)$ (whichever are applicable). Assume that $x, y, z > 0$.

a) $\log(x^3 \cdot y)$

b) $\log(\sqrt[3]{x^2} \cdot \sqrt[4]{y^7})$

c) $\log(\sqrt{x \cdot \sqrt[3]{y}})$

d) $\ln\left(\frac{x^3}{y^4}\right)$

e) $\ln\left(\frac{x^2}{\sqrt{y \cdot z^2}}\right)$

f) $\log_3\left(\sqrt{\frac{x \cdot y^3}{\sqrt{z}}}\right)$

g) $\log_2\left(\frac{\sqrt[4]{x^3 \cdot z}}{y^3}\right)$

h) $\log\left(\frac{100 \sqrt[5]{z}}{y^2}\right)$

i) $\ln\left(\sqrt[3]{\frac{\sqrt{y} \cdot z^4}{e^2}}\right)$

Exercise 14.3

Solve for x without using a calculator.

a) $\ln(2x + 4) = \ln(5x - 5)$

b) $\ln(x + 6) = \ln(x - 2) + \ln(3)$

c) $\log_2(x + 5) = \log_2(x) + 5$

d) $\log(x) + 1 = \log(5x + 380)$

e) $\log(x + 5) + \log(x) = \log(6)$

f) $\log_2(x) + \log_2(x - 6) = 4$

g) $\log_6(x) + \log_6(x - 16) = 2$

h) $\log_5(x - 24) + \log_5(x) = 2$

i) $\log_4(x) + \log_4(x + 6) = 2$

j) $\log_2(x + 3) + \log_2(x + 5) = 3$