

Student Name: _____

Show all relevant work (use back of pages for scratch paper, if needed). **CIRCLE FINAL ANSWERS.**
Each problem is worth 7 points.

1. Evaluate each expression (do not use a calculator or decimal places):

a) $\log_6 18 + \log_6 12$

b) $\ln e^4$

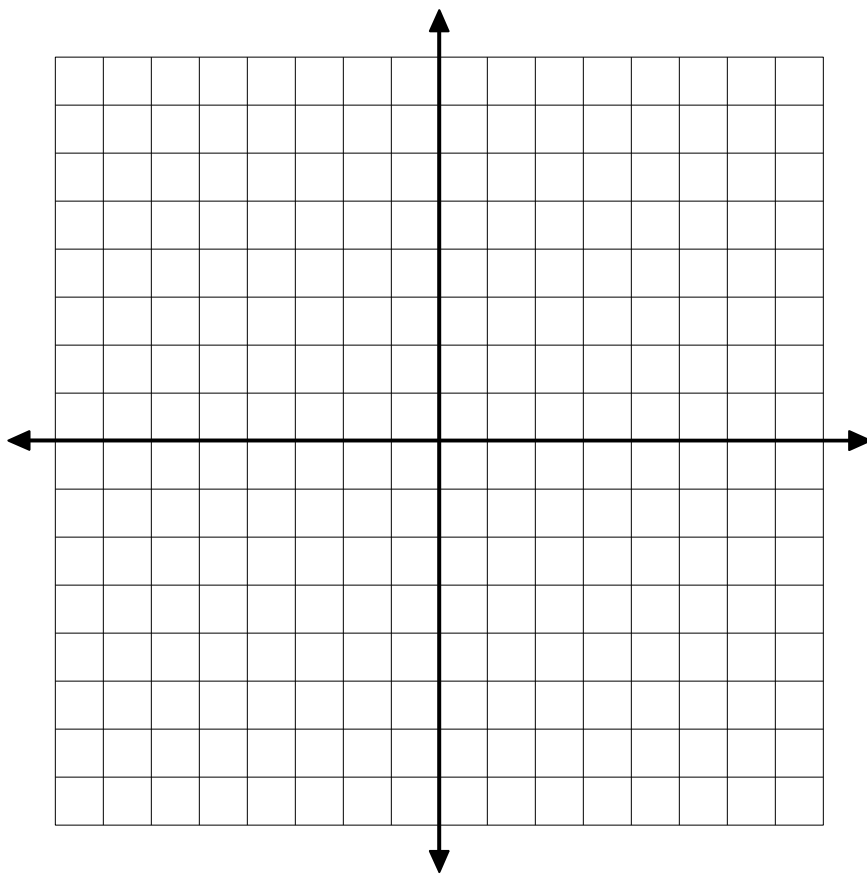
2. Evaluate: $\log_{13} 1278$ (use calculator to four decimal places).

3. Combine each expression into a single logarithm and simplify, if possible:

a) $\log_4(x^2 - 5x + 6) - \log_4(x - 3)$

b) $\ln 2 + \ln(x+1) - 4\ln(3x+7)$

4. Sketch the graph of $h(x) = 4 - \left(\frac{1}{2}\right)^{x+2}$.



5. A sum of \$1000 is invested at an interest rate of 7% per year. Find the time (in years, to two decimal places) required for the money to triple if the interest is compounded:

a) quarterly (that is, four times per year).

b) continuously

6. Find the solution to each equation; you may leave the answer in exact form, or rounded to three decimal places:

a) $3^{x+2}=17$

b) $e^{3-5x}=16$

c) $2\log_5(3x-4)=6$

d) $x^2 10^x - x 10^x = 2(10^x)$

7. Iodine-135 is a radioactive element with a half-life of 8 days. If you currently have a 320 mg sample of this substance, how many days (to two decimal places) will it take to decay down to 60 mg?

8. The initial population of a colony of rabbits is 106, and it is known to double every 17 days.

a) How many rabbits would you expect to be in the colony after 80 days?

b) Calculate the relative growth rate, r , of the colony.