Handout 16: 3.9 Logarithms

1. Solve the following for *x*:
   a. $\log_2(x) = -1$
   b. $\log_x(1) = 0$
   c. $x = \log_4 \sqrt[3]{16}$

2. Simplify the following completely:
   a. $3\log_b b - \log_b 1$
   b. $\frac{1}{2}\log_b 64 + \log_b 8 - 3\log_b 4$
   c. $5^{\log_5 3 + \log_5 7}$
   d. $\log_b(b^2 \log_b(b \log_b(b)))$
   e. $\frac{1}{2}\log_a(8x^2) - \frac{1}{6}\log_a(8x^3)$

3. If $\log_w 2 = a$ and $\log_w 3 = b$, express the following in terms of a and b.
   a. $\log_w 6$
   b. $\log_w \left(\frac{2}{3}\right)$
   c. $\log_w \left(\frac{1}{2}\right)$
   d. $\log_w \left(\frac{16}{9}\right)$
   e. $\log_w \sqrt[5]{6}$

4. Given that $\log_a x = 2$, $\log_a y = 3$, and $\log_a z = 4$, find the value of $\log_a \left(\frac{\sqrt[4]{y^2 z^5}}{\sqrt[4]{x^3 z^{-2}}}\right)$.

5. Decide whether the following are true or false.
   a. $\frac{\log 8}{\log 3} = \log 8 - \log 3$
   b. If $C = a^b$ then $\ln a = \frac{1}{b}\ln C$
   c. $\frac{\log_4(9)}{\log_4(3)} = 3$