

## SAMPLE QUESTIONS FOR *DERIVATIVES MARKETS*

These questions have been written to assist the student in studying for the Exam FM/2. They are not intended to cover the entire breadth of the syllabus for Financial Economics.

1. Which statement about zero-cost purchased collars is FALSE?
  - A. A zero-width, zero-cost collar can be created by setting both the put and call strike prices at the forward price.
  - B. There are an infinite number of zero-cost collars.
  - C. The put option can be at-the-money.
  - D. The call option can be at-the-money.
  - E. The strike price on the put option must be at or below the forward price.
  
2. You are given the following information:
  - The current price to buy one share of XYZ stock is 500.
  - The stock does not pay dividends.
  - The risk-free interest rate, compounded continuously, is 6%.
  - A European call option on one share of XYZ stock with a strike price of  $K$  that expires in one year costs 66.59.
  - A European put option on one share of XYZ stock with a strike price of  $K$  that expires in one year costs 18.64.

Using put-call parity, determine the strike price,  $K$ .

- A. 449
- B. 452
- C. 480
- D. 559
- E. 582

3. Happy Jalapenos, LLC has an exclusive contract to supply jalapeno peppers to the organizers of the annual jalapeno eating contest. The contract states that the contest organizers will take delivery of 10,000 jalapenos in one year at the market price. It will cost Happy Jalapenos 1,000 to provide 10,000 jalapenos and today's market price is 0.12 for one jalapeno. The continuously compounded risk-free interest rate is 6%.

Happy Jalapenos has decided to hedge as follows (both options are one-year, European):

Buy 10,000 0.12-strike put options for 84.30 and sell 10,000 0.14-strike call options for 74.80.

Happy Jalapenos believes the market price in one year will be somewhere between 0.10 and 0.15 per pepper. Which interval represents the range of possible profit one year from now for Happy Jalapenos?

- A. -200 to 100
  - B. -110 to 190
  - C. -100 to 200
  - D. 190 to 390
  - E. 200 to 400
4. Zero-coupon risk-free bonds are available with the following maturities and yield rates (effective, annual):

Maturity (years)	Yield
1	0.06
2	0.065
3	0.07

You need to buy corn for producing ethanol. You want to purchase 10,000 bushels one year from now, 15,000 bushels two years from now, and 20,000 bushels three years from now. The current forward prices, per bushel, are 3.89, 4.11, and 4.16 for one, two, and three years respectively.

You want to enter into a commodity swap to lock in these prices. Which of the following sequences of payments at times one, two, and three will NOT be acceptable to you and to the corn supplier?

- A. 38,900, 61,650, 83,200
- B. 39,083, 61,650, 82,039
- C. 40,777, 61,166, 81,554
- D. 41,892, 62,340, 78,997
- E. 60,184, 60,184, 60,184

5. You are given the following information:

- One share of the PS index currently sells for 1,000.
- The PS index does not pay dividends.
- The effective annual risk-free interest rate is 5%.

You want to lock in the ability to buy this index in one year for a price of 1,025. You can do this by buying or selling European put and call options with a strike price of 1,025. Which of the following will achieve your objective and also gives the cost today of establishing this position.

- A. Buy the put and sell the call, receive 23.81
- B. Buy the put and sell the call, spend 23.81
- C. Buy the put and sell the call, no cost
- D. Buy the call and sell the put, receive 23.81
- E. Buy the call and sell the put, spend 23.81

6. The current price of one share of XYZ stock is 100. The forward price for delivery of one share of XYZ stock in one year is 105. Which of the following statements about the expected price of one share of XYZ stock in one year is TRUE?

- A. It will be less than 100
- B. It will be equal to 100
- C. It will be strictly between 100 and 105
- D. It will be equal to 105
- E. It will be greater than 105.

7. A non-dividend paying stock currently sells for 100. One year from now the stock sells for 110. The risk-free rate, compounded continuously, is 6%. The stock is purchased in the following manner:

- You pay 100 today
- You take possession of the security in one year

Which of the following describes this arrangement?

- A. Outright purchase
- B. Fully leveraged purchase
- C. Prepaid forward contract
- D. Forward contract
- E. This arrangement is not possible due to arbitrage opportunities

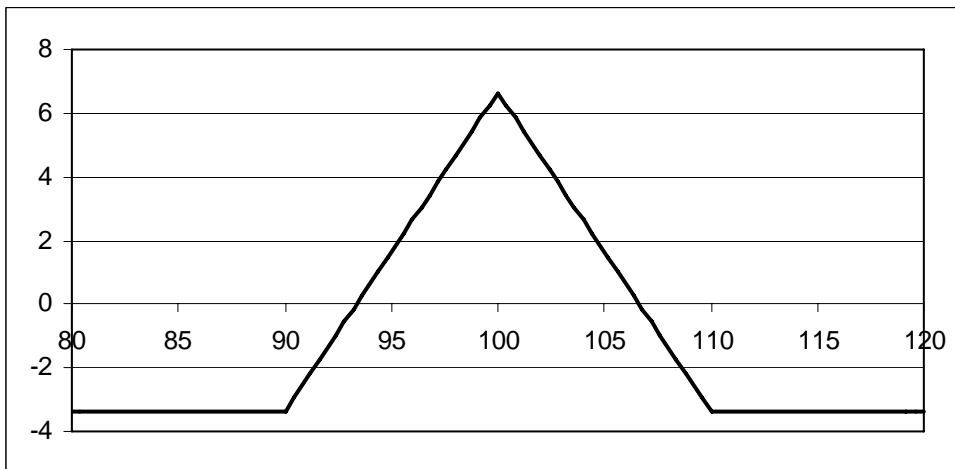
8. You believe that the volatility of a stock is higher than indicated by market prices for options on that stock. You want to speculate on that belief by buying or selling at-the-money options. What should you do?
- A. Buy a strangle
  - B. Buy a straddle
  - C. Sell a straddle
  - D. Buy a butterfly spread
  - E. Sell a butterfly spread

9. You are given the following information:

- The current price to buy one share of ABC stock is 100
- The stock does not pay dividends
- The risk-free rate, compounded continuously, is 5%
- European options on one share of ABC stock expiring in one year have the following prices:

Strike Price	Call option price	Put option price
90	14.63	0.24
100	6.80	1.93
110	2.17	6.81

A butterfly spread on this stock has the following profit diagram.



Which of the following will NOT produce this profit diagram?

- Buy a 90 put, buy a 110 put, sell two 100 puts
- Buy a 90 call, buy a 110 call, sell two 100 calls
- Buy a 90 put, sell a 100 put, sell a 100 call, buy a 110 call
- Buy one share of the stock, buy a 90 call, buy a 110 put, sell two 100 puts
- Buy one share of the stock, buy a 90 put, buy a 110 call, sell two 100 calls.

10. Suppose stock XYZ has a current price of 100. The forward price for delivery of this stock in 1 year is 110. Also, assume there are no dividends, and that the annual effective interest rate is 10%, unless otherwise indicated.

Which of the following statements is FALSE?

- A. The time-1 profit diagram and the time-1 payoff diagram for long positions in this forward contract are identical.
  - B. The time-1 profit for a long position in this forward contract is exactly opposite to the time-1 profit for the corresponding short forward position.
  - C. There is no comparative advantage to investing in the stock versus investing in the forward contract.
  - D. If the 10% interest rate was continuously compounded instead of annual effective, then it would be more beneficial to invest in the stock, rather than the forward contract.
  - E. If there was a dividend of 3.00 paid 6 months from now, then it would be more beneficial to invest in the stock, rather than the forward contract.
11. The current stock price is 40, and the effective annual interest rate is 8%. The price of a 35-strike 1-year European call option is 9.12. The price of a 40-strike 1-year European call option is 6.22. The price of a 45-strike 1-year European call option is 4.08.

Assuming that all call positions being compared are long, at what 1-year stock price range does the 45-strike call produce a higher profit than the 40-strike call, but a lower profit than the 35-strike call?

- A.  $S_1 < 38.13$
- B.  $38.13 < S_1 < 40.44$
- C.  $40.44 < S_1 < 42.31$
- D.  $S_1 > 42.31$
- E. There is no price for  $S_1$  at which this situation occurs.

12. Consider a European put option on a stock index without dividends, with 6 months to expiration, and a strike price of 1,000. Suppose that the nominal annual risk-free rate is 4% convertible semiannually, and that the put costs 74.20 now.

What price must the index be in 6 months so that being long the put would produce the same profit as being short the put?

- A. 922.83
  - B. 924.32
  - C. 1,000.00
  - D. 1,075.68
  - E. 1,077.17
13. Suppose that you short one share of a stock index for 50, and that you also buy a 60-strike European call option that expires in 2 years for 10. Assume the effective annual interest rate is 3%.

If the stock index increases to 75 after 2 years, what is the profit on your combined position, and what is an alternative name for the call in this context?

- | <b>Profit</b> | <b>Name</b>            |
|---------------|------------------------|
| A. -22.64     | Floor                  |
| B. -17.56     | Floor                  |
| C. -22.64     | Cap                    |
| D. -17.56     | Cap                    |
| E. -22.64     | 'Written' Covered Call |

14. The current price of a non-dividend paying stock is 40 and the continuously compounded risk-free rate of return is 8%. You are given that the price of a 35-strike call option is 3.35 higher than the price of a 40-strike call option, where both options expire in 3 months.

How much does the price of an otherwise equivalent 40-strike put option exceed the price of an otherwise equivalent 35-strike put option?

- A. 1.55
  - B. 1.65
  - C. 1.75
  - D. 3.25
  - E. 3.35
15. The current price of a non-dividend paying stock is 40 and the continuously compounded risk-free rate of return is 8%. You enter into a short position on 3 call options, each with 3 months to maturity, a strike price of 35, and an option premium of 6.13. Simultaneously, you enter into a long position on 5 call options, each with 3 months to maturity, a strike price of 40, and an option premium of 2.78.

Assuming all 8 options are held until maturity, what is the maximum possible profit and loss for the entire option portfolio?

	Maximum Profit	Maximum Loss
A.	3.42	4.58
B.	4.58	10.42
C.	Unlimited	10.42
D.	4.58	Unlimited
E.	Unlimited	Unlimited

16. The current price of a non-dividend paying stock is 40 and the continuously compounded risk-free rate of return is 8%. In addition, you are given the following table of call and put option premiums for various exercise prices:

Exercise Price	Call Premium	Put Premium
35	6.13	0.44
40	2.78	1.99
45	0.97	5.08

You are interested in speculating on volatility in the stock price, and are comparing two investment strategies. The first is a 40-strike 'straddle'. The second is a 'strangle' consisting of a 35-strike put and a 45-strike call. For what range of stock prices in 3 months does the 'strangle' outperform the 'straddle'?

- A. The 'strangle' never outperforms the 'straddle.'
- B.  $33.56 < S_T < 46.44$
- C.  $35.13 < S_T < 44.87$
- D.  $36.57 < S_T < 43.43$
- E. The 'strangle' always outperforms the 'straddle.'

17. Assume the current price for a stock index is 1,000, and the following premiums exist for various options to buy or sell the stock index 6 months from now:

Strike Price	Call Premium	Put Premium
950	120.41	51.78
1,000	93.81	74.20
1,050	71.80	101.21

Strategy I is to buy the 1,050-strike call and to sell the 950-strike call.

Strategy II is to buy the 1,050-strike put and to sell the 950-strike put.

Strategy III is to buy the 950-strike call, sell the 1,000-strike call, sell the 950-strike put, and buy the 1,000-strike put.

Assume that the price of the stock index in 6 months will be between 950 and 1,050. In 6 months, which of the three strategies will have greater payoffs for lower prices of the stock index than for relatively higher prices?

- A. I only
- B. I and II only
- C. I and III only
- D. II and III only
- E. I, II, and III

18. You are a jeweler who buys gold, which is the primary input needed for your products. One ounce of gold can be used to produce one unit of jewelry. Assume that the cost of all other inputs is negligible. You are able to sell each unit of jewelry for 700 plus 20% of the market price of gold in one year. In one year, the actual price of gold will be in 1 of 3 possible states, corresponding to the following probability table:

<u>Market Price of Gold in 1-year</u>	<u>Probability</u>
750 per ounce	.2
850 per ounce	.5
950 per ounce	.3

You are considering utilizing forward contracts to lock in 1-year gold prices, in which case you would charge the customer (one year from now) 700 plus 20% of the forward price. The 1-year forward price for gold is 850 per ounce. How much does your expected 1-year profit, per unit of jewelry sold, increase if you buy forward the 1-year price of gold?

- A. 0
- B. 8
- C. 12
- D. 20
- E. 32

19. You are a producer of gold, and have expenses of 800 per ounce of gold produced. Assume that the cost of all other production-related expenses is negligible, and that you will be able to sell all gold produced at the market price. In 1 year, the market price of gold will be 1 of 3 possible prices, corresponding to the following probability table:

Gold Price in 1-year	Probability
750 per ounce	.2
850 per ounce	.5
950 per ounce	.3

You hedge the price of gold by buying a 1-year put option with an exercise price of 900 per ounce. The option costs 100 per ounce now, and the continuously compounded interest rate is 6%. Which of the following is closest to your expected 1-year profit per ounce of gold produced?

- A. 0
  - B. 3
  - C. 6
  - D. 9
  - E. 12
20. The current price of a stock is 200, and the continuously compounded interest rate is 4%. A dividend will be paid every quarter for the next 3 years, with the first dividend occurring 3 months from now. The amount of the first dividend is 1.50, but each subsequent dividend will be 1% higher than the one previously paid.

Which of the following is closest to the fair price of a 3-year forward contract on this stock?

- A. 200
- B. 205
- C. 210
- D. 215
- E. 220

21. You are a market maker in stock index forward contracts. The index spot price is 110, the continuously compounded interest rate is 5%, and the continuously compounded dividend yield on the index is 2%. If you observe a 6-month forward price of 112, describe actions you could take to exploit an arbitrage opportunity, and calculate the resulting profit (per index unit).
- A. Buy observed forward, sell synthetic forward, Profit = 0.34
  - B. Buy observed forward, sell synthetic forward, Profit = 0.78
  - C. Buy observed forward, sell synthetic forward, Profit = 1.35
  - D. Sell observed forward, buy synthetic forward, Profit = 0.78
  - E. Sell observed forward, buy synthetic forward, Profit = 0.34
22. A farmer expects to sell 50 tons of pork bellies at the end of each of the next 3 years. Suppose that the pork bellies forward price for delivery in 1 year is 1,600 per ton. For delivery in 2 years, the forward price is 1,700 per ton. Also, for delivery in 3 years, the forward price is 1,800 per ton. Suppose that interest rates are determined from the following table:

Years to Maturity	Zero-Coupon Bond Yield
1	5.00%
2	5.50%
3	6.00%

If the farmer uses a commodity swap to hedge the price for selling pork bellies, what is the level amount he would receive each year (i.e. – the swap price) for all 50 tons?

- A. 84,600
- B. 84,800
- C. 85,000
- D. 85,200
- E. 85,400

23. You are given the following spot rates from the latest upward-sloping yield curve:

<u>Years to Maturity</u>	1	2	3	4	5
<u>Spot Rate</u>	4.00%	4.50%	5.25%	6.25%	7.50%

You enter into a 5-year interest rate swap (with a notional amount of 100,000) to pay a fixed rate and to receive a floating rate based on future 1-year LIBOR rates. If the swap has annual payments, what is the fixed rate you should pay?

- A. 5.20%
  - B. 5.70%
  - C. 6.20%
  - D. 6.70%
  - E. 7.20%
24. Which of the following statements is NOT a typical reason for why derivative securities are used to manage financial risk?
- A. Derivatives are used as a means of hedging.
  - B. Derivatives are used to reduce the likelihood of bankruptcy.
  - C. Derivatives are used to reduce transaction costs.
  - D. Derivatives are used to satisfy regulatory, tax, and accounting constraints.
  - E. Derivatives are used as a form of insurance.
25. Which of the following statements concerning risk sharing, in the context of financial risk management, is LEAST accurate?
- A. In an insurance market, individuals that do not incur losses have shared risk with individuals that do incur losses.
  - B. Insurance companies can share risk by ceding some of the excess risk from large claims to reinsurers.
  - C. Reinsurance companies can further share risk by investing in catastrophic bonds.
  - D. Risk-sharing reduces diversifiable risk, more so than reducing non-diversifiable risk.
  - E. Ideally, any risk-sharing mechanism should benefit all parties sharing the risk.

26. Which of the following positions have an unlimited loss potential from adverse price movement in the underlying asset, regardless of the initial premium received?

- I. Short 1 forward contract
- II. Short 1 call option
- III. Short 1 put option

- A. I only
- B. I and II only
- C. I and III only
- D. II and III only
- E. I, II, and III

27. Which of the following positions benefit from falling prices in the underlying asset?

- I. Long 1 homeowner's insurance contract
- II. Long 1 equity-linked CD
- III. Long 1 synthetic forward contract

- A. I only
- B. I and II only
- C. I and III only
- D. II and III only
- E. I, II, and III

28. Which of the following is NOT among a firm's rationales to hedge?
- A. To reduce taxes through income shifting
  - B. To reduce the probability of bankruptcy or distress
  - C. To reduce the costs associated with external financing
  - D. To reduce the exposure to exchange rate risk
  - E. To reduce the debt proportion of external financing
29. The dividend yield on a stock ( $d$ ) and the interest rate used to discount the stock's cash flows ( $r$ ) are both continuously compounded. There are 4 alternative methods to buy a stock: outright purchase, fully leveraged purchase, prepaid forward contract, and forward contract. The dividend yield is less than the interest rate, but both are positive. Which of the following is the correct ranking, from smallest to largest, for the amount of payment needed to acquire the stock?

Note: in establishing your ranking, you should calculate each payment amount at the exact time of payment, so that for any methods that have payment times in the future, you do not need to discount these payments back to time-0 when comparing amounts.

- A. Prepaid forward contract, Outright purchase, Forward contract, Fully leveraged purchase
- B. Outright purchase, Prepaid forward contract, Forward contract, Fully leveraged purchase
- C. Outright purchase, Prepaid forward contract, Forward contract, Fully leveraged purchase
- D. Prepaid forward contract, Outright purchase, Fully leveraged purchase, Forward contract
- E. Outright purchase, Prepaid forward contract, Fully leveraged purchase, Forward contract

30. You are trying to decide whether to use forward contracts or futures contracts when committing to buy an underlying asset at some date in the future. Which of the following is NOT a distinguishing characteristic of futures contracts, relative to forward contracts?
- A. Contracts are settled daily, and marked-to-market.
  - B. Contracts are more liquid, as one can offset an obligation by taking the opposite position.
  - C. Contracts are more customized to suit the buyer's needs.
  - D. Contracts are structured to minimize the effects of credit risk.
  - E. Contracts have price limits, beyond which trading may be temporarily halted.