David Bob Case Scenario

David Bob, CFA, is a derivatives analyst at Capital Inc. Capital Inc. deals mainly in arbitrage positions along with leveraged positions. David is following the options prices and futures prices of a company, Slyfly Limited. Because of the low liquidity and trading in this script, there are good chances to find arbitrage opportunities.

The prices for the Slyfly Limited are given in Exhibit 1.

Exhibit 1
Slyfly Limited

Call price (Exercise price = $25)	$3.8
Put price (Exercise price = $25)	$1.0
Futures price	$27.50
Annual risk-free rate	5.00%
Days to expiry	180 days

The days to expiry in Exhibit 1 are same for both the option contracts and futures contract.

David identifies the arbitrage opportunities in the company and takes the position accordingly. He is worried about the increase in competition as markets are becoming more efficient. Because of the efficiency in the market, there are very less arbitrage opportunities available. Even when few opportunities are available, it does not make economic sense to take position into those due to high transaction cost and impediment to borrowing the funds at risk-free rate.

David wants to learn about the Greeks in options so that he can use those in taking other kind of positions in the derivatives markets and can provide value to his clients. He attends a program by the research head of the company, Jim Carbon.

Jim Carbon explains about the Greeks involved with options. He gives the following statements:

Statement 1: The gamma is larger when there is more uncertainly about whether the option will expire in- or out-of-the-money.

Statement 2: Thetas are positive when the put is deep-in-the money, the volatility is high, the interest rate is low, and the time to expiration is low.

Statement 3: The rho has more impact when the underlying is an interest rate rather than equity.

Statement 4: The gamma is maximum for at-the-money options and is similar to duration in the fixed income securities.

David is concerned about one portfolio of his client. The client wants to secure his portfolio value by dynamic delta hedging. The client has 1,000 shares of a stock in his portfolio and the put delta of the stock is -0.4. David explains to him that the portfolio value can also be secured via options. By selling a call option and buying a put option, a zero cost condor can be created and that can secure the portfolio value with no cost at all.

He also explains that in delta hedging, with the movement in the underlying, the portfolio position needs to be rebalanced and there will be more transaction charges involved. But the client is adamant about the delta hedging and doesn't want to take condor position.

1. What is the no-arbitrage futures price as per the data given in Exhibit 1?
   a) $27.21
   b) $27.39
   c) $27.73

2. What is the total arbitrage possible if you are allowed only to take one contract?
   a) $0.29
   b) $0.36
   c) $0.52

3. What is the position taken by David in the option and futures contracts to make arbitrage profit in Slyfly Limited?
   a) Short position in call option and a zero-coupon bond with exercise price as the par value; long position in put option and the futures contract
   b) Long position in call option and a zero-coupon bond with exercise price as the par value; short position in put option and the futures contract
   c) Long position in call option and a zero-coupon bond with exercise price as the current value of the bond; short position in put option and the futures contract

4. Which of the statements made by Jim Carbon are most likely to be accurate?
   a) Statement 2, 3 and 4
   b) Statement 1 and 3
   c) Statement 3 and 4

5. Thetas are positive when
   a) The put is deep in-the-money, the volatility is low, the interest rate is high, and the time to expiration is high
   b) The put is deep-in-the money, the volatility is high, the interest rate is low, and the time to expiration is low
   c) The put is deep in-the-money, the volatility is low, the interest rate is high, and the time to expiration is low

6. What is the position take by David in the put options for securing the portfolio value by the delta hedging?
   a) Short position in 400 put options
   b) Short position in 2,500 put options
   c) Long position in 2,500 put options

Moe Greene Case Scenario

Moe Greene is a manager at Vegas Inc. Vegas Inc. is a U.S. based company and is into casinos business. It is planning to open casinos in Japan. It needs to borrow JPY 500 million (Japanese Yen) from the market for its operation. The company finds a party which is ready to enter into a swap contract with it.

The current exchange rates and the interest rates in USD denominated loans are given in Exhibit 1.

Exhibit 1

Current exchange rate	92 JPY/USD
180-days LIBOR	3.50%
360-days LIBOR	3.80%
540-days LIBOR	4.20%
720 days LIBOR	4.50%

The interest rates in Japanese denominated loans are given in Exhibit 2.

Exhibit 2

180-days interest rate	1.20%
360-days interest rate	1.50%
540-days interest rate	1.70%
720-days interest rate	2.00%

The parties enter into a fixed-fixed currency swap with a notional principal of JPY 500 million. The term for the swap is two years and the interest rates are paid semi-annually.

After 450 days the interest rates in dollar denominated loans and JPY denominated loans change. The changed rates are given in Exhibit 3.

Exhibit 3

	LIBOR	JPY interest rate
90 days	5.20%	2.10%
270 days	6.00%	2.30%

The exchange rate after 450 days is 88 JPY/USD. The exchange rate at the end of the swap contract (after 720 days) is 90 JPY/USD.

Moe Greene also looks at the transactions which the company is expected to make and the revenues that the company is expected to receive in the future. The company is expecting a net liability exposure of floating rate securities having worth $100 million after 1 year. The average duration for the floating rate securities is 4 years. The company wants to lock in the fixed rate after 1 year (when the liabilities will arise) if the fixed rate is lesser than the floating rate. So, Moe Greene decides to enter into the swaption contract.

Michael Corleone, another analyst at the company, asks Moe about how to terminate a swap contract using a swaption and the properties of swaption.

Moe Greene states the following:
Statement 1: If the swap is pay fixed-receive floating, then the swap can be terminated by entering into a payer swaption.
Statement 2: If the swap is pay floating-receive fixed, then the swap can be terminated by entering into a payer swaption.
Statement 3: In a swaption contract, both parties have the obligation to enter into the underlying swap contract.

Michael also asks Moe about the credit risk in a swap contact.

Moe Greene: The credit risk in swaps is relatively higher. The party which has a positive value of swap has a credit risk exposure that the counterparty does not pay the swap value. It can be reduced by the netting. The credit risk is usually higher at the middle of the swap contract.

7. What are the swap rates for the dollar denominated loan and the JPY denominated loan in the swap?
   a) 4.12% and 1.64% respectively
   b) 4.25% and 1.80% respectively
   c) 4.34% and 1.96% respectively

8. What is the swap value for Vegas Inc. after 450 days?
   a) $210,917.10
   b) $265,776.5
   c) $323,792.8

9. What is the value of swap for Vegas Inc. at the end of 720 days?
   a) $57,384.4
   b) $120,772.9
   c) $210,917.1

10. What is the swaption taken by Moe Greene?
   a) 1X4 receiver swaption
   b) 1X5 receiver swaption
   c) 1X5 payer swaption

11. Which of the following statements made by Moe Greene about the swaptions are correct?
   a) Statement 1 and 3
   b) Statement 1 only
   c) Statement 2 only

12. Which of the following swap contracts is most likely to have a higher credit risk near the end of the contract?
   a) Equity swap contract
   b) Interest rate swap contract
   c) Currency swap contract

Alvaro Rosenbluth Case Scenario

Alvaro Rosenbluth, CFA, is a derivatives analyst in Copernicus Inc. Copernicus Inc. is a fund management company which primarily deals in derivatives to provide excess risk-adjusted returns to its clients. The company also provides consulting and management services to its clients.

One of the clients has come to the company for some advice. Alvaro is dealing with the client. The client, Paparica Drom, plans to enter into an interest rate swap. He has found one trustable counter party for the swap. The swap is for 1 year. Paparica would enter into the swap as fixed rate receiver and floating rate payer. The interest amount is to be paid quarterly. The total amount to be swapped is $100 million.

Paparica will get 6% annual coupon rate from the fixed payer side. The floating rate has been decided as LIBOR plus 1.0% spread. The LIBOR rates are given in Exhibit 1.

Exhibit 1

90 days LIBOR	4.5%
180 days LIBOR	5.0%
270 days LIBOR	5.5%
360 days LIBOR	6.0%

Paparica wants to know the value of swap. Alvaro explains that the value of swap at the beginning is zero if we calculate the swap rate which makes the payments equal to the payments from the floating rate party. However, in case the fixed interest rate is different than the swap rate, the swap will have some value to one of the party.

Paparica enquires about the other methods by which we can simulate the payoffs of a swap contract. Alvaro answers his query by stating the following statements:

Statement 1: The swap is a series of forward rate agreements.
Statement 2: We can simulate the payoffs of swap contract by entering into different forward rate agreements for each settlement period of the swap.
Statement 3: We can simulate each forward rate agreement by entering into the interest rate options. For example, if we are a fixed receiver and floating payer, we can long interest rate call option and short interest rate put option to simulate the payoffs.

Another client, Rose Edmund, is concerned about the future exchange rate of currency. She is expecting to receive GBP 2 million after 6 months. She is a US resident. The current exchange rate between the GBP and USD is 1.8USD/GBP. She wants to sell 6-month forward contracts on the currency so that she can lock in the exchange rate. The interest rates in USA and GBP are given in Exhibit 2.

Exhibit 2

Currency	6-month interest rate (annual)
GBP	2.8%
USD	4.2%

Alvaro calculates the forward price for her and tells her the price. She takes position into the forward contract. At the end of 6 months, the exchange rate becomes 1.82USD/GBP.

Alvaro is managing portfolio of one of the clients. The client has advised him to take leveraged position by forwards and futures only. He looks at two stocks which are trading at the same price but the volatility and dividend payments are different for both the stocks. One stock (A) is expected to pay a dividend of $2 per share after 200 days and other stock (B) is expected to pay a dividend of $2.05 per share after 300 days. The risk free rate is 6% per annum. He wants to take a position into 6-month futures contract. The volatility of stock A is 30% per annum and that of stock B is 20% per annum.

13. What is the value of the swap to Paparica Drom at the initiation of the swap contract?
    a) -$773,947
    b) $56,256
    c) $142,020

14. What is the annual spread earned by Paparica on entering into the swap?
    a) 0.15%
    b) -0.80%
    c) -0.85%

15. Which of the following statements is least accurate by Alvaro regarding the simulation of payoff of swap contract?
    a) Statement 2
    b) Statement 3
    c) All statements are correct

16. What is the total gain/loss of Rose by entering into the currency forward contract?
    a) -$15,569.3
    b) -$64,266.0
    c) $9,027.2

17. Which of the futures contact of the stocks will have a higher price?
    a) Stock A because it has higher volatility
    b) Stock B because it has lower present value of dividends
    c) Both will have the same futures price

18. What is the forward exchange rate locked in by Rose?
    a) 1.7879 GBP/USD
    b) 1.8122 GBP/USD
    c) 1.8245 GBP/USD

Glori Smith Case Scenario

Glori Smith is concerned about the movement of stock market in coming future. The movement of stocks will depend on the outcome of ECB (European Central Bank) quarterly meeting where they will discuss about the PIIGS nations and the steps to avoid the crisis in the European Union.

She has 100,000 shares of Maxeye Construction Company which is into construction business and is affected by the macroeconomic factors. She wants to protect her portfolio value. She asks her friend Rebecca Stewart who is a CFA level II candidate about the various positions which she can take to protect the value of her holdings.

Rebecca tells her that she could do it using futures, options or swaps.

She can short the futures contract having settle date beyond the meeting date of ECB which is after 55 days. After the passing of that date, she can accordingly take the position by studying the outcome of the meeting.

You can also protect your portfolio value by using covered call strategy where you can sell call options equal to the number of shares of the portfolio. You can also do the dynamic delta hedging to protect your portfolio value.

You can make a swap contract with some counter party which is ready to pay you fixed return on some stock and receive the return on your portfolio of stock.

Glori decides to enter into futures contract. She enters into 2 months contract. The price of the underlying stock and other details when she entered into the contract are given in Exhibit 1.

Exhibit 1

Spot price	$12.00
Annual risk free rate	6.00%
Initial Margin	20.00%

She shorts the futures contract. At the end of contract, the stock price moves to $14.50 as the situation in Euro zone starts to improve.

She realized at the end of the period that she should have entered into a strategy which protects the downside movement without hindering the upside potential. On asking Rebecca about the same, she tells her that this could be possible by using options.

Glori also has a portfolio of fixed coupon bonds having exposure to PIIGS countries. She secured the portfolio of bond by buying CDS as advised by her friend Rebecca. She bought the CDS at 280 basis points. The CDS spread has now widened to 340 basis points. But the counter party of the CDS position defaults exposing her portfolio to credit risk.

Glori notices that the value of her bond portfolio has fallen because of the increase in interest rates. But she has not been compensated by the CDS party for the fall in this value. She now wants to enter into a position so that she could earn a floating interest rate and in turn can pay the change in her bond portfolio and the fixed rate to the other party.

On consulting her friend, she enters into a total return swap. In a total return swap, she would receive the floating rate payment on her portfolio and would pay the total return on her portfolio to the counter party.

19. Which of the ways told by Rebecca is least accurate for protecting the portfolio value?
    a) Using futures
    b) Using options
    c) Using swaps

20. How much initial margin was paid by Glori to enter into the futures contract?
    a) $240,000
    b) $242,342
    c) $254,400

21. Which of the following options strategy would protect the downside movement without restricting the profits from the upside movement?
    a) Covered call (Selling call options)
    b) Condor (Selling call options and buying put options)
    c) Protective put (Buying put options)

22. Which of the following risk has been taken care of in the total return swap?
    a) Credit risk
    b) Market risk
    c) Both of the above

23. What kind of risk has been faced by Glori for her CDS position?
    a) Double default risk
    b) Replacement risk
    c) Interest rate risk

24. What is the total profit/loss from the futures contract position taken by Glori?
    a) Loss of $238,289
    b) Profit of $238,289
    c) Loss of $250,000

Bernard Sande Case Scenario

Bernard Sande is an analyst at LLC Inc. He is a valuation analyst and values the private companies.

LLC Inc. is into manufacturing of high end printing machines. The company has grown considerably inorganically in recent past. The company is planning to acquire one more company REC Conductors. REC Conductors is a private company and is into development of semi-conductors for electronic devices. LLC Inc. is going to acquire 40% of the equity of REC Conductors. The data for REC Conductors are given in Exhibit 1.

Exhibit 1

Free cash flow to the firm for next 12 months	$2 million
WACC of REC Conductors	15.6%
WACC of LLC Inc.	13.8%
Book value of debt	$5 million
Sustainable growth rate of free cash flow to the firm	5.8%
Sustainable growth rate of earnings of the firm	7.8%

Bernard uses the capitalized cash flow model to value the equity value of REC Conductors. The market value of debt is 8% more than the current book value of debt for REC Conductors.

Arevik Khachatryan, another analyst, asks Bernard about the calculation of WACC for the company. She asks her the following questions regarding the discount rates to be used for valuing an acquisition party:

Arevik Khachatryan: The private company has lesser access to debt as compared to a public company. So, the current capital structure may not be optimal. How should an analyst do an adjustment for this if the transaction has a control perspective?

Bernand Sande: An analyst should use the debt proportion of the similar public trading company and then calculate the WACC for the company using those proportions.

Arevik Khachatryan: How should an analyst adjust the discount rate for the projection risk?

Bernand Sande: An analyst should be concerned about the projection ability of the company. It would be highly subjective to adjust the discount rate. Projections may reflect excessive optimism or pessimism. Analyst should take all that into consideration while adjusting the discount rate for projection risk.

Arevik Khachatryan has evaluated the value of a private company. The company is valued on the basis of control but her position would be that of a minority. The DLOC for the company is 25% and the DLOM of the company is 10%. After adjusting both the discount factors, she calculated the value of the company to be $120 million.

LLC Inc. is looking at acquiring another company, Beta Horizons. The valuation of Beta Horizons has been done using the GPCM model (Guideline Public Company Method) where the valuation is done using as per the minority perspective. The value of the equity of the company comes out to be $60 million. LLC Inc. is going to acquire 80% of the company. The discount for lack of control (DLOC) is 20%.

25. What is the approximate value of the firm (REC Conductors) calculated by Bernand Sande?
    a) $20.41 million
    b) $25.00 million
    c) $25.64 million

26. How much approximate money is LLC Inc. willing to pay for acquiring 40% stake in REC Conductors?
    a) $6.00 million
    b) $6.16 million
    c) $8.10 million

27. Is the answer given by Bernard to the question of Arevik regarding the usage of capital structure weights while computing the WACC correct?
    a) Yes
    b) No, the weights should be based on the current capital structure weights
    c) No, the weights should be based on the optimal capital structure weights of the acquiring company

28. The value of the 80% of the Beta Horizons to be acquired by LLC Inc. is closest to:
    a) $38.4 million
    b) $57.6 million
    c) $60.0 million

29. Assuming that LLC Inc. will have control on acquiring 40% stake of REC Conductors and the WACC according to optimal structure weight is 1.8% less than the WACC according to current capital structure. What would be the rise in value of firm because of using the WACC with optimal structure weights?
    a) $7.69 million
    b) $7.26 million
    c) $4.59 million

30. What is the value of the company without discount for control and marketability as done by Arevik Khachatryan?
    a) $184.62 million
    b) $177.78 million
    c) $81.00 million