**Note: When responding to “Why/Explain” you should give a meaningful answer that would convince a skeptic. Show your work for quantitative questions!**

**P2**

You are currently 30 years old and plan on retiring at 65 of age. You have been called to the personnel department to look at your retirement planning for the future. You plan to deposit $200 a month (the first deposit will occur at the end of this month) until retirement. Interest rates are expected to be 6 percent a year compounded monthly. The employee from personnel reminds you that if your career takes off, your salary will be increasing and you can afford to increase your deposits. You begin to think about this and you plan to keep the deposits the same ($200 per month) for the first two years. From that point to retirement, your monthly deposit will be allowed to increase by 0.2% per month. When you retire, the balance in your retirement fund will be transferred to low risk, low interest RIFT that will allow you to make monthly withdrawals of $1,340 every month with the first withdrawal occurring at the end of the first retirement month. The interest rate on the RIFT is 4.0% per year (annual). You expect to live until you are 90 years of age. The use of a time line is highly recommended.

1. How much will be left in the retirement fund for your kids inheritance when you die at age 90? **Note: interest rate calculations contain a minimum of 9 decimal places! If you round to less, marks for the question are rounded to 0. (25 marks)**

**Instructions:** Construct a step by step process to solve this problem. In each step include the formula you are using and a description of why you are using that particular formula. **Label** and show the value for each variable in the formula. A diagram would be valuable! **(Hint)**

Example I: You deposit $500 into an account that pays 3 percent compounded monthly. How much will be in the account at the end of 3 years?

Step 1. Cash flow characteristics – single cash flow today and we need to calculate the future value.

Step 2. Interest rate – the APR is given as 3 percent compounded monthly.

 We can use $EAR= \left(1+\frac{APR}{m}\right)^{m}-1= \left(1+\frac{.03}{12}\right)^{12}-1=0.030415957 per year$ or

$$EPR= \left(1+\frac{APR}{m}\right)^{^{m}/\_{f}}-1= \left(1+\frac{.03}{12}\right)^{^{12}/\_{12}}-1=0.0025 per month$$

Step 3. Calculating the value in the account at the end of 3 years.

$$FV=PV\left(1+r\right)^{t}=\$500\left(1.030415957\right)^{3}=\$500\left(1.0025\right)^{36}=\$547.0257004≈\$547.03$$

At the end of 3 years there will be $547.03 in the account.

Remember to show your work and do not round. Interest rate calculations

Example II: The future value of a growing annuity.

The future value of a growing annuity is the present value of the growing annuity multiplied by the interest factor for the future value.

 Present value Future value factor

$$FV=C\left[\frac{1-\frac{\left(1+g\right)^{t}}{\left(1+r\right)^{t}}}{r-g}\right]\left(1+r\right)^{t}=C\left[\frac{1\left(1+r\right)^{t}-\frac{\left(1+g\right)^{t}}{\left(1+r\right)^{t}}\left(1+r\right)^{t}}{r-g}\right]=C\left[\frac{\left(1+r\right)^{t}-\left(1+g\right)^{t}}{r-g}\right]$$

1. You retired at 65 and you are enjoying your retirement. You are on your way to meet with your family on your 75th birthday when space debris from a CIA spy satellite falls from the sky and you instantaneously meet your demise. How much will be left in the retirement fund for your kids and spouse? **(9 marks)**

**P6-3**

You bought a bond with face value of $1,000 and 7% coupon rate (paid semi-annually) for $900. After 6 months you received one coupon payment and then sold the bond for the same price. What effective rate of return did you earn on this investment?

**P6-5**

Is the yield to maturity (YTM) of a bond the same as its expected return? Explain briefly!

**P7 (8 marks, 2 each)**

A bond with an unknown face value and a coupon rate of 10% (paid annually) matures in 10 years from now. The required return (YTM) is 5%.

1. Is the bond sold at premium or at discount? Explain!
2. If the face value of the bond is $1000, what is the current market price of the bond?
3. What is the current yield of the bond in part ii)?
4. Suppose, interest rates and the required return for the bond in part ii) change, so that the market price of this bond is now $980. What is the new required return/yield to maturity of this bond? Did interest rates go up or down?

**P8-1**

You just bought a 5-year Treasury bond with a 4 year term, a face value of $1,000 and a coupon rate of 2.5% in the open market at a quoted price of 94.3. The bond pays semi-annual coupons.

1. Calculate the yield to maturity for the bond. (2 marks)
2. What is the current yield for the bond in part i)? (2 marks)
3. Suppose you observe a 7-year Treasury bond with a 6 year term, a face value of $1,000 and a coupon rate of 2.5%. Is its quoted price higher or lower compared to the quoted price of the 5-year bond? Explain briefly! (2 marks)
4. Two years ago you also bought a 4.4\% coupon bond (semi-annual coupons) at $945. The bond currently has 4 years left to maturity. If you sell the bond today for $1,005 after receiving four coupons, what would be the quoted and the effective annual return on your bond investment be? (4 marks)
5. What can you say about the maturity of the bond in part iv)? (1 mark)

Now assume that you bought a 5-year bond exactly identical to the 5-year bond from above but with an unknown face value. What can you say about the yield to maturity of this bond? Explain briefly! (3 marks

**MUST USE GIVEN FORMULAS SHEET**

  

 

 













