Review Problems for Math 34A Spring 2009, Midterm II

The test will be 4 problems, with 2 word problems. A 3x5 notecard is allowed, but no calculators. The test will be on the material in Chapter 7.

1) Use the logarithm rules to write the following with as few logarithms as possible:

(a) $\log(x) + 3\log(y) - 2$.

(b) $\dfrac{\log(3) - \log(7)}{\log(4) + \log(3)}$.

(c) $\dfrac{\log(x) - \log(xy)}{\log(y^3) + \log(y)}$.

2) Solve for x in the following equations. Your answer should involve only the logarithm of integers and variables (so $\log(2) - \log(3)$ is acceptable, but $\log(2/3)$ is not).

(a) $3^x = 24$.

(b) $7 \cdot 8^x = 3^{x-1}$.

(c) $4 \cdot 5^x = 2y$.

3) Change the following exponentials to have base e (that is, write in the form e^y), using the natural logarithm:

(a) 3^x

(b) 2^{x-1}

4) Initially I have 10g of a certain radioactive isotope. Three hours later I have 3g left. What is the half-life, in hours?

5) John's credit card has an APR of 10%, and interest is compounded monthly. He charges a \$1000 computer to his card. Being lazy, John neglects to pay off the card for an entire year. Assuming there are no additional fees, what does he owe after a year has passed?

6) A mold colony develops on a piece of bread. If the colony doubles in size every 4 days, how many days until it is ten times its original size?

7) Two bacteria cultures are growing on the same petri dish. Initially the first culture has a mass of 1mg and the second has a mass of 2mg. Twenty days later, both cultures have the same mass. If the mass of the first culture doubles every 5 days, what is the doubling time, in days, of the second culture?

8) I have a pool of money in my bank account. Ten years ago I had $1000 in the account. Now I have $1500 in the account. Assuming interest is compounded annually, what is the interest rate on my bank account?