The Problem Set

General Instructions: Show formulas used to solve problems. Display the appropriate numbers in the formulas, so partial credit can be assigned if the results aren't quite right. When working with money, round off the final answer to the nearest penny.

1. If you put a lump sum of $5,000 into an investment that pays 6%, compounded monthly, how much will you have after 15 years?

2. If the present value of a $6,000 investment pays a nominal interest rate of 7.5%, compounded continuously, what will be the future value of that investment in 20 years?

3. For a present value of $10,000 and an annual interest rate of 8%, compute the future value after 20 years for each of these compounding strategies:

a.) compounded yearly
b.) compounded quarterly
c.) compounded monthly
d.) compounded daily (365 days per year)
e.) compounded every hour
f.) compounded continuously

4. If the future value of an investment in 30 years is $150,000, what was the present value, assuming the investment was compounded daily at 5.5% yearly interest.

5. You just inherited a large sum of money. You plan on using part of it in risky investments, but you want to be sure that in case those fail, you have part of your winnings that will provide for you when you turn 60 years old in 15 years. How much should you put into a "safe" 4.5% investment, compounded monthly, that will give you $600,000 when you turn 60?

After solving the given problem, answer the same question, but use your actual age instead of assuming an age of 45 (unless, of course, you are 45).

6. Population growth is often considered as a compounding problem, compounded annually. If a population of Black Bears is 60,000 in 1995, how many bears do we estimate there will be in the year 2020 if the annual growth rate is 2.4%?

7. $5,000 is invested in an account compounded monthly at a nominal interest rate of 6%, for 10 years. At the end of that time, your money is pulled from the account and is reinvested in an account compounded continuously at a rate of 6.5%. The money is left in that second account for another 10 years. How much will you have after that time?

8. Inflation is considered to be growth with annual compounding. Suppose the inflation rate has been about 3.1% for the past 10 years. A loaf of bread that today costs $2.18, would probably have cost about how much 10 years ago?

9. Exactly 7 years ago, Betty put in $8,000 into an investment that compounded her money continuously at 7.5% annual interest rate. She then took out all of her money from the investment and used 60% of it as a down payment on a car. If she puts the balance in her credit union that

compounds her money quarterly at a 5% nominal interest rate, how long before she will have $8,000 again?

10. Answer the following questions regarding the importance of *P*.

a.) If you start with present value of $1,500, compounded continuously at 7%, how long will it take to triple in value?
b.) If you start with a present value of $10, compounded continuously at 7%, how long will it take to triple in value?
c.) State a conclusion based on these two examples (along with others made up to make sure you're right - change only your starting amount).

11. Suppose you start with a present value of $800, how long will it take to double in value if you are compounding the money monthly at a yearly interest rate of 6.5%?

12. $5,000 is put in to account A and $6,000 into another account B. The money in account A is compounded quarterly at a nominal rate of 6.8%, whereas the money in account B is compounded daily at a nominal rate of 5%. At the end of 6 years, they are cashed out and the total is put into a single savings account paying 6% compounded continuously. 10 years later the savings is used as a down payment buy a vacation cabin that will cost $124,000. How big of a mortgage will have to be taken out to make up the difference.

13. What interest rate will result in a future value of $8,000, starting with a present value of $3,500 that was compounded quarterly for 10 years?