

1. Simplify the following expressions:

- (a) $\ln e^3$
- (b) $10^{\log 7.4}$
- (c) $\log_8 16$
- (d) $\log_{25} 5$
- (e) $\log_2 8 =$
- (f) $\log \frac{1}{10} =$
- (g) $\ln e^{2.78} =$
- (h) $\log_4 64 =$
- (i) $\log_3 \frac{1}{\sqrt{27}}$

2. Write each expression as a single logarithm:

- (a) $\log 4k + \log 5k^3$
- (b) $4 \ln x - 2(\ln x^3 + 4 \ln x)$

3. Solve each equation:

- (a) $2 \cdot e^{2x+1} = 10$
- (b) $\ln(2x - 1) = 3$
- (c) $\ln(m + 3) - \ln m = \ln 2$
- (d) $2 \ln(y + 1) = \ln(y^2 - 1) + \ln 5$
- (e) $\log(m + 2) = 1$
- (f) $\log_2(3k - 2) = 4$
- (g) $\log_5 \left(\frac{5z}{z - 2} \right) = 2$
- (h) $\log_2 r + \log_2(r - 2) = 3$
- (i) $2^{3x} = \frac{1}{8}$
- (j) $\left(\frac{9}{16} \right)^x = \frac{3}{4}$
- (k) $9^{2y-1} = 27^y$
- (l) $8^p = 19$
- (m) $6^{2-m} = 2^{3m+1}$
- (n) $2 \cdot 15^{-k} = 18$