**Investments Problem Sheet 8 Lent Term 2024**

1. A 5 year bond with a coupon of 7%, that pays interest annually, has its next coupon due in 12 months. It yields 5% per annum.

(a) compute the price of the bond.

(b) compute the duration of the bond. Use this to compute approximately how the price of the bond will change if yields rise to 6%.

(c) Compute the convexity of the bond. Use this to obtain a more precise estimate of the change in the price which will occur if the yield rises to 6%.

2. Firm XYZ is required to make a $5M payment in 1 year and a $4M payment in 3 years. The yield curve is flat at 10% APR with semi-annual compounding. Firm XYZ wants to form a portfolio using 1-year and 4-year U.S. strips to fund the payments. How much of each strip must the portfolio contain for it to still be able to fund the payments after a shift in the yield curve?

3.You are managing a portfolio of $1 million, Your target duration is 10 years, and you can choose from two bonds: a zero-coupon bond with maturity of 5 years, and a perpetuity, each currently yielding 5%

1. How much of each bond will you hold in your portfolio?
2. How will these fractions change next year if target duration is now 9 years?
3. You will be paying $10,000 a year in tuition expenses at the end of the next 2 years. Bonds currently yield 8%.
4. What is the present value and duration of your obligation?

1. What maturity zero-coupon bond would immunize your obligation?
2. Suppose you buy a zero-coupon bond with value and duration equal to your obligation. Now suppose that rates immediately increase to 9%. What happens to your net position? What if the rates fall to 7%?
3. Long-term Treasury bonds currently are selling at yields to maturity of nearly 8%. You expect interest rates to fall. The rest of the market thinks that they will remain unchanged over the coming year. In each question, choose the bonds that will provide the higher holding-period return over the next year if you are correct. Briefly explain your answer.
4. i. A Baa-rated bond with coupon rate 8% and time to maturity 20 years.

ii. An Aaa-rated bond with coupon rate of 8% and time to maturity 20 years.

1. i. An A-rated bond with coupon rate 4% and maturity 20 years.

ii.An A-rated bond with coupon rate 8% and maturity 20 years.

1. i. A 6% coupon T-bond with maturity 20 years and YTM = 8%.

ii. A 9% coupon T-bond with maturity 20 years and YTM = 8%.