Homework #2 Name: _____

Math 131 Section: _____ Row: _____

This assignment is due by 5:00 pm on Febuary 1, 2007 You can turn it in to me in class or drop it by the office, **Blocker 640D**. Be sure that you follow the homework rules, they can be found on your syllabus. Please work the problems in the order that they are listed.

Give all answers to at least 4 decimal digits. Be careful to not round intermediate steps since this can cause problems with your final answer.

1. Find the following for each of the exponential formulas.
   I) Give the the relative growth/decay rate. Be sure to indicate if it is growth or decay.
   II) Give the continuous growth/decay rate. Be sure to indicate if it is growth or decay.

   (a) $y = 300 * (.91)^x$

   (b) $y = 267 * (1.415)^x$

   (c) $y = 100e^{-.256x}$

2. An air-freshener starts with 70 grams and evaporates at 12% per day.

   (a) Give a formula for the quantity, Q grams, of air-freshener remaining t days after the start.

   (b) What is the half-life of this air-freshener?

   (c) At your friends house you notice the same type of air-freshener and it only has 24.67 grams remaining. How long has this air-freshener been operating?

3. The Interstellar Association of Biologist placed 250 rabbits on a planet that has the magical property of always having enough food for all of the rabbits. Five years later the association recorded the size of the population of rabbits and noted that while the population was growing exponentially, the population had an average growth rate of 350 rabbits per year over that period.

   (a) Find an exponential formula that will give the population of rabbits as a function of time(in years).

   (b) What is the relative growth rate for the population?

   (c) What is the continuous growth rate for the population?

4. Given $\log_b 5 = 2.3219$, $\log_b 7 = 2.8074$, and $\log_b 3 = 1.585$, use the properties of logarithms to find

   (a) $\log_b \frac{35}{b^2}$

   (b) $\log_b(27b^5)$

5. Solve for x.

   (a) $40 * 5^x = 3 * 4^{2x}$

   (b) $200 = 950e^{-.0025x}$

6. Solve for the value of x that gives the desired result.

   (a) A population grows according to the formula $y = P_o(1.35)^x$, where P_o is the initial size of the population. How long does it take for the population grow by a factor of 7.

   (b) If x is in years since 1990, one model for the population of the world, P, in billions, is

   $$P = \frac{40}{(1 + 11e^{-0.08x})}$$

   According to this model when will the population reach 20 billion?