Calculus I
Homework Exponents, Logarithms
Lecture 7

1. **The problem is too easy to appear on a quiz or test.** Find the exact value of each expression.

   (a) $\log_5 125$.
   (b) $\log_3 \dfrac{1}{27}$.
   (c) $\ln\left(\dfrac{1}{e}\right)$.
   (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. **The problem is too easy to appear on a quiz or test.** Use the definition of a logarithm to evaluate each of the following without using a calculator.

   (a) $\log_2 16$
   (b) $\log_3\left(\dfrac{1}{9}\right)$
   (c) $\log_{10} 1000$
   (d) $\log_6 36^{-\frac{2}{3}}$
   (e) $\log_2(8\sqrt{2})$
   (f) $\log_7\left(\dfrac{49^x}{343^y}\right)$

3. **The problem is too easy to appear on a quiz or test.** 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) $3\cdot 2^x + 2\left(\frac{1}{2}\right)^{x-1} - 7 = 0$.