Applications of Logarithms and Exponentials

1. What will a $90,000 house costs 5 years from now if the inflation rate over that period averages 3% compounded annually.
2. Sears charges 1.25% per month on the unpaid balance for customers with charge accounts (interest is compounded monthly). A customer charges $200 and does not pay her bill for 6 months What is the bill at that time?
3. Jim places $1000 in a bank account that pays 5.6% compounded continuously. After 1 year, will he have enough money to buy a computer system that costs $1060? If another bank will pay Jim 5.9% compounded monthly, is this a better deal?
4. Jerome will be buying a new car for $15,000 in 3 years. How much money should he ask his parent for now so that, if he invests it at 5% compounded continuously, he will have enough to buy the car?
5. On January 1, Kim places $1000 in a certificate that pays 6.8% compounded continuously and matures in 3 months. Then Kim places the $1000 and the interest in a passbook account that pays 5.25% compounded monthly. How much does Kim have in the passbook account on May 1?
6. Will invests $2000 in a bond trust that pays 9% interest compounded semiannually. His friend Henry invests $2000 in a CD that pays 8.5% compounded continuously. Who has more money after 20 years, Will or Henry?
7. Suppose that April has access to an investment that will pay 10% interest compounded continuously. Which is better: To be give $1000 now so that she can take advantage of this opportunity or to be given $1325 after 3 year?
8. The number of N of bacteria present in a culture at time t (in hours) obeys the equation N=1000$e^{0.01t}$. After how many hours will the population reach 1500?
9. Iodine-31 is a radioactive material that decays according to the equation A=$A\_{0}e^{-0.087t}$, where $A\_{0 }$is the initial amount present and A is the amount present at time t (in days). What is the half-life of iodine-131?
10. A culture of bacteria obeys the law of uninhibited growth. If 500 bacteria are present initially and there are 800 after 1 hour, how many will be present in the culture after 5 hours?
11. The population of a mid-western city follows an exponential law. If the population decreased from 900,000 to 800,000 from 1993 to 1995, what will the population be in 1997?
12. A fossilized leaf contains 70% of its normal amount of carbon-14. How old is the fossil? Determine the time that elapses until half of the carbon 14-remains? The half-life of carbon 14 is 5,730 years.
13. Bobby purchases a car worth $7600 dollars. If its value depreciates at a rate of 4.75% per year, how long before it is worth only $2000?
14. At the height of the economic recession in 2008, a teacher purchases a house valued at $156,900. Today, the value has appreciated to $265,000. Determine the rate of appreciation.