Math 103 – Section 9.3 – Logarithms

1. How are exponential functions and logarithmic functions related?

2. Write the definition of a logarithm.

3. Write in exponential form

a. $\log_2 16 = 4$	b. $\log_{1/3} 9 = -2$
c. $\log_5 625 = 4$	d. $\log_8 2 = \frac{1}{3}$

4. Find each of the following logs

$\log_3 9 =$	$\log_3 81 =$
$\log_5 125 =$	$\log_{1/2} 32 =$
$\log_7 \frac{1}{49} =$	$\log_2 128 =$

5. What is a common log? What do we mean by $\log 100$?

6. What is a natural log? What do we mean by ln 5?

Change Exponential Expressions to Logarithmic Expressions
Change Logarithmic Expressions to Exponential Expressions

Exponential Form	Logarithmic Form
$3^4 = 81$	
	$\log_5 25 = 2$
$2^{-4} = \frac{1}{16}$	
	$\log_4 64 = 3$
	$\log 1000 = 3$
$e^2 = 7.389$	
	$\log x = 2$
$e^x = 2$	
	$\log_2 x = 3$
$7^x = 15$	

Section 9.4
Evaluating Logarithms

1) $\log_3 9 =$ because

2) $\log_2 8 =$ because

3) $\log_8 1 =$ because

4) $\log_6 6 =$ because

5) $\log_{16} 4 =$ because

6) $\log_3 \frac{1}{3} =$ because

7) $\log_8 2 =$ because

8) $\log \frac{1}{1000} =$ because

9) $\log_2 2^3 =$ because

10) $\log 10^4 =$ because

11) $\ln e^5 =$ because

12) $\ln e^{3.5} =$ because

13) $\log_2(\log_3 9) =$

14) $\log_2(\log 100) =$

15) Now answer each of the following:

a)
$\log_8 1 =$
$\log_3 1 =$
$\log 1 =$
$\ln 1 =$
$\log_b 1 =$

b)
$\log_8 8 =$
$\log_3 3 =$
$\log 10 =$
$\ln e =$
$\log_b b =$

c)
$\ln e^{1.5} =$
$\ln e^{3} =$
$\ln e^{-1} =$
$\ln e^{2.8} =$
$\ln e^{x} =$

d)
$\log 10^{4} =$
$\log 10^{2} =$
$\log 10^{3} =$
$\log 10^{-1} =$
$\log 10^{x} =$

e)
$\log_2 2^{4} =$
$\log_3 3^{2} =$
$\log_4 4^{3} =$
$\log 10^{-1} =$
$\ln e^{3.1}$
$\log_b b^{x} =$

f)
$e^{\ln 2} =$
$e^{\ln 1.2} =$
$e^{\ln x} =$

g)
$10^{\log 1000} =$
$10^{\log 10000} =$
$10^{\log 1.7} =$
$10^{\log x} =$

h)
$2^{\log_2 8} =$
$3^{\log_3 9} =$
$4^{\log_4 16} =$
$2^{\log_2 1.98} =$
$b^{\log_b x} =$