

### Question #1 of 98

Referring to put-call parity, which one of the following alternatives would allow you to create a synthetic European call option?

- A) Buy the stock; sell a European put option on the same stock with the same exercise price and the same maturity; short an amount equal to the present value of the
  - B) Buy the stock; buy a European put option on the same stock with the same exercise price and the same maturity; short an amount equal to the present value of the
  - C) Sell the stock; buy a European put option on the same stock with the same exercise price and the same maturity; invest an amount equal to the present value of the
- 

### Question #2 of 98

Which of the following *best* describes the implied volatility method for estimated volatility inputs for the Black-Scholes model? Implied volatility is found:

- A) using historical stock price data.
  - B) by solving the Black-Scholes model for the volatility using market values for the stock price, exercise price, interest rate, time until expiration, and option price.
  - C) using the most current stock price data.
- 

### Question #3 of 98

Which of the following is NOT one of the assumptions of the Black-Scholes-Merton option-pricing model?

- A) The yield curve for risk-free assets is fixed over the term of the option.
  - B) There are no cash flows over the term of the options.
  - C) There are no taxes and transactions costs are zero for options and arbitrage portfolios.
-

Al Bingly, CFA, is a derivatives specialist who attempts to identify and make short-term gains from trading mispriced options. One of the strategies that Bingly uses is to look for arbitrage opportunities in the market for European options. This strategy involves creating a synthetic call from other instruments at a cost less than the market value of the call itself, and then selling the call. During the course of his research, he observes that Hilland Corporation's stock is currently priced at \$56, while a European-style put option with a strike price of \$55 is trading at \$0.40 and a European-style call option with the same strike price is trading at \$2.50. Both options have 6 months remaining until expiration. The risk-free rate is currently 4 percent.

Bingly often uses the binomial model to estimate the fair price of an option. He then compares his estimated price to the market price. He observes that Dale Corporation's stock has a current market price of \$200, and he predicts that its price will either be \$166.67 or \$240 in one year. The risk-free rate is currently 4 percent. He also observes that the price of a one-year call with a \$220 strike price is \$11.11.

Bingly also uses the Black-Scholes-Merton model to price options. His stated rationale for using this model is that he believes the prices of the stocks he analyzes follow a lognormal distribution, and because the model allows for a varying risk-free rate over the life of the option. His plan is to use a statistical technique to estimate the volatility of a stock, enter it into the Black-Scholes-Merton model, and see if the associated price is higher or lower than the observed market price of the options on the stock.

Bingly wishes to apply the Black-Scholes-Merton model to both non-dividend paying and dividend paying stocks. He investigates how the presence of dividends will affect the estimated call and put price.

### Question #4 of 98

In the case of the options on Hilland Corporation's stock, if Bingly were to establish a long protective put position, he could:

- A)** earn an arbitrage profit of \$0.30 per share by selling the call and lending \$57.20 at the risk-free rate.
- B)** not earn an arbitrage profit because he should short the protective put position.
- C)** earn an arbitrage profit of \$0.03 per share by selling the call and borrowing the remaining funds needed for the position at the risk-free rate.

### Question #5 of 98

The one-year call option on Dale Corporation:

- A) is underpriced.
  - B) is overpriced.
  - C) may be over or underpriced. The given information is not sufficient to give an answer.
- 

### Question #6 of 98

Bingly's sentiments towards the Black-Scholes-Merton (BSM) model regarding a lognormal distribution of prices and a variable risk-free rate are:

- A) correct concerning the distribution of stocks but incorrect concerning the risk-free rate.
  - B) incorrect for both reasons.
  - C) correct for both reasons.
- 

### Question #7 of 98

Which of the following is *least* accurate regarding the limitations of the BSM model?

- A) The BSM is not useful in situations where the volatility of the underlying asset changes over time.
  - B) The BSM is designed to price American options but not European options.
  - C) The BSM is not useful in pricing options on bonds and interest rates.
- 

### Question #8 of 98

If Bingly forecasts the volatility for a stock and find that it is significantly greater than that implied by the prices of the puts and calls of the stock, he would conclude that:

- A) puts and calls are overpriced.

- B)** puts and calls are underpriced.
  - C)** the puts are overpriced and the calls are underpriced.
- 

### Question #9 of 98

All else being equal, the greater the dividend paid by a stock the:

- A)** higher the call price and the lower the put price.
  - B)** lower the call price and the lower the put price.
  - C)** lower the call price and the higher the put price.
- 

### Question #10 of 98

The value of a put option will be higher if, all else equal, the:

- A)** underlying asset has positive cash flows.
  - B)** exercise price is lower.
  - C)** underlying asset has less volatility.
- 

### Question #11 of 98

A payer swaption gives its holder:

- A)** an obligation to enter a swap in the future as the fixed-rate payer.
  - B)** the right to enter a swap in the future as the floating-rate payer.
  - C)** the right to enter a swap in the future as the fixed-rate payer.
- 

### Question #12 of 98

In order to compute the implied asset price volatility for a particular option, an investor:



- A) does not need to know the risk-free rate.
  - B) must have a series of asset prices.
  - C) must have the market price of the option.
- 

### Question #13 of 98

Suppose a forward rate agreement (FRA) requires us to exchange six-month LIBOR one year from now for a fixed rate of interest of 8%. In other words, we will pay floating and receive fixed. Which of the following structures is *equivalent* to this FRA? A long:

- A) put and a short call on LIBOR with a strike rate of 8% and twelve months to expiration.
  - B) call and a short put on LIBOR with a strike rate of 8% and twelve months to expiration.
  - C) call and a short put on LIBOR with a strike rate of 8% and six months to expiration.
- 

### Question #14 of 98

Pete Jenkins makes the following statement about options:

" $N(d_2)$  is interpreted as the risk-neutral probability that a call option will expire in the money. Similarly,  $N(-d_2)$  is the risk-neutral probability that a put option will expire in the money."

Jenkins is *most likely*:

- A) incorrect about the risk-neutral probability of call option expiring in the money.
  - B) correct.
  - C) incorrect about the risk-neutral probability of put option expiring in the money.
- 

### Question #15 of 98

How is the gamma of an option defined? Gamma is the change in the:

- A) delta as the price of the underlying security changes.

- B)** vega as the option price changes.
- C)** option price as the underlying security changes.

---

Rachel Barlow is a recent graduate of Columbia University with a Bachelor's degree in finance. She has accepted a position at a large investment bank, but first must complete an intensive training program to gain experience in several of the investment bank's areas of operations. Currently, she is spending three months at her firm's Derivatives Trading desk. One of the traders, Jason Coleman, CFA, is acting as her mentor, and will be giving her various assignments over the three month period.

One of the first projects Coleman asks Barlow to do is to compare different option trading strategies. Coleman would like Barlow to pay particular attention to strategy costs and their potential payoffs. Barlow is not very comfortable with option models, and knows she needs to be able to fully understand the most basic concepts in order to move on. She decides that she must first investigate how to properly price European and American style equity options. Coleman has given Barlow software that provides a variety of analytical information using three valuation approaches: the Black-Scholes model, the Binomial model, and Monte Carlo simulation. Barlow has decided to begin her analysis using a variety of different scenarios to evaluate option behavior. The data she will be using in her scenarios is provided in Exhibits 1 and 2. Note that all of the rates and yields are on a continuous compounding basis.

**Exhibit 1**

|                          |          |
|--------------------------|----------|
| Stock Price (S)          | \$100.00 |
| Strike Price (X)         | \$100.00 |
| Interest Rate (r)        | 7.0%     |
| Dividend Yield (q)       | 0.0%     |
| Time to Maturity (years) | 0.5      |
| Volatility (Std. Dev.)   | 20.0%    |
| Value of Put             | \$3.9890 |

**Exhibit 2**

|                   |          |
|-------------------|----------|
| Stock Price (S)   | \$110.00 |
| Strike Price (X)  | \$100.00 |
| Interest Rate (r) | 7.0%     |

|                          |           |
|--------------------------|-----------|
| Dividend Yield (q)       | 0.0%      |
| Time to Maturity (years) | 0.5       |
| Volatility (Std. Dev.)   | 20.0%     |
| Value of Call            | \$14.8445 |
| $N(d_1)$                 | 0.8394    |
| $N(d_2)$                 | 0.8025    |

**Exhibit 3**

|                          |           |
|--------------------------|-----------|
| Stock Price (S)          | \$115.00  |
| Strike Price (X)         | \$100.00  |
| Interest Rate (r)        | 7.0%      |
| Dividend Yield (q)       | 0.0%      |
| Time to Maturity (years) | 0.5       |
| Volatility (Std. Dev.)   | 20.0%     |
| Value of Call            | \$19.2147 |
| Value of Put             | \$0.7753  |

**Question #16 of 98**

Barlow notices that the stock in Exhibit 1 does not pay dividends. If the stock begins to pay a dividend, how will the price of a call option on that stock be affected? The price of the call option:

- A) will increase.
- B) will decrease.
- C) may either increase or decrease.

**Question #17 of 98**

Barlow calculated the value of an American call option on the stock shown in Exhibit 2. Which of the following is *closest* to the value of this call option?

- A) \$14.84.
  - B) \$15.12.
  - C) \$15.41.
- 

### Question #18 of 98

Using the information in Exhibit 2, Barlow computes the value of a European put option. Which of the following is *closest* to the value of this option?

- A) \$1.41.
  - B) \$1.97.
  - C) \$4.84.
- 

### Question #19 of 98

Barlow notices that the stock in Exhibit 2 does not pay dividends. If the stock starts to pay a dividend, how will the price of a put option on that stock be affected?

- A) Decrease.
  - B) Increase.
  - C) Increase or decrease.
- 

### Question #20 of 98

If the price of the underlying stock increases from the \$110.00 price showing in Exhibit 2 to \$115.00, the approximate price change as predicted by delta using the data from Exhibit 2 is:

- A) is precisely the actual \$19.2147 value of the call because of gamma.
  - B) more than the actual \$19.2147 value of the call because of gamma.
  - C) less than the actual \$19.2147 value of the call because of gamma.
-



### Question #21 of 98

If the market price of all calls and puts are greater than the predicated option prices, the implied volatility is:

- A) calculated from historical volatility.
  - B) less than the current standard deviation of 20.0%.
  - C) greater than the current standard deviation of 20.0%.
- 

### Question #22 of 98

A stock is priced at 38 and the periodic risk-free rate of interest is 6%. What is the value of a two-period European put option with a strike price of 35 on a share of stock using a binomial model with an up factor of 1.15, a down factor of 0.87 and a risk-neutral probability of 68%?

- A) \$2.58.
  - B) \$0.64.
  - C) \$0.57.
- 

### Question #23 of 98

A floor on a floating rate note, from the bondholder's perspective, is equivalent to:

- A) owning a series of puts on fixed income securities.
  - B) writing a series of interest rate puts.
  - C) owning a series of calls on fixed income securities.
- 

### Question #24 of 98

Bob Dilla, CFA makes the following statement about call options:

" Call options on stock can be thought of as leveraged stock investment where  $N(d_1)$  units of stock is purchased using  $e^{-rT}XN(-d_2)$  of borrowed funds.

Dilla is *most likely*:

- A) incorrect about use of  $e^{-rT}XN(-d_2)$  borrowed funds.
- B) incorrect about  $N(d_1)$  units of stock.
- C) correct.

---

### Question #25 of 98

When an option's gamma is higher:

- A) a delta hedge will perform more poorly over time.
- B) delta will be higher.
- C) a delta hedge will be more effective.

---

Ronald Franklin, CFA, has recently been promoted to junior portfolio manager for a large equity portfolio at Davidson-Sherman (DS), a large multinational investment-banking firm. He is specifically responsible for the development of a new investment strategy that DS wants all equity portfolio managers to implement. Upper management at DS has instructed its portfolio managers to begin overlaying option strategies on all equity portfolios. The relatively poor performance of many of their equity portfolios has been the main factor behind this decision. Prior to this new mandate, DS portfolio managers had been allowed to use options at their own discretion, and the results were somewhat inconsistent. Some portfolio managers were not comfortable with the most basic concepts of option valuation and their expected return profiles, and simply did not utilize options at all. Upper management of DS wants Franklin to develop an option strategy that would be applicable to all DS portfolios regardless of their underlying investment composition. Management views this new implementation of option strategies as an opportunity to either add value or reduce the risk of the portfolio.

Franklin gained experience with basic options strategies at his previous job. As an exercise, he decides to review the fundamentals of option valuation using a simple example. Franklin

recognizes that the behavior of an option's value is dependent on many variables and decides to spend some time closely analyzing this behavior. His analysis has resulted in the information shown in Exhibit 1 and Exhibit 2 for European style options.

**Exhibit 1: Input for European Options**

| <b>Exhibit 1: Input for European Options</b> |          |
|--|----------|
| Stock Price (S)                              | 100      |
| Strike Price (X)                             | 100      |
| Interest Rate (r)                            | 0.07     |
| Dividend Yield (q)                           | 0.00     |
| Time to Maturity (years) (t)                 | 1.00     |
| Volatility (Std. Dev.)(Sigma)                | 0.20     |
| Black-Scholes Put Option Value               | \$4.7809 |

**Exhibit 2: European Option Sensitivities**

| <b>Exhibit 2: European Option Sensitivities</b> |             |            |
|---|-------------|------------|
| <b>Sensitivity</b>                              | <b>Call</b> | <b>Put</b> |
| Delta   | 0.6736      | -0.3264    |
| Gamma   | 0.0180      | 0.0180     |
| Theta   | -3.9797     | 2.5470     |
| Vega  | 36.0527     | 36.0527    |
| Rho   | 55.8230     | -37.4164   |

**Question #26 of 98**

Using the information in Exhibit 1, Franklin wants to compute the value of the corresponding European call option. Which of the following is the *closest* to Franklin's answer?

- A) \$5.55.
- B) \$4.78.
- C) \$11.54.

### Question #27 of 98

Franklin is interested in the sensitivity of the European call option to changes in the volatility of the underlying equity's returns. What happens to the value of the call option if the volatility of the underlying equity's returns *decreases*? The call option value:

- A) increases.
  - B) increases or decreases.
  - C) decreases.
- 

### Question #28 of 98

Franklin is interested in the sensitivity of the European put option to changes in the volatility of the underlying equity's returns. What happens to the value of the put option if the volatility of the underlying equity's returns *increases*? The put option value:

- A) decreases.
  - B) increases.
  - C) increases or decreases.
- 

### Question #29 of 98

Franklin wants to know how the put option in Exhibit 1 behaves when all the parameters are held constant except the delta. Which of the following is the *best* estimate of the change in the put option's price when the underlying equity increases by \$1?

- A) -\$0.33.
  - B) -\$0.37.
  - C) -\$3.61.
- 

### Question #30 of 98



Franklin computes the rate of change in the European put option delta value, given a \$1 increase in the underlying equity. Using the information in Exhibit 1 and Exhibit 2, which of the following is the *closest* to Franklin's answer?

- A) 0.6736.
  - B) 0.0180.
  - C) -0.3264.
- 

### Question #31 of 98

Franklin wants to know if the option sensitivities shown in Exhibit 2 have minimum or maximum bounds. Which of the following are the minimum and maximum bounds, respectively, for the put option delta?

- A) -1 and 1.
  - B) There are no minimum or maximum bounds.
  - C) -1 and 0.
- 

### Question #32 of 98

Which of the following statements regarding an option's price is CORRECT? An option's price is:

- A) a decreasing function of the underlying asset's volatility when it has a long time remaining until expiration and an increasing function of its volatility if the option is
  - B) a decreasing function of the underlying asset's volatility.
  - C) an increasing function of the underlying asset's volatility.
- 

### Question #33 of 98

The writer of a receiver swaption has:

- A) the right to enter a swap in the future as the floating-rate payer.

- B)** an obligation to enter a swap in the future as the fixed-rate payer.
  - C)** an obligation to enter a swap in the future as the floating-rate payer.
- 

### Question #34 of 98

Which of the following statements is *most* accurate?

- A)** European options on futures are more valuable than comparable American options on futures.
  - B)** American options on forwards are more valuable than comparable European options on forwards.
  - C)** American options on futures are more valuable than comparable European options on futures.
- 

### Question #35 of 98

The value of a put option is positively related to all of the following EXCEPT:

- A)** exercise price.
  - B)** time to maturity.
  - C)** risk-free rate.
- 

### Question #36 of 98

Referring to put-call parity, which one of the following alternatives would allow you to create a synthetic stock position?

- A)** Buy a European call option; short a European put option; invest the present value of the exercise price in a riskless pure-discount bond.
- B)** Sell a European call option; buy a European put option; short the present value of the exercise price worth of a riskless pure-discount bond.

- C) Buy a European call option; buy a European put option; invest the present value of the exercise price in a riskless pure-discount bond.
- 

### Question #37 of 98

Which of the following is *least likely* one of the assumptions of the Black-Scholes-Merton option pricing model?

- A) Changes in volatility are known and predictable.  
B) The risk-free rate of interest is known and does not change over the term of the option.  
C) There are no cash flows on the underlying asset.
- 

### Question #38 of 98

The price of a June call option with an exercise price of \$50 falls by \$0.50 when the underlying non-dividend paying stock price falls by \$2.00. The delta of a June put option with an exercise price of \$50 *closest* to:

- A) 0.25.  
B) -0.25.  
C) -0.75.
- 

### Question #39 of 98

If we use four of the inputs into the Black-Scholes-Merton option-pricing model and solve for the asset price volatility that will make the model price equal to the market price of the option, we have found the:

- A) implied volatility.  
B) option volatility.  
C) historical volatility.

## Question #40 of 98

A cap on a floating rate note, from the bondholder's perspective, is equivalent to:

- A) writing a series of puts on fixed income securities.
- B) writing a series of interest rate puts.
- C) owning a series of calls on fixed income securities.

John Fairfax is a recently retired executive from Reston Industries. Over the years he has accumulated \$10 million worth of Reston stock and another \$2 million in a cash savings account. He hires Richard Potter, CFA, a financial adviser from Stan Morgan, LLC, to help him develop investment strategies. Potter suggests a number of interesting investment strategies for Fairfax's portfolio. Many of the strategies include the use of various equity derivatives. Potter's first recommendation includes the use of a total return equity swap. Potter outlines the characteristics of the swap in Table 1. In addition to the equity swap, Potter explains to Fairfax that there are numerous options available for him to obtain almost any risk return profile he might need. Potter suggests that Fairfax consider options on both Reston stock and the S&P 500. Potter collects the information needed to evaluate options for each security. These results are presented in Table 2.

**Table 1: Specification of Equity Swap**

|                        |   |
|------------------------|---|
| Term                   | 3 years                                 |
| Notional principal     | \$10 million                            |
| Settlement frequency   | Annual, commencing at end of year 1     |
| Fairfax pays to broker | Total return on Reston Industries stock |
| Broker pays to Fairfax | Total return on S&P 500 Stock Index     |

**Table 2: Option Characteristics**

|               | Reston  | S&P 500    |
|---------------|---------|------------|
| Stock price   | \$50.00 | \$1,400.00 |
| Strike price  | \$50.00 | \$1,400.00 |
| Interest rate | 6.00%   | 6.00%      |



|                            |        |        |
|----------------------------|--------|--------|
| Dividend yield             | 0.00%  | 0.00%  |
| Time to expiration (years) | 0.5    | 0.5    |
| Volatility                 | 40.00% | 17.00% |
| Beta Coefficient           | 1.23   | 1      |
| Correlation                | 0.4    |        |

Potter presents Fairfax with the prices of various options as shown in Table 3. Table 3 details standard European calls and put options. Potter presents the option sensitivities in Potter presents Fairfax with the prices of various options as shown in Table 4 and Potter presents Fairfax with the prices of various options as shown in Table 5.

**Table 3: Regular and Options (Option Values)**

|               | <b>Reston</b> | <b>S&amp;P 500</b> |
|---------------|---------------|--------------------|
| European call | \$6.31        | \$6.31             |
| European put  | \$4.83        | \$4.83             |
| American call | \$6.28        | \$6.28             |
| American put  | \$4.96        | \$4.96             |

**Table 4: Reston Stock Option Sensitivities**

|               | <b>Delta</b> |
|---------------|--------------|
| European call | 0.5977       |
| European put  | -0.4023      |
| American call | 0.5973       |
| American put  | -0.4258      |

**Table 5: S&P 500 Option Sensitivities**

|               | <b>Delta</b> |
|---------------|--------------|
| European call | 0.622        |
| European put  | -0.378       |
| American call | 0.621        |
| American put  | -0.441       |

### Question #41 of 98

Given the information regarding the various Reston stock options, which option will increase the *most* relative to an increase in the underlying Reston stock price?

- A) American put.
  - B) American call.
  - C) European call.
- 

### Question #42 of 98

Fairfax is very interested in the total return swap and asks Potter how much it would cost to enter into this transaction. Which of the following is the cost of the swap at inception?

- A) \$45,007.
  - B) \$0.
  - C) \$340,885.
- 

### Question #43 of 98

Fairfax would like to consider neutralizing his Reston equity position from changes in the stock price of Reston. Using the information in Table 4 how many standard Reston European options would have to be either bought or sold in order to create a delta neutral portfolio?

- A) Buy 300,703 put options.
  - B) Sell 334,616 call options.
  - C) Sell 334,616 put options.
- 

### Question #44 of 98

Fairfax remembers Potter explaining something about how options are not like futures and swaps because their risk-return profiles are non-linear. Which of the following option sensitivity measures does Fairfax need to consider to completely hedge his equity position in Reston from changes in the price of Reston stock?

- A) Gamma and Theta.
  - B) Delta and Vega.
  - C) Delta and Gamma.
- 

### Question #45 of 98

Fairfax has heard people talking about "making a portfolio delta neutral." What does it mean to make a portfolio delta neutral? The portfolio:

- A) is insensitive to interest rate changes.
  - B) is insensitive to volatility changes in the returns on the underlying equity.
  - C) is insensitive to stock price changes.
- 

### Question #46 of 98

After discussing the various equity swap options with Fairfax, Potter checks his e-mail and reads a message from Clark Ali, a client of Potter and the treasurer of a firm that issued floating rate debt denominated in euros at London Interbank Offered Rate (LIBOR) + 125 basis points. Now Ali is concerned that LIBOR will rise in the future and wants to convert this into synthetic fixed rate debt. Potter recommends that Ali:

- A) take a short position in Eurodollar futures.
  - B) enter into a pay-fixed swap.
  - C) enter into a receive-fixed swap.
- 

### Question #47 of 98

Early exercise of in-the-money American options on:

- A) both futures and forwards is sometimes worthwhile.
  - B) forwards is sometimes worthwhile but never is for options on futures.
  - C) futures is sometimes worthwhile but never is for options on forwards.
- 

### Question #48 of 98

Which of the following is the *best* approximation of the gamma of an option if its delta is equal to 0.6 when the price of the underlying security is 100 and 0.7 when the price of the underlying security is 110?

- A) 0.01.
  - B) 0.10.
  - C) 1.00.
- 

### Question #49 of 98

Which of the following *best* represents an interest floor?

- A) A put option on an interest rate.
  - B) A portfolio of put options on an interest rate.
  - C) A portfolio of call options on an interest rate.
- 

Joel Franklin, CFA, has recently been promoted to junior portfolio manager for a large equity portfolio at Davidson Sherman (DS), a large multinational investment banking firm. The portfolio is subdivided into several smaller portfolios. In general, the portfolios are composed of U.S. based equities, ranging from medium to large-cap stocks. Currently, DS is not involved in any foreign markets. In his new position, he will now be responsible for the development of a new investment strategy that DS wants all of its equity portfolios to implement. The strategy involves overlaying option strategies on its equity portfolios. Recent performance of many of



their equity portfolios has been poor relative to their peer group. The upper management at DS views the new option strategies as an opportunity to either add value or reduce risk.

Franklin recognizes that the behavior of an option's value is dependent upon many variables and decides to spend some time closely analyzing this behavior. He took an options strategies class in graduate school a few years ago, and feels that he is fairly knowledgeable about the valuation of options using the Black-Scholes model. Franklin understands that the volatility of the underlying asset returns is one of the most important contributors to option value.

Therefore, he would like to know when the volatility has the largest effect on option value.

Upper management at DS has also requested that he further explore the concept of a delta neutral portfolio. He must determine how to create a delta neutral portfolio, and how it would be expected to perform under a variety of scenarios. Franklin is also examining the change in the call option's delta as the underlying equity value changes. He also wants to determine the minimum and maximum bounds on the call option delta. Franklin has been authorized to purchase calls or puts on the equities in the portfolio. He may not, however, establish any uncovered or "naked" option positions. His analysis has resulted in the information shown in Exhibit 1 and Exhibit 2 for European style options.

**Exhibit 1**

| Input for European Options     |          |
|--------------------------------|----------|
| Stock Price (S)                | 100      |
| Strike Price (X)               | 100      |
| Interest Rate (r)              | 0.07     |
| Dividend Yield (q)             | 0        |
| Time to Maturity (years) (t)   | 1        |
| Volatility (Std. Dev.) (sigma) | 0.2      |
| Black-Scholes Put Option Value | \$4.7809 |

**Exhibit 2**

| European Option Sensitivities |         |         |
|-------------------------------|---------|---------|
| Sensitivity                   | Call    | Put     |
| Delta                         | 0.6736  | -0.3264 |
| Gamma                         | 0.0180  | 0.0180  |
| Theta                         | -3.9797 | 2.5470  |

|      |         |          |
|------|---------|----------|
| Vega | 36.0527 | 36.0527  |
| Rho  | 55.8230 | -37.4164 |

### Question #50 of 98

What does it mean to make an options portfolio delta neutral? The option portfolio:

- A) moves exactly in the opposite direction with the stock price.
  - B) moves exactly in line with the stock price.
  - C) is insensitive to price changes in the underlying security.
- 

### Question #51 of 98

Which of the following *most* accurately describes the sensitivity of the call option's delta to changes in the underlying asset's price? The sensitivity to changes in the price of the underlying is the greatest when the call option is:

- A) in the money.
  - B) it depends on the other inputs.
  - C) at the money.
- 

### Question #52 of 98

Which of the following *most* accurately describes when the call option delta reaches its minimum bound? The call option reaches its minimum bound when call option is:

- A) at the money.
  - B) far out of the money.
  - C) the option's delta has no minimum bound.
- 

### Question #53 of 98

If the portfolio has 10,000 shares of the underlying stock and he wants to completely hedge the price risk using options, what kind of options should Franklin buy?

- A) Call and put options.
  - B) Call options.
  - C) Put options.
- 

### Question #54 of 98

Compute the number of shares of stock necessary to create a delta neutral portfolio consisting of 100 long put options in Exhibit 2 and the stock.

- A) 32.64.
  - B) -32.64.
  - C) 67.36.
- 

### Question #55 of 98

Compute the number of shares of stock necessary to create a delta neutral portfolio consisting of 100 long call options in Exhibit 2 and the stock.

- A) -32.64.
  - B) 67.36.
  - C) -67.36.
- 

### Question #56 of 98

DTK Inc stock (current price \$55) has 1-year call options with an exercise price of \$55 trading at \$4.92. The stock can increase by 20% or decrease by 15% over the next year and the risk-free rate is 5%. Arbitrage profits are *most likely*.

- A) possible by purchasing 57 shares and writing 100 calls.

- B) not possible.
  - C) possible by purchasing 100 calls and short selling 57 shares.
- 

### Question #57 of 98

Which of the following *best* explains the sensitivity of a call option's value to volatility? Call option values:

- A) increase as the volatility of the underlying asset increases because investors are risk seekers.
  - B) increase as the volatility of the underlying asset increases because call options have limited risk but unlimited upside potential.
  - C) are not affected by changes in the volatility of the underlying asset.
- 

### Question #58 of 98

In order to form a dynamic hedge using stock and calls with a delta of 0.2, an investor could buy 10,000 shares of stock and:

- A) write 2,000 calls.
  - B) buy 50,000 calls.
  - C) write 50,000 calls.
- 

### Question #59 of 98

Zetion Inc stock (current price \$28) has 1-year call options with an exercise price of \$30 trading at \$2.07. The stock can increase by 15% or decrease by 13% over the next year and the risk-free rate is 3%. Arbitrage profits are *most likely*:

- A) possible by purchasing 28 shares and writing 100 calls.
- B) not possible.



C) possible by purchasing 100 calls and short selling 28 shares.

---

### Question #60 of 98

Referring to put-call parity, which one of the following alternatives would allow you to create a synthetic riskless pure-discount bond?

- A) Sell a European put option; sell the same stock; buy a European call option.
  - B) Buy a European put option; buy the same stock; sell a European call option.
  - C) Buy a European put option; sell the same stock; sell a European call option.
- 

### Question #61 of 98

Which of the following statements concerning vega is *most* accurate? Vega is greatest when an option is:

- A) far out of the money.
  - B) far in the money.
  - C) at the money.
- 

### Question #62 of 98

The delta of an option is equal to the:

- A) dollar change in the stock price divided by the dollar change in the option price.
  - B) dollar change in the option price divided by the dollar change in the stock price.
  - C) percentage change in option price divided by the percentage change in the asset price.
- 

### Question #63 of 98

To the issuer of a floating rate note, a cap is equivalent to:

- A) owning a series of interest rate calls.
  - B) owning a series of calls on a fixed income security.
  - C) writing a series of interest rate calls.
- 

### Question #64 of 98

An instantaneously riskless hedged portfolio has a delta of:

- A) 0.
  - B) 1
  - C) anything; gamma determines the instantaneous risk of a hedge portfolio.
- 

Max Perrot, CFA, works for WWF, a mortgage banking company which originates residential mortgage loans. On a monthly basis, WWF issues agency mortgage-backed securities (MBS) backed by their loans. WWF sells the MBS in the open market soon after securitization, but retains the servicing rights to the loans. WWF currently owns the third largest mortgage servicing portfolio in the U.S. Perrot has recently been promoted to Senior Vice President of Asset and Liability Management for WWF. Perrot's new responsibilities encompass hedging WWF's newly created MBS prior to their sale, as well as managing the interest rate exposure on the servicing portfolio. Both types of assets are extremely sensitive to changes in interest rates, though not necessarily in the same manner.

Although WWF has retained all of the servicing rights of its loans in the past, they are not opposed to the selling of portions of the portfolio if market conditions are right. WWF's management wants Perrot in his new position to focus primarily on preserving the value of the servicing portfolio through hedging strategies that are cost effective to execute. Also, any hedge strategy used by Perrot must be extremely liquid in the event that a portion of the servicing portfolio is sold and the hedge needs to be unwound. The upper management of WWF anticipates a period of volatility in interest rates, and they have asked Perrot to project expected returns of a hedged position under a variety of interest rates scenarios.

Perrot's predecessor lacked experience in hedging with swaps and futures contracts, but he had used them periodically with lackluster results. Through his inaction, he had exposed the

firm to significant asset and liability mismatch, which had increased dramatically over the past two years as both production and the servicing portfolio had grown. Perrot, on the other hand, had extensive experience with hedging with derivatives in his prior job. He is familiar with executing hedging strategies utilizing not only swap and futures, but also with options such as caps and floors. He decides that before he presents any potential hedging strategy to WWF's management, he would first like to bring them up to speed on the basic hedging concepts. He prepares a brief presentation on the relationships between interest rates and options, and outlines some basic hedging strategies. He anticipates many questions that may arise from his presentation, and prepares a handout in a question and answer format.

### Question #65 of 98

Which of the following *best* explains the relationship between interest rate swaps and forward contracts? Interest rate swaps:

- A) are equivalent to forward contracts.
  - B) are equivalent to a series of forward contracts.
  - C) have the same payoff as a package of forward contracts but not the same value.
- 

### Question #66 of 98

Which of the following *most* accurately describes the relationship between an interest rate floor and a bond option? Buying an interest rate floor is equivalent to:

- A) buying a portfolio of call options on a bond.
  - B) buying a portfolio of put options on a bond.
  - C) selling a portfolio of put options on a bond.
- 

### Question #67 of 98

Assume that a three-year semi-annually settled floor with a strike rate of 8% and a notional amount of \$100 million is being analyzed. The reference rate is six-month London Interbank Offered Rate (LIBOR). Suppose that LIBOR for the next four semi-annual periods is as follows:

| Period | LIBOR |
|--------|-------|
| 1      | 7.5%  |
| 2      | 8.2%  |
| 3      | 8.1%  |
| 4      | 8.7%  |

What is the payoff for the floor for period 1?

- A) \$0.
  - B) \$500,000.
  - C) \$250,000.
- 

### Question #68 of 98

Which of the following *best* explains the difference between an interest rate put option and a put option on a fixed income security? The interest rate put option value:

- A) decreases if interest rates increase just as the value of a put option on a fixed income security decreases.
  - B) decreases if interest rates increase while the value of a put option on a fixed income security increases if interest rates increase.
  - C) increases if interest rates increase just as the value of a put option on a fixed income security increases.
- 

### Question #69 of 98

A LIBOR based floating rate bond combined with a LIBOR based collar (a short position in an interest rate cap and a long position in an interest rate floor both at the same strike rate) is equivalent to a:

- A) fixed-rate bond.
  - B) call option on a bond.
  - C) pay-fixed swap position.
- 

### Question #70 of 98

Which of the following is *most likely* a reason why dynamic riskless arbitrage is difficult in real markets?

- A) Short sale constraints exist.
  - B) Securities are subject to insider trading.
  - C) Continuous rebalancing.
- 

### Question #71 of 98

The value of a European call option on an asset with no cash flows is positively related to all of the following EXCEPT:

- A) exercise price.
  - B) time to exercise.
  - C) risk-free rate.
- 

### Question #72 of 98

Mark Roberts anticipates utilizing a floating rate line of credit in 90 days to purchase \$10 million of raw materials. To get protection against any increase in the expected London Interbank Offered Rate (LIBOR) yield curve, Roberts should:

- A) buy a payer swaption.
- B) write a receiver swaption.
- C) buy a receiver swaption.



### Question #73 of 98

Which of the following option sensitivities measures the change in the price of the option with respect to a decrease in the time to expiration?

- A) Theta.
  - B) Gamma.
  - C) Delta.
- 

### Question #74 of 98

Two call options have the same delta but option A has a higher gamma than option B. When the price of the underlying asset increases, the number of option A calls necessary to hedge the price risk in 100 shares of stock, compared to the number of option B calls, is a:

- A) larger (negative) number.
  - B) smaller (negative) number.
  - C) larger positive number.
- 

### Question #75 of 98

Cal Smart wrote a 90-day receiver swaption on a 1-year LIBOR-based semiannual-pay \$10 million swap with an exercise rate of 3.8%. At expiration, the market rate and LIBOR yield curve are:

Fixed rate 3.763%

180-days 3.6%

360-days 3.8%

The payoff to the writer of the receiver swaption at expiration is *closest* to:

- A) \$3,600.

**B)** -\$3,600.

**C)** \$0.

---

### Question #76 of 98

Which of the following is NOT one of the assumptions of the Black-Scholes-Merton (BSM) option-pricing model?

**A)** Any dividends are paid at a continuously compounded rate.

**B)** There are no taxes.

**C)** Options valued are European style.

---

### Question #77 of 98

Which of the following *best* describes an interest rate cap? An interest rate cap is a package or portfolio of interest rate options that provide a positive payoff to the buyer if the:

**A)** T-Bond futures exceeds the strike price.

**B)** reference rate is below the strike rate.

**C)** reference rate exceeds the strike rate.

---

### Question #78 of 98

Compared to the value of a call option on a stock with no dividends, a call option on an identical stock expected to pay a dividend during the term of the option will have a:

**A)** lower value only if it is an American style option.

**B)** higher value only if it is an American style option.

**C)** lower value in all cases.

---

## Question #79 of 98

Regarding deep in-the-money options on futures, it is:

- A)** sometimes worthwhile to exercise both calls and puts early.
- B)** never worthwhile to exercise puts or calls early.
- C)** sometimes worthwhile to exercise calls early but not puts.

Gina Davalos, CFA is a portfolio manager for the Herron Investments. She is interested in hedging the equity risk of one of her clients, Lou Gier. Gier has 200,000 shares of a stock with the symbol QJX that he believes could take a dive in the next 9 months. Davalos gathers the following information to suggest potential strategies to offset the potential loss.

General Information:

|                          |          |
|--------------------------|----------|
| QJX Current Stock Price  | \$100.00 |
| Risk-free rate           | 5.0%     |
| QJX Dividend Yield       | 0.0%     |
| Time to Maturity (years) | 0.75     |

Option Information:

|                      |          |
|----------------------|----------|
| Strike Price         | \$100.00 |
| Value of Call        | \$12.09  |
| Delta on Call Option | 0.6081   |
| Value of Put (years) | \$8.41   |

Equity Swap Information:

|                      |           |
|----------------------|-----------|
| Terms                | 9 months  |
| Settlement frequency | Quarterly |
| Fixed rate           | 6.0%      |
| Return on QJX        | Variable  |

Futures Information:

|       |          |
|-------|----------|
| Terms | 9 months |
|-------|----------|

|                       |          |
|-----------------------|----------|
| Current Futures Price | \$105.50 |
|-----------------------|----------|

### Question #80 of 98

The number of call option contracts that Davalos would need to trade to create a delta neutral hedge is *closest* to:

- A) 328,920 contracts.
  - B) 2,000 contracts.
  - C) 3,289 contracts.
- 

### Question #81 of 98

In order to create a delta-neutral hedge using put option contracts, Davalos would *most accurately* need to:

- A) Buy 2,000 contracts.
  - B) Buy 5,103 contracts.
  - C) Sell 510,271 contracts.
- 

### Question #82 of 98

When a delta neutral hedge has been established using call options, which of the following statements is *most* accurate? As the price of the underlying stock:

- A) increases, some option contracts would need to be repurchased in order to retain the delta neutral position.
  - B) increases, some option contracts would need to be sold in order to retain the delta neutral position.
  - C) changes, no changes are needed in the number of call options purchased.
-

### Question #83 of 98

An equity swap to hedge the equity risk for Gier would result in receipt of a:

- A) variable rate based on the total return of QJX stock.
  - B) fixed rate of 1.5% per quarter.
  - C) fixed rate of 4.5% for the year.
- 

### Question #84 of 98

If the equity swap is implemented and after 3 months the stock price has increased to \$106.00, the net cash flow for the swap is:

- A) a gain of \$900,000.
  - B) a loss of \$900,000.
  - C) zero.
- 

### Question #85 of 98

Based on the futures information, an arbitrage opportunity can be exploited by:

- A) Buying the stock QJX, and selling the futures.
  - B) Selling the stock QJX and buying the futures.
  - C) Buying the futures and buying the stock QJX.
- 

Jacob Bower is a bond strategist who would like to begin using fixed-income derivatives in his strategies. Bower has a firm understanding of the properties fixed-income securities. However, his understanding of interest rate derivatives is not nearly as strong. He decides to train himself on the valuation and sensitivity of interest rate derivatives using various interest rate scenarios. He considers the forward London Interbank Offered Rate (LIBOR) interest rate environment shown in Table 1. Using a rounded daycount (i.e., 0.25 years for each quarter) he has also computed the corresponding implied spot rates resulting from these LIBOR forward rates. These are included in Table 1.



**Table 1 90-Day LIBOR Forward Rates and Implied Spot Rates**

| Period (in months) | LIBOR Forward Rates | Implied Spot Rates |
|--------------------|---------------------|--------------------|
| 0 × 3              | 5.500%              | 5.5000%            |
| 3 × 6              | 5.750%              | 5.6250%            |
| 6 × 9              | 6.000%              | 5.7499%            |
| 9 × 12             | 6.250%              | 5.8749%            |
| 12 × 15            | 7.000%              | 6.0997%            |
| 15 × 18            | 7.000%              | 6.2496%            |

Bower has also estimated the LIBOR forward rate volatilities to be 20%. The particular fixed instruments that Bower would like to examine are shown in Table 2. He also wants to analyze the strategy shown in Table 3.

**Table 2 Interest Rate Instruments**

|                                     |              |
|-------------------------------------|--------------|
| Dollar Amount of Floating Rate Bond | \$42,000,000 |
| Floating Rate Bond paying LIBOR +   | 0.25%        |
| Time to Maturity (years)            | 8            |
| Cap Strike Rate                     | 7.00%        |
| Floor Strike Rate                   | 6.00%        |
| Interest Payments                   | quarterly    |

**Table 3 Initial Position in 90-day LIBOR Eurodollar Contracts**

| Contract Month (from now) | Strategy A (contracts) | Strategy B (contracts) |
|---------------------------|------------------------|------------------------|
| 3 months                  | 300                    | 100                    |
| 6 months                  | 0                      | 100                    |
| 9 months                  | 0                      | 100                    |

## Question #86 of 98

Bower is a bit puzzled about how to use caps and floors. He wonders how he could benefit both from increasing and decreasing interest rates. Which of the following trades would *most likely* profit from this interest rate scenario?

- A) Sell at the money cap and at the money floor.
  - B) Buy at the money cap and at the money floor.
  - C) Buy at the money cap and sell at the money floor.
- 

### Question #87 of 98

Bower has studied swaps extensively. However, he is not sure which of the following is the swap fixed rate for a one-year interest rate swap based on 90-day LIBOR with quarterly payments. Using the information in Table 1 and the formula below, what is the *most* appropriate swap fixed rate for this swap?

$$C = \frac{1 - Z_4}{Z_1 + Z_2 + Z_3 + Z_4}$$

where

$$Z_n = \frac{1}{1 + R_N} \text{ price of } n - \text{zero} - \text{coupon bond per \$ of principal}$$

- A) 5.65%.
  - B) 5.75%.
  - C) 6.01%.
- 

### Question #88 of 98

Bower computes the implied volatility of a one year caplet on the 90-day LIBOR forward rates to be 18.5%. Using the given information what does this mean for the caplet's market price relative to its theoretical price? The caplet's market price is:

- A) undervalued or overvalued.
- B) undervalued.
- C) overvalued.

### Question #89 of 98

For this question only, assume Bower expects the currently positively sloped LIBOR curve to shift upward in a parallel manner. Using a plain vanilla interest rate swap, which of the following will allow Bower to best take advantage of his expectations? Purchase a:

- A) pay fixed interest rate swap.
  - B) receive fixed interest rate swap.
  - C) floating rate bond and enter into a receive fixed swap.
- 

### Question #90 of 98

A bond analyst decides to use the BSM model to price options on bond prices. This model will *most likely* be inadequate because:

- A) the risk free rate must be constant and known.
  - B) the price of the underlying asset follows a lognormal distribution.
  - C) BSM cannot be modified to deal with cash flows like coupon payments.
- 

### Question #91 of 98

A stock is priced at 40 and the periodic risk-free rate of interest is 8%. The value of a two-period European call option with a strike price of 37 on a share of stock using a binomial model with an up factor of 1.20 and down factor of 0.833 is *closest* to:

- A) \$9.25.
  - B) \$3.57.
  - C) \$9.13.
- 

Mark Washington, CFA, is an analyst with BIC, a Bermuda-based investment company that does business primarily in the U.S. and Canada. BIC has approximately \$200 million of assets under

management, the bulk of which is invested in U.S. equities. BIC has outperformed its target benchmark for eight of the past ten years, and has consistently been in the top quartile of performance when compared with its peer investment companies. Washington is a part of the Liability Management group that is responsible for hedging the equity portfolios under management. The Liability Management group has been authorized to use calls or puts on the underlying equities in the portfolio when appropriate, in order to minimize their exposure to market volatility. They also may utilize an options strategy in order to generate additional returns.

One year ago, BIC analysts predicted that the U.S. equity market would most likely experience a slight downturn due to inflationary pressures. The analysts forecast a decrease in equity values of between 3 to 5% over the upcoming year and one-half. Based upon that prediction, the Liability Management group was instructed to utilize calls and puts to construct a delta-neutral portfolio. Washington immediately established option positions that he believed would hedge the underlying portfolio against the impending market decline.

As predicted, the U.S. equity markets did indeed experience a downturn of approximately 4% over a twelve-month period. However, portfolio performance for BIC during those twelve months was disappointing. The performance of the BIC portfolio lagged that of its peer group by nearly 10%. Upper management believes that a major factor in the portfolio's underperformance was the option strategy utilized by Washington and the Liability Management group. Management has decided that the Liability Management group did not properly execute a delta-neutral strategy. Washington and his group have been told to review their options strategy to determine why the hedged portfolio did not perform as expected. Washington has decided to undertake a review of the most basic option concepts, and explore such elementary topics as option valuation, an option's delta, and the expected performance of options under varying scenarios. He is going to examine all facets of a delta-neutral portfolio: how to construct one, how to determine the expected results, and when to use one. Management has given Washington and his group one week to immerse themselves in options theory, review the basic concepts, and then to present their findings as to why the portfolio did not perform as expected.

### Question #92 of 98

Which of the following *best* explains a delta-neutral portfolio? A delta-neutral portfolio is perfectly hedged against:

**A)** small price decreases in the underlying asset.



- B) all price changes in the underlying asset.
  - C) small price changes in the underlying asset.
- 

### Question #93 of 98

After discussing the concept of a delta-neutral portfolio, Washington determines that he needs to further explain the concept of delta. Washington draws the payoff diagram for an option as a function of the underlying stock price. Using this diagram, how is delta interpreted? Delta is the:

- A) level in the option price diagram.
  - B) curvature of the option price graph.
  - C) slope in the option price diagram.
- 

### Question #94 of 98

Washington considers a put option that has a delta of  $-0.65$ . If the price of the underlying asset decreases by \$6, then which of the following is the *best* estimate of the change in option price?

- A)  $-\$6.50$ .
  - B)  $+\$3.90$ .
  - C)  $-\$3.90$ .
- 

### Question #95 of 98

Washington is trying to determine the value of a call option. When the slope of the at expiration curve is close to zero, the call option is:

- A) in-the-money.
  - B) out-of-the-money.
  - C) at-the-money.
-



### Question #96 of 98

BIC owns 51,750 shares of Smith & Oates. The shares are currently priced at \$69. A call option on Smith & Oates with a strike price of \$70 is selling at \$3.50, and has a delta of 0.69. What is the number of call options necessary to create a delta-neutral hedge?

- A) 14,785.
  - B) 0
  - C) 75,000.
- 

### Question #97 of 98

Which of the following statements regarding the goal of a delta-neutral portfolio is *most* accurate? One example of a delta-neutral portfolio is to combine a:

- A) long position in a stock with a long position in call options so that the value of the portfolio does not change with changes in the value of the stock.
  - B) long position in a stock with a short position in a call option so that the value of the portfolio changes with changes in the value of the stock.
  - C) long position in a stock with a short position in call options so that the value of the portfolio does not change with changes in the value of the stock.
- 

### Question #98 of 98

For a change in which of the following inputs into the Black-Scholes-Merton option pricing model will the direction of the change in a put's value and the direction of the change in a call's value be the same?

- A) Risk-free rate.
- B) Exercise price.
- C) Volatility.