FIN2010 Problem Set 1
Due 2024-03-04 at 6PM

1. A CUHK(SZ) graduate earns 150K per year starting from the age of 23, growing at 4% per year. The annual expenditure is 100K in the first year, growing at 2% per year. Suppose all the cash flow occurs at the birthdays, starting at age 23. The investment return per year is 7%.
   (1) How much would (s)he have in the bank account at retirement at age 60?
   (2) The student receives an offer from SFI and is trying to decide whether to take this offer. The master program takes 2 years, and costs 150k per year. After graduation, the starting salary will be 200K per year, also growing at 4% per year. Assume the living expenditures do not change. What is the NPV of getting a master's degree?

2. Amy is choosing between two apartments. Apartment A is selling at ￥ 9 million, and apartment B is selling at ￥ 11 million. She can take a 30-year mortgage to finance 70% of the price with an interest rate of 5.145% (APR). Other than the down payment, she needs to pay a total transaction fee (taxes, commission, etc.) equaling 2% of the purchase price. She plans to sell the apartment after 3 years. In the meantime, she does not plan to live in this apartment, and she can rent it out. Apartment A is expected to generate a rent of ￥8000 per month, and apartment B is expected to generate a rent of ￥12,000 per month. After 3 years, she expects to sell apartment A for ￥11.5 million or apartment B for ￥13 million, and pre-pay the outstanding balance of her mortgage. Suppose her opportunity cost of capital is 7.2% (that is, she can invest the cash elsewhere and make 7.2% per year in term of APR, monthly compounding).
   (1) What are her monthly payments for the two apartments?
   (2) What is the NPV if she purchases apartment A? (Hint: for each month, mortgage payment is the cash outflow, and the rent is the cash inflow)
   (3) What is the NPV if she purchases apartment B? ((Hint: for each month, mortgage payment is the cash outflow, and the rent is the cash inflow))
   (4) Which apartment should she choose?

3. The annual membership fee at your health club is $750 a year and is expected to increase at 4% per year. A life membership is $7,500 and the discount rate is 12%. You either pay the annual membership right now, or pay the life membership right now. In order to justify taking out the life membership, what would be your minimum life expectancy?

4. You are considering buying a car worth $30,000. The dealer, who is anxious to sell the car, offers you an attractive financing package. You have to make a down-payment of $3,200, and pay the rest over 3 years with monthly payments. The dealer will charge you interest at a constant APR of 2%, which is lower than the market interest rate.
   a. What is the monthly payment to the dealer?

b. The dealer offers you a second option: you pay cash, but get a $2,500 discount. Should you go for the loan or should you pay cash? Assume that the market annual interest rate (APR) is at 5.5%.

5. Currently a 20-year Treasury bond with 4.5 % semiannual coupon is traded at a yield of 5% (APR).
   (1) Is the current price above or below 100?
   (2) Calculate the current price of the bond.
   (3) If the market prevailing yield increase by 0.1%, how much would the price change? Would the price increase or decrease?