EXAM 4 - MATH 111

YOUR NAME:_____

Friday, April 17

George Voutsadakis

Read each problem **very carefully** before starting to solve it. Each problem is worth 10 points. It is necessary to show **all** your work. Correct answers without explanations are worth 0 points. GOOD LUCK!!

1. Consider the following table of data:

t	1	2	3	4	5	6
y	15.246	15.779	16.331	16.903	17.495	18.107

   (a) Check manually showing all steps whether the data are exponential.

   (b) If yes, find **manually** an exponential model; If not find an exponential model using exponential regression.

   (c) Use the model to predict the time t when y will reach 36.

2. Suppose that $\log_b x = 10$ and $\log_b y = 2$. Find manually the exact value of the following expressions:

   $$\log_b \frac{\sqrt{x}}{y} =$$

   $$\log_b \frac{y^5}{x} =$$

   $$\log_b (bxy) =$$

3. Recall the formula giving the size R in the Richter scale of an earthquake based on its intensity I, which is $R = \log \left(\frac{I}{I_0}\right)$. An earthquake in Algeria measured 4.81 on the Richter scale whereas one in China measured 7.9 on the Richter scale.

   (a) How many times more powerful was the Chinese earthquake than the Algerian one?

   (b) An earthquake that hit Japan was 15488 times stronger than the Algerian earthquake. What was the Japanese earthquake Richter scale measurement?

4. Solve the following logarithmic equation manually.
$$2 \log x - 2 = \log (x - 25).$$

5. Consider the following data:

x	-2	-1	0	1	2	3	4
y	0	-3	0	-3	0	45	192

(a) Check manually (showing all details) whether the data are cubic or quartic.

(b) Use cubic or quartic regression, as appropriate, to find the right model for the given data.

(c) Sketch a graph of the model (without the data points) labeling carefully all x- and y-intercepts and all turning points (local max and min points).
(Please, do as good a job as you possibly can.)