Name _____ Date _____

Practice 5.3: Properties of Logs

1. Use the change of base formula to rewrite the following as quotients of common and natural logs. For example: $\log_3(5) = \frac{\log(5)}{\log(3)} = \frac{\ln(5)}{\ln(3)}$

a. $log_4(11)$ **b.** $ln\ (6)$

2. Use change of base formula to calculate the following logs with common log.

a. $log_3(7)$ **b.** $log_9(0.4)$ **c.** $log_{16}(4.1)$

3. Use change of base formula to calculate the following logs with natural log.

a. $log_3(7)$ **b.** $log_9(0.4)$ **c.** $log_{16}(4.1)$

4. Use the properties of logarithms to write the expressions as the sum, difference and/or the constant multiple of logs. For example: $\log_3(5x) = \log_3(5) + \log_3(x)$

a. $log_4(7z)$ **b.** $ln\ (3x)$

c. $\log_4\left(\frac{x}{2}\right)$ **d.** $\ln\left(\frac{5}{y}\right)$

e. $log\ (x^6)$ **f.** $ln\ (a)^8$

g. $\log\left(\frac{9}{x}\right)^{-1}$ **h.** $\ln(2x)^4$

i. $\log\sqrt{x}$ **j.** $\ln\sqrt[3]{5x}$

k. $\log(xyz)$ **l.** $\ln\left(\frac{xy}{e}\right)$

5. Use the properties of logarithms to rewrite the expressions as a single log. For example: $\log_3(5)+\log_3(x)=\log_3(5x)$

a. $log_4(7) + log_4(z)$

b. $ln(3) - ln(x)$

c. $3log_4(7)$

d. $-4ln(2)$

e. $\frac{1}{2}\log(x)$

f. $2ln(a) + 3\ ln(b)$

g. $\frac{1}{3}\ln(x)-4\ln(y)$

h. $4\log(x)+\frac{1}{2}\log(y)-3\log(z)$

6. Use the properties of logarithms simplify the following if $\log_x(2) = 1.4$, $\log_x(3) = 2.6$, and $\log_x(5) = 4.8$. For example: $\log_x(6)=\log_x(2\bullet 3)=\log_x(2)+\log_x(3)=1.4+2.6=4.0$

a. $log_x(10)$

b. $log_x(30)$

c. $\log_x\left(\frac{3}{5}\right)$

d. $\log_x(15)^2$

e. $\log_x\sqrt{2}$

f. $\log_x\sqrt[3]{75}$

g. $\log_x 1$

h. $\log_x\sqrt{2x}$