1 – (8 points) An annuity-due pays $300 every 6 months for 5 years. If the nominal interest rate is 8% convertible semi-annually, what is the value of this annuity at the end of the five-year period?

2 – (14 points) John is 40 years old and wishes to accumulate a fund for retirement. To do so, he starts to pay $10 at the end of every month until the age of 65, at which time he makes the final payment. After 65 he starts to withdraw a certain amount at the end of every month for 5 years, by which time the fund is depleted. Find the amount of each withdrawal if the nominal interest rate is 12% convertible monthly.

3 – (10 points) Given an annuity that consists of 10 annual payments of $100 each. The first payment is made at time t=4. What is the value of the annuity at time t=7, if the annual effective interest rate is 8%?

4 – (10 points) A family wishes to accumulate $100,000 in a college education fund at the end of 20 years. They deposit $1,000 in the fund at the end of each of the first 6 years, $3,000 at the end of each of the next 10 years, and $3000+X at the end of each of the last 4 years. Find X to the nearest dollar if the fund earns 8% effective.

5 – (16 points) Morris, Jack and Diana won a lotto ticket. The ticket pays 1 million L.L. at the end of every month forever. Interest is at the nominal rate of 12% convertible monthly.

 a) Find the present value of the ticket.

b) Morris, Jack and Diana agreed to split the prize as follows: Morris gets the payments for the first 4 years, Jack gets the payments for the next 6 years, and Diana gets all the payments thereafter. Calculate the share of each of the three.

6 – (10 points) An annuity pays $50 at the end of every year for 16 years. The annual effective interest rate is 4% for the first 6 years, and 8% thereafter. Find the value of this annuity at the end of 20 years.

7 – (12 points) A loan of $5,000 is to be repaid by payments of $500 at the end of every six months to continue for as long as necessary. Find the time and amount of the final payment, if the final payment is to be smaller than the regular payments. Assume a nominal interest rate of 4% convertible semi-annually.

8 – (8 points) Jack left an inheritance for his two children, Joan and Mike. Joan is to receive $15,000 after 10 years. Mike is to receive an annuity that starts after 2 years and that pays $600 at the beginning of every 6-month period for 8 years. Who receives the bigger inheritance if the annual effective interest rate is 10%?

9 – (12 points) At a nominal interest rate of 8% convertible quarterly, the following two annuities have the same present value.

 a) An annuity-immediate which pays $500 each year for 20 years.

 b) An annuity which pays X at the end of every quarter for 4 years.

Find X.