

**Math 105 - Homework 9**

Name: \_\_\_\_\_

*Express the following numbers as powers of 10.*

1. 10,000,000

2.  $\frac{1}{1000}$

3. 0.00001

4. 100 billion

*Compute the following logarithms without a calculator.*

5.  $\log_2(64)$

6.  $\log_5(5 \cdot 5 \cdot 5 \cdot 5)$

7.  $\log_3\left(\frac{1}{81}\right)$

8.  $\ln\left(\frac{1}{\sqrt{e}}\right)$

*Solve the following without a calculator.*

9.  $2^7 \cdot 2^n = \frac{1}{2^4}$

10.  $(10^3)^m = 1,000,000$

11.  $6^x = \frac{1}{36}$

12.  $\frac{2^{10}}{2^x} = 4$

13.  $4^{50} = 2^n$

14.  $2^{-3} = 10^{-2}x$

15.  $\log_4(x) = 2.5$

16.  $\log_{10}(x) = -2$

17.  $\log_x(36) = 2$

Use the natural log function and its properties to find the solution. Do not use a calculator (it's okay if your answer is a formula as long as you have solved for  $x$ ).

18.  $e^x = 4$

19.  $(1.05)^x = 2$

20.  $500(1.01)^x = 600$

21. Find all values of  $x$  for which  $2^{(x^2)} < 16$ .

22. An investment with a 5% annual interest rate with grow by a factor of  $F = (1.05)^y$  where  $y$  is the time in years. Find the inverse of this function, i.e., find a function for the number of years  $y$  it will take for the investment to grow by a factor of  $F$ .