MATH 113 – PRACTICE TEST 3 (4.3 – 5.6 & 6.1) Work on other pages and number all your work. **Hand in a photocopy** –keep your original to use for the in-class review. Write your name on all pages.

Instructions: Point values are in [ ] brackets—this assignment will be worth a total of 20 points (instead of the usual 10). Mark your answers clearly and write them in simplified form. **You must show all appropriate work in order to receive full credit for an answer.** Show work algebraically and find exact answers unless otherwise indicated.

1. [2] Solve the following system of equations. Show your work algebraically and write your answer as an ordered pair: $y = -x^2 + 2x - 3$ and $y = x - 5$

2. [2]Solve for *t* algebraically, showing all of your work: $\log_2(t+4) + \log_2(t+3) = 1$

3. [1] The population of a city is given by $P = 80{,}000e^{0.035t}$ where $t = 0$ corresponds to the year 1995. Determine the year during which the population will be double what it was in 1995.

4. (a) [1] Use properties of logarithms to write the following as a single log expression: $\frac{2}{3}\ln x^3 - \frac{5}{2}\ln x^6$

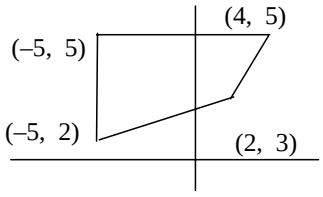
   (b) [1] Evaluate the following, writing your answer as a decimal correct to 3 decimal places: $\log_{12} 47$

5. A parabola, $y = ax^2 + bx + c$, passes through the points $(0, 3)$, $(1, 4)$, and $(2, 9)$.
   (a) [1] Determine a system of equations you could use to find the equation of the parabola.
   (b) [2] Solve the system algebraically (show your work) and give the equation of the parabola.

6. The half-life for a radioactive isotope is 1620 years, and it decays according to the model $y = 90e^{kt}$.
   a) [1] Find the value of *k*. Show your algebraic work and give an exact answer.
   b) [1] Use your answer to determine how long it would take for the isotope to decay to 50 g. Give both an exact answer and a decimal approximation to the nearest hundredth.

7. [1] The level of sound, β, in decibels, of a sound with an intensity of *I* is given by the function $\beta(I) = 10\log_{10}\frac{I}{I_0}$ where I_0 is an intensity of 10^{-16} watts per square centimeter.
   Determine the level of sound in decibels if the intensity is 10^{-9} watts per cm^2.

8.a) [2] Graph the following system of inequalities: $y \geq x^2 + 2$ and $x - y < -4$. Label your solution set "S".
   b) [1] Find the maximum and minimum of the objective function $P = 2x + 4y$ given the feasible set pictured to the right.



9. [1] A furniture company makes sofas and recliners. Each sofa requires 4 hours for assembly and 2 hours for covering. Recliners require 3 hours for assembly and 5 hours for covering. The profit for sofas is $95 each, and the profit for recliners is $110. The company has 150 work-hours available for assembling furniture and 190 work-hours available for covering. The company wants to maximize its profit. Let *x* = the number of sofas and let *y* = the number of recliners. Write the objective function and the system of constraints. DO NOT SOLVE.

10. (a) [1] Write the augmented matrix that is associated with the following system of equations:

$$x + 4y + 2z = 1$$
$$2x + y + z = 3$$
$$x + y - 3z = -6$$

   (b) [2] Solve the above system of equations either algebraically or using matrices. Show your work neatly and clearly.

Copy the following pledge and sign your name:

I pledge on my honor that I have not given or received any unauthorized assistance on this practice test.