# Derivative Securities Fall 2019: Assignment 2

1. You believe that interest rates will rise. Accordingly, you

   A. Buy a December Eurodollar futures (true/false)
   B. Sell a December Eurodollar futures (true/false)
   C. Pay fixed on a 5-year swap (true/false)
   D. Receive fixed on a 5-year swap (true/false)

   Explain carefully your answers.

2. Consider a FRA in which you will borrow money for 6 months on December 20, 2019 (T) based on the 3-month LIBOR rate:

   Borrow $1 on date T, return $[1+ (0.5) $\times$ $(3M\ LIBOR(T))$] on date T+6 months.

   Assume that you know the zero-coupon bond values (a) from today to the loan's inception (T), (b) from today to T+3M, and (c) from today to T+6M. What is the no-arbitrage value of the FRA?

   [Hint: replicate the cash-flow of the loan by lending X dollars forward for 3 months, and reinvesting the proceeds and borrowing Y dollars forward for 6 months. Also note that if forward 3M-LIBOR < forward 6M-LIBOR, the FRA value should be positive, and it should be negative if the opposite inequality holds.]

   Give a possible application of this result in the real world of swap pricing.

3. Build a smooth discount curve (Z-curve) with monthly granularity for LIBOR rates on October 8, 2019, using the following information:

| LIBOR | |
|---|---|
| 30 days | 1.94% |
| 90 days | 2.01% |
| LIBOR SWAPS | |
| 1-Year | 1.67% |
| 2-Year | 1.47% |
| 3-Year | 1.39% |
| 5-Year | 1.35% |
| 7-Year | 1.38% |
| 10-Year | 1.45% |
| 30-year | 1.63% |

4. Build the curve using the Hagan-West iteration method explained in p. 92 of that paper.