1) Assume the following rates, which include both bid and offer: USDCHF 0.9755 / 0.9765
If a customer (i.e., market taker) buys CHF 15 million versus USD, what will the USD amount be?

Buy CHF = Sell USDCHF, so a market-taker would use the bid, 0.9755. Converting CHF to USD means dividing by the USDCHF rate.

So the USD amount = 15,000,000 / 0.9755 = 15,376,730

2) A USD-based trader has the following position, selling CAD 27.40 million versus USD at 1.1270. If the current USDCAD rate is 1.2620, what is the mark-to-market value of the position in USD terms?

The trader's initial position is - CAD 27,400,000 + USD 27,400,000 / 1.1270 = USD 24,312,334

To unwind at current rate means + CAD 27,400,000 - USD 27,400,000 / 1.2620 = - USD 21,711,569

So the market value is positive (CAD has weakened) = USD 2,600,765

3) Assume USDCNY is 6.2130 and USDJPY is 95.50, what is the implied JPYCNY cross rate?

JPYCNY means the value of JPY 1 in CNY terms.

Using the USDJPY rate, we know that JPY 1 = USD (1/95.5)

And, using the USDCNY rate we know that USD 1 = CNY 6.2130

So JPY 1 = CNY (6.2130/95.5) = CNY 0.06506, meaning that 0.06506 is the implied JPYCNY cross rate.

4) A USD-based trader has the following position, selling EUR 100 million versus JPY at 132.25. The current spot EURJPY rate is 135.75, and current spot USDJPY is 98.25. What is the market-to-market value of the trader's position, in USD?

The trader's initial position is - EUR 100,000,000 and + JPY 100,000,000*132.25 = JPY 13,225 million

To unwind at current rate + EUR 100,000,000 and - JPY 100,000,000*135.75 = - JPY 13,575 million

So the market value is negative (EUR has strengthened) = - JPY 350 million

And the USD value = - 350 million / 98.25 = -USD 3,562,341

5) Find the all-in 4-month forward rate for AUDUSD, ignoring bid/ask and assuming the following:

AUDUSD spot 0.8370
AUD deposit rate 2.10%
USD deposit rate 0.20%
121 days between spot and the forward date
(AUD deposit rates follow ACT/365)

Forward = Spot * (1 + USD deposit * 121/360) / (1 + AUD deposit * 121/365)

So, Forward = 0.8370 * 1.000672 / 1.006962 = 0.8318

6) A trader (market-maker) executes a USDCHF forward contract, buying CHF. If the spot rate (including bid/offer) is 0.9720/0.9725 and the forward point quote (also with bid/offer) is -21/-15, then what is the trader's all-in forward rate?

Buying CHF = selling USDCHF, so a market-maker would use the offer for both spot and for forward points. We apply the forward point quote of "-15" by adjusting the decimal place to reflect that forward points are quoted in pips.

So, the all-in forward rate = 0.9725 - 0.0015 = 0.9710

7) Assume there are 91 days between spot and the 3-month forward date, and assume the following rates (with bid offer listed):

EURUSD 1.0550 / 1.0555
3mo EUD deposit 0.05% / 0.15%
3mo USD deposit 0.35% / 0.45%
What is the lower arbitrage limit for 3 month EURUSD forward points?
(EUR deposit rates follow ACT/360)

The lower arbitrage limit is found using the spot rate bid, USD deposit bid and EUR deposit offer. First, we calculate the all-in forward rate

Forward = 1.0550 * (1 + 0.35% * 91/360) / (1 + 0.15% * 91/360) = 1.0555

Then the forward points are the different between forward and spot, expressed in pips: "+5"

8) Calculate the NOK interest rates implied by the following forward rates ("implied yield"), ignoring bid/offer.

USDNOK spot	7.6090
USDNOK 6mo fwd	7.7085
6mo USD deposit	0.25%

182 days between spot and the forward date
(NOK deposit rates follow ACT/360)

Use the formula for the forward rate and solve for the NOK deposit rate

Forward = Spot * (1 + NOK deposit * 182/360) / (1 + USD deposit * 182/360)

7.7085 = 7.6090 * (1 + NOK deposit * 182/360) / (1 + 0.0025 * 182/360)

NOK deposit = [(7.7085/7.6090)*(1+0.0025*182/360) - 1]*(360/182) = 2.84%

9) If the 3-month NDF rate for USDBRL is 3.0500 higher than the spot USDBRL rate of 3.0100, then what do we know about domestic BRL deposit rates relative to USD deposit rates? **(Indicate your answer by circling one of the following choices)**

a) BRL deposit rates must be lower since the USD is stronger on a forward basis

b) BRL deposit rates must be higher since the USD is stronger on a forward basis

c) No information, non-deliverable forward rates give no information about BRL deposit rates

d) No information, non-deliverable forward rates are always above spot rates

Covered interest rate parity does not apply to non-deliverable forward rates. The relationship between deposit rates does not necessarily influence NDF rates. It is possible for NDF rates to be either higher or lower than spot rates (meaning that even with very low USD interest rates, negative implied yields for BRL are possible in theory.)

10) Given the information below, calculate the FX swap points for a USDNOK position maturing in 3 months that needs to be rolled out to the 6 month date, ignoring bid/offer.

USDNOK spot	7.6130
3mo USD deposit	0.25%
6mo USD deposit	0.35%
3mo NOK deposit	2.65%
6mo NOK deposit	2.85%

92 days between spot and the 3-month forward date
183 days between spot and the 6-month forward date

Swap points are the difference between the two forward rates, expressed in pips

Far rate = 7.6130 * (1 + 2.65% * 92/360) / (1 + 0.25% * 92/360) = 7.6597

Near rate = 7.6130 * (1 + 2.85% * 183/360) / (1 + 0.35% *183/360) = 7.7096

Swap points = +499

11) Let the EURUSD spot rate be 1.0750 and the forward rate be 1.0810. If a EUR call USD put has a strike of 1.1000 and a premium of 0.0270 in USD pips, then what is the premium in percent of EUR?

Premium of "0.0270 in USD pips", means the premium is USD 0.0270 for a notional = EUR 1. If we calculate the EUR-value of this exact premium, that will give us the premium in %EUR.

The conversion to EUR is done using the spot rate: 0.0270 / spot = 0.0270 / 1.0750 = 0.0251.

So premium is 2.51% of EUR.

12) Consider a EUR put /USD call and a EUR call / USD put with the same maturity, say in 3-months. Further assume both options have strike = forward. What do we know about the values and deltas of these two options? (Hint: consider put-call parity.) **(Indicate your answer by circling one of the following choices)**

a) Values are equal and deltas are equal

b) Values are equal and deltas have opposite signs and are equal in absolute values

c) Values are equal and call delta is greater than put delta in absolute value

d) Values are equal and call delta is less than put delta in absolute value

e) Neither values nor deltas are equal

This was meant to be a hard question. Put-call parity implied that the option values are equal. You should remember from the homework that put and call deltas are equal only at the "delta neutral strike" – which is a positive multiple of the forward. Since the forward rate is lower than this, the call must have a higher delta in absolute value.

13) The AUDUSD one week outright is 1.02. Which of these one week options has the smallest delta in absolute value? **(Indicate your answer by circling one of the following choices)**

a) 1.02 AUD put

b) 1.20 AUD put

c) 1.20 AUD call

d) 1.00 AUD call

The 1.20 AUD call is the only out-of-the money choice. Since the other choices are either in-the-money or at-the-money, this out-of the-money choice must have the lowest delta (in absolute value).

14) The EURGBP spot rate is 0.8700. The one week outright is 0.8720 and the one month outright is 0.8780. Which of these options have the smallest gamma? **(Indicate your answer by circling one of the following choices)**

a) 0.7700 EUR call expiring in one month

b) 0.8780 EUR call expiring in one month

c) 0.7780 EUR call expiring in one hour

d) 0.8700 EUR call expiring in one hour

Choices b) and d) are both at-the-money and thus have relatively large gamma – at least larger than gamma for an away-from-the-money option with the same maturity.

Between choices a) and c), c) must have the lowest gamma. This option has essentially no chance of expiring in-the-money, so its delta remains zero for small (or even moderate) movements in spot. Thus its gamma is also zero.