SOLUTIONS FOR SESSION 1: THE FX MARKET, SPECULATION & ARBITRAGE

1. Identifying bid and offer quotes

Consider the table below, given by a bank to a client. For each of the questions the required rate is against the home (fixed) currency, which is the pound sterling (\pounds) .

	US \$	Swiss Franc	Japanese Yen
Spot	1.6325-35	3.30 - 3.30¾	263.15-25
	Premium	Premium	Discount
1 month forward	0.75 - 0.73 cents	⁵ / ₈ - ¹ / ₂ cents	10 - 15 cents
2 months forward	1.35 - 1.32 cents	1 ¹ / ₈ - 1 cents	12 - 21 cents
3 months forward	2.03 - 2.00 cents	1 ⁵ / ₈ - 1 ¹ / ₂ cents	16 - 29 cents

The word 'premium' or 'discount' implies that the foreign currency quoted at the head of each column is at a premium or discount respectively. One cent = 0.01 of the currency unit (US \$, Swiss Francs or Japanese yen).

ANSWERS:

1. BANK BUYS SPOT DOLLARS

Bank sells variable currency (\$) on LEFT ∴ Bank buys \$ on RIGHT

Ans 1.6335

2. CUSTOMER BUYS JAPANESE YEN 3-M FORWARD

Bank sells variable currency (yen) on LEFT ∴ Customer buys yen on LEFT

ie	spot	263.15
	3-M	<u>+0.16</u> dis
		263.31

Ans: 263.31

3. CUSTOMER SELLS DOLLARS 1-M FORWARD

Bank sells \$ on LEFT, BUYS \$ on RIGHT		
	Customer	SELLS \$ on RIGHT
ie	spot	1.6335
	1-m	<u>(0.0073)</u> pm
		1.6262

Ans: 1.6262

BANK SELLS SPOT JAPANESE YEN 4.

Bank sells Japanese yen on LEFT

Ans: 263.15

CUSTOMER BUYS SPOT SWISS FRANCS 5.

Bank sells Swiss francs on LEFT .: Customer buys Swiss francs on LEFT

Ans: 3.30

6. **BANK BUYS JAPANESE YEN 2-M FORWARD**

Bank sells Japanese yen on LEFT .: Bank buys Japanese yen on RIGHT

ie	spot	263.25	
	2-M	+0.21	dis
		263.46	

Ans: 263.46

CUSTOMER BUYS DOLLARS TWO MONTHS FORWARD 7.

Customer buys \$ at rate at which bank sells, ∴ on LEFT

ie	spot	1.6325
	2-m	<u>(0.0135)</u> pm
		1.6190

Ans: 1.6190

BANK SELLS DOLLARS TWO MONTHS FORWARD at 1.6190 8.

9. **BANK BUYS SWISS FRANCS THREE MONTHS FORWARD**

Bank buys Swiss francs on RIGHT

ie	spot	3.3075
	3-m	<u>(0.0150)</u> pm
		3.2925

Ans: 3.2925

10. CUSTOMER SELLS JAPANESE YEN ONE MONTH FORWARD

Customer sells Yen at rate at which bank buys, ∴ on RIGHT

ie	spot	263.25	
	1-M	+0.15	dis
		263.40	
	0(0.40		

Ans: 263.40

11.

$$\frac{1.6250 - 1.6325}{1.6325} \times \frac{12}{1} \times 100\%$$

$$= -5.51\% \text{ p.a.}$$
US\$ at premium
 ${}^{i}\pounds > {}^{i}US\$$
12.

$$\frac{1.6135 - 1.6335}{1.6335} \times \frac{12}{3} \times 100\%$$

$$= -4.90\% \text{ p.a.}$$
US\$ at premium
 ${}^{i}\pounds > {}^{i}US\$$

2. Currency Speculation

Blue Demon Bank expects that the Chinese currency (the renminbi) will depreciate against the dollar from its spot rate of \$0.15 to \$0.14 in 10 days. The following interbank lending and borrowing rates exist:

	Lending rate	Borrowing rate
US dollar	8.0%	8.3%
Chinese renminbi	8.5%	8.7%

Assume that Blue Demon Bank has a borrowing capacity of either \$10 million or 70 million RMB in the interbank market, depending on which currency it wants to borrow.

ANSWERS:

- (a) Blue Demon Bank can capitalize on its expectations about the renminbi (RMB) as follows:
 - 1. Borrow RMB 70 million
 - 2. Convert the RMB 70 million to dollars:

CNY 70,000,000 × .15 = 10,500,000

3. Lend the dollars through the interbank market at 8.0% annualized over a 10-day period. The amount accumulated in 10 days is:

 $10,500,000 \times [1 + (8\% \times 10/360)] = 10,500,000 \times [1.00222] = 10,523,333$

4. Repay the RMB loan. The repayment amount on the renminbi loan is:

RMB 70,000,000 × [1 + (8.7% × 10/360)] = 70,000,000 x [1.002417] = CNY 70,169,167

5. Based on the expected spot rate of \$.14, the amount of dollars needed to repay the renminbi loan is: RMB 70,169,167 \times \$.14 = \$9,823,683

6. After repaying the loan, Blue Demon Bank will have a speculative profit (if its forecasted exchange rate is accurate) of:

\$10,523,333 - \$9,823,683 = **\$699,650**

- (b) Blue Demon Bank can capitalize on its expectations as follows.
 - 1. Borrow \$10 million
 - 2. Convert the \$10 million to renminbi (RMB):

\$10,000,000/\$.15 = RMB 66,666,667

3. Lend the renminbi through the interbank market at 8.5% annualized over a 30-day period. The amount accumulated in 30 days is:

RMB 66,666,667 × [1 + (8.5% × 30/360)] = 66,666,667 × [1.0071]= RMB 67,138,889

4. Repay the dollar loan. The repayment amount on the dollar loan is:

 $10,000,000 \times [1 + (8.3\% \times 30/360)] = 10,000,000 [1.0069] = 10,069,000$

5. Convert the renminbi to dollars to repay the loan. The amount of dollars to be received in 30 days (based on the expected spot rate of \$.17) is:

RMB 67,138,889 × \$.17 = \$11,413,611

6. The profits are determined by estimating the dollars available after repaying the loan:

\$11,413,611 - \$10,069,000 = **\$1,344,611**

NOTE: These profits are risky as they depend upon the bank's exchange rate expectations being fulfilled.

3. Bilateral currency arbitrage

Assume the following prices for the US dollar quoted against the New Zealand dollar:

	Bank X	Bank Y
Bid price of New Zealand dollar	\$0.401	\$0.398
Ask price of New Zealand dollar	\$0.404	\$0.400

Given this information, is locational arbitrage possible? If so, explain the steps that would reflect locational arbitrage and compute the profit from this arbitrage if you had \$1,000,000 to use. What market forces would occur to eliminate any further possibilities of locational arbitrage?

ANSWER:

Yes. One could purchase New Zealand dollars from Bank Y for \$0.40 and sell them to Bank X for \$0.401. With \$1 million available, 2.5 million New Zealand dollars could be purchased from Bank Y. These New Zealand dollars could then be sold to Bank X for \$1,002,500, thereby generating a **profit of \$2,500**.

Locational Arbitrage

1.	Buy New Zealand dollars from Bank Y (\$1,000,000/\$0.4)	2,500,000
2.	Sell New Zealand dollars to Bank X (NZ 2,500,000 × \$0.401)	1,002,500
	US dollar profit (\$1,002,500 – \$1,000,000)	2,500

Market forces:

- The demand for New Zealand dollars at Bank Y will force this bank's ask price on New Zealand dollars to increase.
- The sales of New Zealand dollars to Bank X will force its bid price down.
- Once the ask price of Bank Y is no longer less than the bid price of Bank X, locational arbitrage will no longer be beneficial.