Alg2 Homework, due Wednesday, Jan 24

1. **Rewrite each of the following in the form $\mathbf{WhatPower}_b(x) = L$.**

   a. $3^5 = 243$ b. $6^{-3} = \frac{1}{216}$ c. $9^0 = 1$

2. **Rewrite each of the following in the form $\log_b(x) = L$.**

   a. $16^{\frac{1}{4}} = 2$ b. $10^3 = 1,000$ c. $b^k = r$

3. **Rewrite each of the following in the form $b^L = x$.**

   a. $\log_5(625) = 4$ b. $\log_{10}(0.1) = -1$ c. $\log_{27} 9 = \frac{2}{3}$

4. **Consider the logarithms base 2. For each logarithmic expression below, either calculate the value of the expression, or explain why the expression does not make sense.**

   a. $\log_2(1024)$

   b. $\log_2(128)$

   c. $\log_2(\sqrt{8})$

   d. $\log_2\left(\frac{1}{16}\right)$

   e. $\log_2(0)$

   f. $\log_2\left(-\frac{1}{32}\right)$

5. **Consider the logarithms base 3. For each logarithmic expression below, either calculate the value of the expression, or explain why the expression does not make sense.**

   a. $\log_3(243)$

   b. $\log_3(27)$

   c. $\log_3(1)$

   d. $\log_3\left(\frac{1}{3}\right)$

   e. $\log_3(0)$

   f. $\log_3\left(-\frac{1}{3}\right)$

6. **Consider the logarithms base 5. For each logarithmic expression below, either calculate the value of the expression, or explain why the expression does not make sense.**

   a. $\log_5(3125)$

   b. $\log_5(25)$

   c. $\log_5(1)$

   d. $\log_5\left(\frac{1}{25}\right)$

   e. $\log_5(0)$

   f. $\log_5\left(-\frac{1}{25}\right)$

7. Is there any positive number b so that the expression $\log_b(0)$ makes sense? Explain how you know.

8. Is there any positive number b so that the expression $\log_b(-1)$ makes sense? Explain how you know.

9. Verify each of the following by evaluating the logarithms.

   a. $\log_2(8) + \log_2(4) = \log_2(32)$

   b. $\log_3(9) + \log_3(9) = \log_3(81)$

   c. $\log_4(4) + \log_4(16) = \log_4(64)$

   d. $\log_{10}(10^3) + \log_{10}(10^4) = \log_{10}(10^7)$

10. Looking at the results from Problem 9, do you notice a trend or pattern? Can you make a general statement about the value of $\log_b(x) + \log_b(y)$?