Chapter 8
Logarithmic Functions Assignment

1. a) Write $2^5 = 32$ in logarithmic form.

b) Write $\log_3 m = n$ in exponential form.

2. Use the definition of a logarithm to evaluate $\log_3 81$. Show all work.

3. Determine the value of x in each.. Show all work.

a) $\log_5 x = 3$

b) $\log_x 8 = \dfrac{3}{4}$

4. Rewrite each expression as a single logarithm.

a) $\log_3 x^2 + 3\log_3 x - \log_3 x$

b) $\log x - 3\log y + \dfrac{2}{3}\log z$

5. Use the laws of logarithms to simplify to a single log and then evaluate each expression.

a) $\log_6 3 + \log_6 12$

b) $2\log_2 12 - (\log_2 6 + \dfrac{1}{3}\log_2 27)$

6. Write each expression as a single logarithm in simplest form.

a) $2 \log x + 3 \log \sqrt{x} - \log x^3$ b) $\log(x^2 - 25) - 2 \log(x + 5)$

6. Use the laws of logarithms to isolate x in the expression $\log_5 25x = 3$.

7. State the transformations, in order of application, to transform $y = \log_c x$ to $y = 3\log_5\left(4(x-2)\right)+6$.

8. Write the equations that correspond to the following transformations of $y = \log_5 x$

a) vertically stretched by a factor of 2 and translated 3 units to the left

b) reflected on the x-axis, stretched horizontally by a factor or ½ , translated 3 units to the right and 4 units up

9. For the equation $y = 3\log_5\big(6(x-2)\big) - 4$, state:
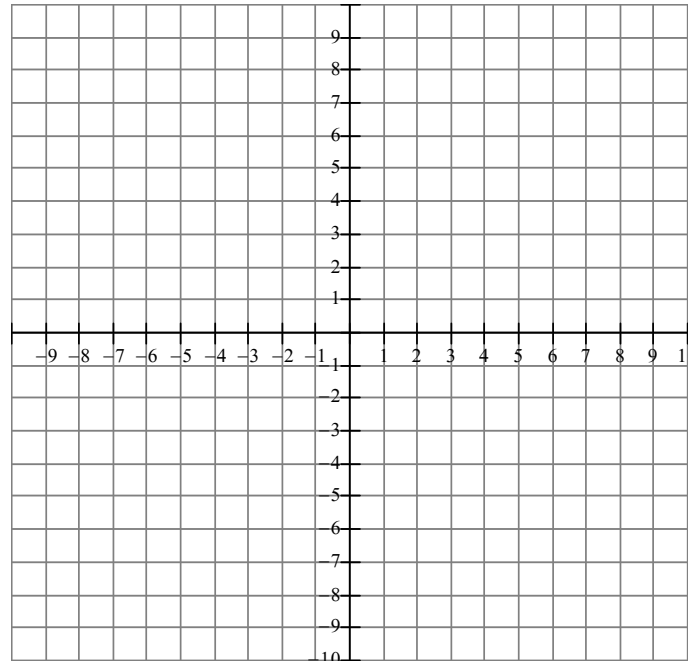
a) domain

b) range

c) equation of the asymptote

d) x-intercept (if it exists)
e) y-intercept (if it exists)

10. Sketch the graph of $y = -\log_4(x+1) - 8$. Show your work (chart) and do not use a graphing calculator.

Domain:_____

Range:_____

Asymptote(s):_____

11. Solve. Check for extraneous roots.

a) $\log_6(x-3)+\log_6(x+6)=2$

b) $\log x + \log(x-1) = \log(4x)$

12. Solve. Express your answer as an exact value (with logs) and as a decimal value correct to the nearest hundredth.

a) $3^{2x+1} = 75$

b) $2^{2x-5} = 6^{x+2}$

13. A water filter removes 40% of the impurities in a sample of water.
a) Write an exponential equation to determine the percent of impurities remaining, P, after the water has passed through n filters.

b) What percent of impurities will remain after the water has passed through 3 filters?

c) How many filters are needed to remove at least 99% of impurities in the water?

14. According to Kleiber's law, a mammal's resting metabolic rate, R, in kilocalories per day, is related to its mass, m, in kilograms, by the equation
$$\log R = \log 73.3 + 0.75 \log m$$
Predict the mass of a wolf with a resting metabolic rate of 1050 kCal/day. Answer to the nearest kilogram.