

# QUIZ 13

This quiz covers section 4.3, 4.4, 4.5.

**Exercise 1:** Use properties of logarithms to condense the logarithmic expression:

$$\frac{1}{3}(\log_4 x - \log_4 y) \quad (2 \text{ points})$$

**Exercise 2:** The loudness level of a sound can be expressed by comparing the sound's intensity to the intensity of a sound barely audible to the human ear. The formula

$D = 10(\log I - \log I_0)$  describes the loudness level of a sound,  $D$ , in decibels, where  $I_0$  is the intensity of the sound, in watts per square meter, and  $I_0$  is the intensity of a sound barely audible to the human ear.

- a) Express the formula so that the expression in parentheses is written as a single logarithm.
- b) Use the form of formula from part (a) to answer this question: If a sound has an intensity 100 times the intensity of a softer sound, how much larger on the decibel scale is the loudness level of the more intense sound? (1+2 points)

**Exercise 3:** Solve each logarithmic equation. Be sure to reject any value of  $x$  that is not in the domain of the original logarithmic expressions. Give the exact answer.

a)  $\ln \sqrt{x+3} = 2$

b)  $\log_2(x+2) - \log_2(x-1) = 3$  (1+2 points)

**Exercise 4:** Use the exponential growth model,  $A = A_0 e^{kt}$ , to show that the time it takes a population to triple (to grow from  $A_0$  to  $3A_0$ ) is given by  $t = \frac{\ln 3}{k}$ . (2 points)