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. Assume all interest rates are yearly rates, even if not explicitly stated. When working with money, round off the final answer to the nearest penny.

1. What will be the future value of an annuity if $7,000 is deposited semiannually at a yearly rate of 7%, compounded every 6 months for 15 years?

2. You are saving towards a house. Towards this end, you put away $600 per month into an investment that is compounded monthly at 9%. How much will you have after 6 years?

3. You need $54,000 in 10 years for a vacation cabin. How much do you need to put aside monthly into an account that is compounded monthly, at an annual rate of 7.5%?

4. You plan to pay $150 per month into your IRA (Individual Retirement Account) for 29 years. The IRA will be an account that guarantees a 7.8% nominal interest rate, compounded monthly. What will you have in your account at the end of that time?

Note: There are restrictions on how much you can deposit in an IRA (or Roth IRA). As of 2003, most people can deposit at most $3,000 each year into their IRA. There is a clause that allows people over the age of 50 to deposit $3,500 in a year. Also, you cannot make a deposit larger than your gross income for the year.

5. Jane paid $200 per month into an IRA account for 20 years that paid 5.5%, compounded monthly. At the end of that time, she "rolled-over" the money that was in her IRA into another account that earned interest continuously at a rate of 6%. She simply left the money, without adding any additional amount, for another 10 years. How much money did she have at the end of the 30 years?

6. You estimate that you will need to replace your car in 5 more years. The car you want will probably cost $25,000. If you think you will get $3,000 for your present car, how much will you need to set aside in order to be able to pay cash for your car? Assume your savings account will pay 5.5%, compounded monthly.

7. For some IRA's you only make annual contributions. If you invest $3,000 annually in an investment that pays 12%, compounded annually, for 10 years, how much will you have?

8. See if you can make a formula that will calculate the amount you will have after 10 years if you put $500 per month into an account that pays continuous interest of 6%. (This will require you to modify the original annuity formula. The original formula always assumes the payment period is the same as the compounding period. Try one of two approaches: (1) remember that 1-month is 1/12 of a year and go back and see how the original formula was developed. Or (2) look at the problems at the end of the previous section and find the monthly interest rate that is equivalent to the continuous interest rate.)