HOMEWORK 5 - MATH 111

DUE DATE: Monday, March 8

INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. Each question is worth 1 point. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. Pick the three "critical" points and graph the functions $f(x) = 3^x, g(x) = (\frac{1}{2})^x$ and $h(x) = 7^{x-1} - 1$.

2. Solve the exponential equation $2003^{x^2+2004x} = 1$.

3. The population of a certain culture in your biology lab is following the exponential growth model $y = y_0 e^{kt}$, where y is the number of individuals in the culture and t is time in hours. If the culture consists initially of 100 individuals and in 3 hours has 1000 individuals, find the values of the constants y_0 and k in the growth model.

4. Find the values of the following logarithms without using a calculator

$$\log_9 81, \log 2\frac{1}{16}, \ln \sqrt[5]{e}, \log_{10} 0.00001.$$

5. Find the domains of the functions $f(x) = \log_{2003}(x^2 - 23x + 22)$ and $g(x) = \log_{2003} \frac{x-2004}{2005-x}$.

6. Pick the three "critical" points and graph on the same system of axes the functions $f(x) = \log_3 x, g(x) = \log_{\frac{1}{3}} x$ and $h(x) = \log_3(-x)$.

7. Expand or contract as appropriate using your logarithmic identities:

   (a) $5 \log y - 13 \log x$

   (b) $2 \ln(x + 5) - \frac{1}{2} \ln(x + 2)$

   (c) $\log \frac{z^3}{\sqrt{x^3 z}}$

8. Solve the equations

   (a) $\log_3(y + 2) = \log_3(y - 7) + \log_3 4$

   (b) $10e^{3z-7} = 5$

   (c) $(\log_2(\log_2(\log_2 x)) = 1.$