

**Individual problem set – do not work on with classmates. Submit each question in a separate worksheet in a single Excel file.**

1. A family purchased a house for \$750,000 and made a 20% down payment, financing the balance with a standard 30-year, fixed-rate mortgage at 4%, with monthly payments with a face amount of \$600,000.
  - (a) What are the monthly payments of this mortgage?
  - (b) Construct an amortization table showing the amount of principal and interest paid each month over the term of the mortgage, as well as the remaining balance each month.
  - (c) Suppose that 160 months after they obtained this mortgage their bank advises them that mortgage rates have fallen to 3.75%. For a fee of \$5,000, the bank would refinance the mortgage at this lower rate. This would retire the old mortgage and create a new 30-year mortgage. Does this refinancing make sense financially? Show all work, and discuss your recommendation.
  - (d) Suppose that this mortgage is not assumable, and our family thinks that it is likely to sell this house (and move) in 18 months. How does that affect your advice to the family?
2. Consider the following trade: purchase \$40,000 par value of a 4.25% May 15, 2028 note on Thursday, August 27, 2020, when the quoted spread on this note was 121-03 - 121-03+.
  - (a) What is the amount of cash that will be wired from your account, and when will these funds be moved?
  - (b) What is the yield to maturity on this position? Be sure to take account of bad days in this computation.
  - (c) What is the position's yield to maturity on a bond-equivalent basis?
3. Suppose that you would like to have a monthly cash flow of \$10,000 when you retire. You hope to retire at age 65, and expect to live until age 90. You are currently 25.
  - (a) Assuming that the yield on 25-year annuities in 40 years, when you retire is 3% on a continuously-compounded basis, how much will you have to have in your pension at age 65 to achieve your goal?
  - (b) Assuming that the yield on 25-year annuities in 40 years, when you retire is 5% on a continuously-compounded basis, how much will you have to have in your pension at age 65 to achieve your goal?
  - (c) Explain the effect of the annuity rate on the cost of this annuity.