Math 105 - Homework 10 **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. An investment with a 5% annual interest rate will 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.