TEST 7 - MATH 140

DATE: Friday, February 24

INSTRUCTOR: George Voutsadakis

Read each problem very carefully before starting to solve it. Each question is worth 5 points. It is necessary to show your work. Correct answers without explanations are worth 0 points.

GOOD LUCK!!

1. (a) Convert the logarithmic expression $\log_7 x = 13$ to an exponential. (1 point)
   (b) Convert the exponential expression $3^x = 18$ to a logarithmic. (1 point)
   (c) Find the exact value of $\log_{\sqrt{2}} 16$. (1 point)
   (d) Solve the logarithmic equation $\log_3 (x^2 + 1) = 2$. (2 points)
2. (a) Use a small 3-value table to roughly sketch the graph of the function $f(x) = \log_4 x$. (1 point)
   (b) Describe the transformations that may be performed to obtain from the graph of f the graph of the function $g(x) = 2 \log_4 (3 - x)$. (2 points)
   (c) Use the information in the previous two parts to sketch the graph of g. (2 points)
3. (a) Calculate the value of the expression $\log_2 6 \cdot \log_6 4$. (1 point)
   (b) Calculate the value of the expression $3^{\log_3 5 - \log_3 4}$. (1 point)
   (c) Find the domain of the function $f(x) = \log_{2006} \frac{x^2-2x-24}{x-1}$. (3 points)
4. (a) Convert to a sum-difference of logarithms the expression $\ln \frac{5x\sqrt{1-3x}}{(x-4)^3}$. (2 points)
   (b) Convert into a single logarithm the expression $3 \log_5 (3x + 1) - 2 \log_5 (2x - 1) - \log_5 x$. (2 points)
   (c) Change to base 2006 the logarithmic expression $\log_{2005} (x - 7)$. (1 point)
5. Solve the following logarithmic equations:
   (a) $\log_7 x + \log_7 (x - 2) = \log_7 (x + 4)$ (2 points)
   (b) $\log_2 (3x + 2) - \log_4 x = 3$ (2 points)
   (c) $\log_2 (\log_2 (\log_2 x)) = 1$ (1 point)