Name:

HW 9: §4.1-4.4

Complete the following problems to the best of your ability. **SHOW ALL OF YOUR WORK.** Unshown work will not be graded. You may use a calculator.

1. Evaluate the following.

   (a) $\log_3(81)$

   $= 4$ since $3^4 = 81$

   (b) $\ln(e^4)$ $= 4$

   (c) $\log(1000)$

   $= 3$

   (d) $\log_{2016}(1)$

   $= 0$

2. Expand the following expressions as much as possible.

   (a) $\log_2\left(\frac{8x^2\sqrt[3]{y}}{z^4}\right)$

   $= \log_2(8) + \log_2(x^2) + \log_2(y^{\frac{1}{3}}) - \log_2(z^4)$
   $= 3 + 2\log_2(x) + \frac{1}{3}\log_2(y) - 4\log_2(z)$

   (b) $\log\left(100a^4b^{-4}\right)$

   $= \log(100) + \log(a^4) + \log(b^{-4})$
   $= 2 + 4\log(a) - 4\log(b)$

3. Write the following expressions using one logarithm.

(a) $2\log(x) - \frac{1}{2}\log(y) - \log(z)$

$= \log(x^2) - \log(\sqrt{y}) - \log(z) = \log\left(\frac{x^2}{\sqrt{y}\,z}\right)$

(b) $4 + \log_2(x) - 2\log_2(y)$

$= \log_2(16) + \log_2(x) - \log_2(y^2)$

$= \log_2\left(\frac{16x}{y^2}\right)$

4. Convert the function $y = 25(1.04)^x$ into an exponential function of base e.

$25(1.04)^x = 25\, e^x \qquad k = \ln(a) = \ln(1.04) = .039$

$y = 25\, e^{.039x}$

5. Suppose Tabitha is taking out a loan for $2000 at an interest rate of 5%, compounded continuously.

(a) Write a function that gives the amount Tabitha owes on the loan as a function of the number of years that have passed.

$A(t) = 2000\, e^{.05t}$

(b) How much does Tabitha owe after 10 years?

$A(10) = \$3297.44$

Optional Problems:
4.1: All
4.2: 1-24, 33-38
4.4: 1-16, 23-55