HOMEWORK 5 - MATH 111 DUE DATE: Monday, March 7 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. Use the basic graphs of exponentials together with graphing techniques (shifts and reflections) to sketch the graph of the exponential function $f(x) = -2^{x-3}$. (Detail me on all the transformations used.)
- 2. Suppose that an investment grows exponentially from \$700 to \$900 in 5 years. Find a function of the form $f(t) = y_0 b^t$ that gives the value of the investment after t years.
- 3. The population of fish in a pond at t months from today is given by $f(t) = 300 200e^{-0.5t}$. Find how many fish there are in the pond today and how many fish there will be in the pond eventually. (Limiting value as t goes to infinity.)
- 4. Use you basic knowledge of logarithmic functions and your graphing techniques to find the domain and to plot the graph of the function $f(x) = \log_{1/3} (x+2)$. (Detail me on all the transformations used.)
- 5. Use you basic knowledge of logarithmic functions and your graphing techniques to find the domain and to plot the graph of the function $f(x) = \log_7 (3 x)$. (Detail me on all the transformations used.)
- 6. Expand or write as a single logarithm, as appropriate, the following expressions:
 - (a) $\log 9 + \log 27 \log 3$

(b)
$$\ln \frac{\sqrt{xx}}{x^2y}$$

- 7. Solve the exponential equations
 - (a) $81^{-2x} = 3^{x-1}$
 - (b) $4^{3x-1} = 3^{x-2}$
 - (c) $5(e^{2x} 2) = 15$
- 8. Solve the logarithmic equations
 - (a) $\ln(2x+1) 1 = \ln(x-2)$
 - (b) $\log_2(\log_3(\log_2 x)) = 1$