Review: In a – d, express as a single logarithm.

a. $2\log_x 4 - 3\log_x y$

b. $4\log_k w + 2\log_k 9$

c. $7\log_5 t + 3\log_5 k - 2\log_5 g$

d. $\dfrac{4\log_3 k}{3}$

e. The formula for earthquake magnitude is $M = \log\dfrac{x}{0.001}$ where x is the seismographic reading of the earth quake in mm. Express the formula in expanded form.

Example 1: Write each logarithm in terms of ln 2 and ln 5.

a. $\ln 10 =$

b. $\ln\dfrac{25}{2} =$

Example 2: Use the properties of logarithms to rewrite and simplify the logarithmic expression.

a. $\log_2 8 =$

b. $\ln(5e^6) =$

Example 3: Find the exact value of each expression without using a calculator.

a. $\log_3 9 =$

b. $\log_7 \sqrt[5]{7} =$

c. $\ln e^{12} + \ln e^5 =$

Example 4: Expand each Logarithmic Expression.

a. $\log 3x^2 y =$

b. $\ln \dfrac{\sqrt{4x+1}}{8} =$

c. $\log_2 xyz^3 =$

Example 5: Condense each Logarithmic Expression.

a. $\dfrac{1}{3}\log x + 5\log(x-3)$

b. $4\ln(x-4) - 2\ln x$

c. $\dfrac{1}{5}\left[\log_3 x + \log_3(x+1)\right]$

Example 6: A pebble is dropped into a calm pond, causing ripples in the form of concentric circles. The table below gives the radius *r* and the area *A* of the outer ripple in feet. Find an equation that expresses *A* as a function of *r*.

r	**0.6**	**1.2**	**1.8**	**2.4**	**3.0**	**3.6**
A	**1.131**	**4.524**	**10.179**	**18.096**	**28.274**	**40.715**

***Step 1*:** Rewrite the table by taking the natural log of each number.

ln *r*						
ln *A*						

Step 2: Find the slope

Remember m is slope so in this case,

$$m = \frac{\ln y_2 - \ln y_1}{\ln x_2 - \ln x_1}$$

Step 3: Write the equation**.**

Instead of using $y = mx + b$,

use $\ln y = m \ln x + b$

Homework: Page 241 #29-43 odd, 67-81 odd, 87, 91, 95