

Calculus I

Homework

Exponents and logarithms review

1. Find the exact value of each expression.

(a) $\log_5 125$.

(b) $\log_3 \frac{1}{27}$.

(c) $\ln \left(\frac{1}{e} \right)$.

(d) $\log_{10} \sqrt{10}$.

(e) $e^{\ln 4.5}$.

(f) $\log_{10} 0.0001$.

(g) $\log_{1.5} 2.25$.

(h) $\log_5 4 - \log_5 500$.

(i) $\log_2 6 - \log_2 15 + \log_2 20$.

(j) $\log_3 100 - \log_3 18 - \log_3 50$.

(k) $e^{-2 \ln 5}$.

(l) $\ln \left(\ln e^{e^{10}} \right)$.

2. Use the definition of a logarithm to evaluate each of the following without using a calculator.

(a) $\log_2 16$

(b) $\log_3 \left(\frac{1}{9} \right)$

(c) $\log_{10} 1000$

(d) $\log_6 36^{-\frac{2}{3}}$

(e) $\log_2 (8\sqrt{2})$

(f) $\log_7 \left(\frac{49^x}{343^y} \right)$

3. Express each of the following as a single logarithm.

(a) $\ln 4 + \ln 6 - \ln 5$

(b) $2 \ln 2 - 3 \ln 3 + 4 \ln 4$

(c) $\ln 36 - 2 \ln 3 - 3 \ln 2$

4. Solve each equation for x . If available, use a calculator to give an (\approx) answer in decimal notation. If available, use a calculator to verify your approximate solutions.

(a) $e^{7-4x} = 7$.

(b) $\ln(2x - 9) = 2$.

(c) $\ln(x^2 - 2) = 3$.

(d) $2^{x-3} = 5$.

(e) $\ln x + \ln(x - 1) = 1$.

(f) $e^{2x+1} = t$.

(g) $\log_2(mx) = c$.

(h) $e - e^{-2x} = 1$.

(i) $8(1 + e^{-x})^{-1} = 3$.

(j) $\ln(\ln x) = 1$.

(k) $e^{e^x} = 10$.

(l) $\ln(2x + 1) = 3 - \ln x$.

(m) $e^{2x} - 4e^x + 3 = 0$.

(n) $e^{4x} + 3e^{2x} - 4 = 0$.

(o) $e^{2x} - e^x - 6 = 0$.

(p) $4^{3x} - 2^{3x+2} - 5 = 0$.

(q) $3 \cdot 2^x + 2 \left(\frac{1}{2} \right)^{x-1} - 7 = 0$.