Math 107

HW #8 – Savings Plans and Annuities

1. What is the value of an account where you make $150 monthly payments for 2 years and get an APR of 6% compounded monthly? How much of this amount is interest?
2. Your goal is to have a college fund for your child. Suppose you find a fund that offers an APR of 5% compounded monthly. How much should you deposit monthly to accumulate $85000 in 15 years?
3. You put $300 per quarter in an investment plan that pays an APR of 3.5% compounded quarterly. How much money will you have after 18 years? How much of this amount is interest?
4. At age 20 when you graduate, you start saving for retirement. If your retirement plan pays an APR of 4.5% compounded monthly and you want $5000000 when you retire in 45 years, how much should you deposit monthly to achieve this goal?
5. Assume that cigarettes cost $9.50 per pack and consider a 20 year old college student smoker who smokes 16 packs of cigarettes per month. If the student quits smoking and invests the amount she would have spent on cigarettes in a savings plan that averages 4% compounded monthly, how much will she have saved by the time she is 65?

In problem 6-7, consider the following pairs of savings plans. Compare the balances in each plan after 10 years. In each case which person deposited more money in the plan? Which of the two investment strategies do you think was better?

6. Yolanda deposits $200 per month in an account with an APR of 5% compounded monthly, while Zach deposits $2400 per year in an account with an APR of 5% compounded annually
7. Jeff deposits $400 each month in an account with an APR of 6% compounded monthly, while Maria deposits $5000 at the end of each year in an account paying 6.5% compounded annually
8. Mitch and Bill are both age 75. When Mitch was 25 years old, he began depositing $1000 per year into a savings account that pays 5% per year compounded annually. He made deposits for the first 10 years, at which point he was forced to stop making deposits. However, he left his money in the account, where it continued to earn interest for the next 40 years. Bill did not start saving until he was 45 years old, but for the next 30 years he made annual deposits of $1000 at 5% compounded annually
    a. How much money does each of them have at age 75
    b. Compare the amounts Mitch and Bill deposited in their accounts
    c. Which was the better investment option? Why?

An annuity is an arrangement that withdraws both principal and interest from your "nest egg". Payments end when your account is empty. In this situation, you receive a payment (usually every month), from your account. Your account is still earning interest so the principal (the amount of money in your account) isn't reduced by as much as the payment you receive from the account. This arrangement is called a fixed term annuity.

9. Suppose you have a nest egg of $1,000,000 with an APR of 6%.

a) Find the monthly payment for a 25 year annuity. In other words, you start with a million dollars and receive an equal payment every month for 25 years. At that time, the account is empty.

b) Find the monthly payment for a 30 year annuity.

c) Find the monthly payment for a 35 year annuity.

10. Suppose your retirement account pays 9% APR compounded monthly.

a) What size nest egg do we need in order to retire with a 25 year annuity that yields $500 per month?

b) What size nest egg do we need in order to retire with a 25 year annuity that yields $700 per month?

11. Suppose your retirement account has $500,000 and an APR of 4%.

a) Find the monthly payment for a 20 year annuity.

b) How much money will you have left in the account after 10 years?

c) At that time (after the 10 years), you think you want your annuity to be stretched from a 20 year annuity to a 25 year annuity. What will the payments be for the next 15 years