Introduction to Mathematical Finance

Problem Sheet 1

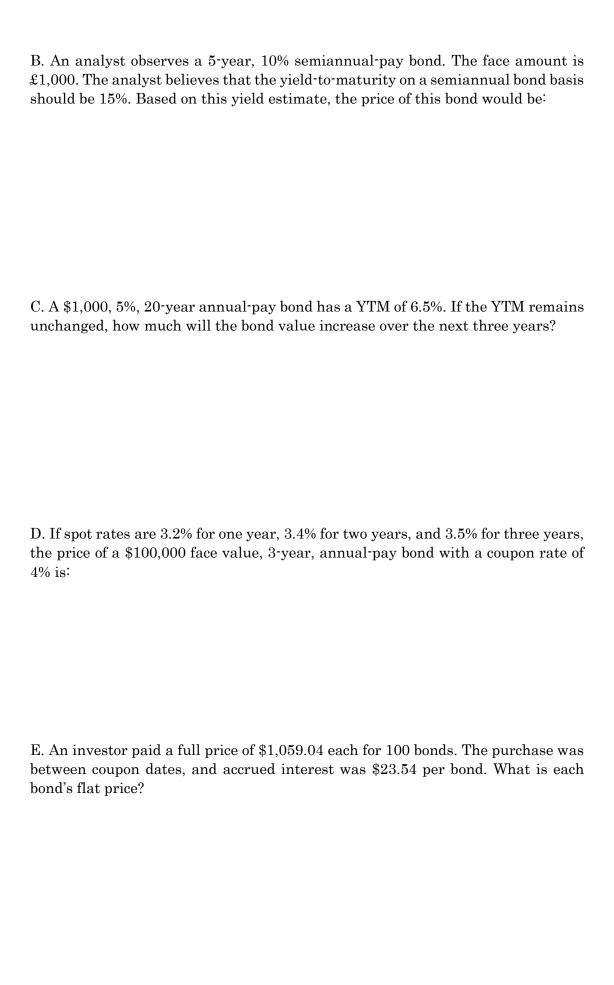
Date due: 2025-03-31

- 1. LIBOR rates are determined:
 - A. by countries' central banks.
 - B. by money market regulators.
 - C. in the interbank lending market.
- 2. A market rate of discount for a single payment to be made in the future is:
 - A. a spot rate.
 - B. a simple yield.
 - C. a forward rate.
- 3. An analyst observes a 20-year, 8% option-free bond with semiannual coupons. The required yield-to-maturity on a semiannual bond basis was 8%, but suddenly it decreased to 7.25%. As a result, the price of this bond:
 - A. increased.
 - B. decreased.
 - C. stayed the same.
- 4. You are estimating a value for an infrequently traded bond with six years to maturity, an annual coupon of 7%, and a single-B credit rating. You obtain yields-to-maturity for more liquid bonds with the same credit rating:

5% coupon, eight years to maturity, yielding 7.20%. 6.5% coupon, five years to maturity, yielding 6.40%.

The infrequently traded bond is **most likely** trading at:

- A. par value.
- B. a discount to par value.
- C. a premium to par value.
- 5. A floating-rate note has a quoted margin of +50 basis points and a required margin of +75 basis points. On its next reset date, the price of the note will be:
 - A. equal to par value.
 - B. less than par value.
 - C. greater than par value.
- A. A 20-year, 10% annual-pay bond has a par value of \$1,000. What is the price of the bond if it has a yield-to-maturity of 15%?



| F. Based on semiannual compounding, what would the YTM be on a 15-year, zero-coupon, \$1,000 par value bond that's currently trading at \$331.40? |
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| G. An analyst observes a Widget & Co. 7.125%, 4-year, semiannual-pay bond trading at 102.347% of par (where par is \$1,000). The bond is callable at 101 in two years. What is the bond's yield-to-call? |
| H. The 4-year spot rate is 9.45%, and the 3-year spot rate is 9.85%. What is the 1-year forward rate three years from today? |
| I. Given the following spot and forward rates: Current 1-year spot rate is 5.5%. One-year forward rate one year from today is 7.63%. One-year forward rate two years from today is 12.18%. One-year forward rate three years from today is 15.5%. The value of a 4-year, 10% annual-pay, \$1,000 par value bond is: |