Scoring is 2 points for each question. Questions 11 and 17 will be scored at 4 points each.

11) (This problem counts for 4 points) Relative volatility of spot, forward and points

Let S_t be the spot FX rate at time t. For this exercise we assume t is measured in years, and t refers to the "trade date", i.e., the time rates are observed in the market, not the "value date".

Let F_t be the 5-month forward rate. Specifically, for any time t, F_t is the quoted rate for a 5-month forward (i.e., F_t is not a specific contract, but rather a rate observed each day in the market.)

We want to calculate the standard deviations of $\log(F_t)$ and $\log(F_t/S_t)$ over the period [0, 1], assuming that covered interest rate parity holds. To be clear, standard deviation in this case is measuring the uncertainty in what $\log(F_t)$ and $\log(F_t/S_t)$ will be at time t=1 conditional on their values at time t=0.

Assume $\log(S_t)$ has an annualized standard deviation of 12% over this period [0,1], and that the 5-month tenor "variable currency" interest rate and the 5-month tenor "fixed currency" interest rate have annualized standard deviations of 0.95% (95 basis points) and 1.15%, respectively.

(And for simplicity treat these interest rates as continuously compounded with 0.42 as the appropriate year fraction.)

If we assume the interest rates and $\log(S_t)$ are all uncorrelated, then what are the annualized standard deviations of $\log(F_t)$ and $\log(F_t/S_t)$ over the period?c

Scoring is 2 points for each question. Questions 11 and 17 will be scored at 4 points each.

12) Assume there are 181 days between spot and the 6-month forward date and assume the following rates (with bid offer listed). Assume all deposit rates are quoted ACT/360:

    USDCHF   0.9305 / 0.9307
    6mo CHF deposit   1.20% / 1.30%
    6mo USD deposit   4.80% / 4.90%

    Under covered interest rate parity, what is the bid and offer for 6-month USDCHF forward points?

13) If South Korean won (KRW) deposit rates are lower than USD deposit rates for a particular maturity, then must the USDKRW non-deliverable forward rate for the same maturity be lower than the USDKRW spot rate?

    Please give a brief explanation for your answer.

Scoring is 2 points for each question. Questions 11 and 17 will be scored at 4 points each.

14) Calculate the Norwegian krone (NOK) interest rates implied by the following forward rates ("implied yield"). Please calculate both bid and offer side interest rates.

   USD deposit rates below are money market, ACT/360 and the implied yield should also be calculated as ACT/360 money market rates.

USDNOK spot	9.8570 / 9.8580
USDNOK 3mo fwd	9.8155 / 9.8195
3mo USD deposit	4.55% / 4.65%
Days spot to 3mo	92

Scoring is 2 points for each question. Questions 11 and 17 will be scored at 4 points each.

15) Given the information below, calculate the FX swap points for a long USDCHF position maturing in 3 months that needs to be rolled out to the 6 month date. Assume you are a market-taker.

USDCHF	0.9320 / 0.9322
Days spot to 3months	91
Days spot to 6months	182
3mo USD deposit	4.60% / 4.70%
6mo USD deposit	4.85% / 4.95%
3mo CHF deposit	1.10% / 1.15%
6mo CHF deposit	1.25% / 1.30%

NOTE: Assume all interest rates are money market rates using ACT/360.

16) Given the information below, calculate the forward-forward FX swap points for a short AUDUSD position maturing in 2 years that needs to be shortened to the 1-year date. Assume you are a market-taker. What would the near date and far date all-in forward rates be for the FX swap?

AUDUSD spot	0.6678 / 0.6680
1yr points	+73 / +78
2yr points	+66 / +71

Scoring is 2 points for each question. Questions 11 and 17 will be scored at 4 points each.

17) (This problem counts for 4 points) <u>Window forward</u>:

A client needs to buy Mexican peso (MXN) 1 billion versus USD but is unsure of the timing. The client asks you to quote a single forward rate where the client will be committed to buy MXN 1 billion, but can do so any time between the 3 month (91 days) and 6 month (183 days) forward dates.

Assuming the rates below (ignoring bid and offer, and assuming covered interest rate parity holds and that both currencies follow an ACT/360 convention) what forward rate would you quote? (Hint: you are allowed to be greedy, but not unreasonable.)

USDMXN spot   19.77
3mo USD deposit   4.60%
6mo USD deposit   4.70%
3mo MXN deposit   10.70%
6mo MXN deposit   11.20%.

18) Would you be willing to offer the product in problem 6 above if the client asked to sell CAD 100 million instead of MXN 1 billion, when CAD deposit rates are equal to USD deposit rates? Why or why not?   (HINT: Do CAD interest rates present a difficulty?)