Question 1
L2DRR41-TB002-1610
LOS: LOS-9237
Lesson Reference: Lesson 1: Introduction and the One-Period Binomial Model
Difficulty: medium

An investor has determined that a call option is overpriced and wants to take advantage of the arbitrage opportunity. She has determined that the value of a stock in up and down periods is \$60 (S^+) and \$40 (S^-), respectively, and the value of a call on the stock in up and down periods is \$10 and \$0, respectively. In order to take advantage of the arbitrage opportunity, she should *most likely*:

- (selected) Sell the option and buy 0.50 units of the stock.
- Buy the option and sell 0.50 units of the stock.
- Sell the option and buy 2.0 units of the stock.

Rationale

This Answer is Correct

If a call option is overpriced, an investor will want to sell it and buy the underlying stock. In order to compute the number of units to be purchased, the following equation is used:

$$h = \frac{c^+ - c^-}{S^+ - S^-}$$

h (number of units) = \$10 – \$0/\$60 – \$40 = 0.50

Question 2

L2R41PQ-BS030-1609

LOS: LOS-9247

Lesson Reference: Lesson 6: Option Greeks and Implied Volatility

Difficulty: easy

If the delta of a call option equals 0.35, the delta of an equivalent put option would *most likely* be:

- ( ) −0.35
- (•) −0.65
- ( ) 0.65

Rationale

This Answer is Correct

Put option delta equals call option delta minus 1.

Question 3
L2R41PQ-BS040-1609
LOS: LOS-9247
Lesson Reference: Lesson 6: Option Greeks and Implied Volatility
Difficulty: medium

Consider the following statements:

> **Statement 1**: As interest rates rise, call options increase in value, while put option values decrease.
> **Statement 2**: When interest rates are zero, call and put option values are the same for at-the-money options.

Which of the following is *most likely*?

- ○ Only Statement 1 is incorrect.
- ○ Only Statement 2 is incorrect.
- ◉ Both statements are correct.

Rationale

This Answer is Correct

Statement 1 is correct. Call options have positive rho, while put options have negative rho.

Statement 2 is also correct. With the risk-free rate at 0, put-call parity become C + X = P + S. If X = S (for at-the-money options), then C must equal P.

Question 4

L2DRR41-TB009-1610

LOS: LOS-9246

Lesson Reference: Lesson 5: The Black Model

Difficulty: medium

Option gamma is *most likely* described as:

- (selected) The change in an option's delta given a change in the value of the underlying stock.
- The change in an option's theta given a change in the value of the underlying stock.
- The change in an option's vega given a change in the value of the underlying stock.

Rationale

This Answer is Correct

Option gamma is the change in an option's delta given a change in the value of the underlying stock.

Question 5

L2R41PQ-BS036-1609

LOS: LOS-9247

Lesson Reference: Lesson 6: Option Greeks and Implied Volatility

Difficulty: medium

Which of the following is *least likely* regarding gamma?

- (selected) Gamma for a long stock position equals = 1.0, and gamma for a short stock position equals −1.0.
- The gammas for otherwise identical call and put options are the same.
- Gamma changes in response to changes in the underlying stock and to changes in time to expiration.

Rationale

This Answer is Correct

The gamma of a long or short position in one share of stock is zero. Delta stays at +1.0 for a long position on a stock, and at −1.0 for a short position.

Question 6

L2DRR41-TB001-1610

LOS: LOS-9235

Lesson Reference: Lesson 1: Introduction and the One-Period Binomial Model

Difficulty: medium

Susan holds Atlas stock (ATL) at a current price of $50 per share and has determined that the stock can either go up by 20% or go down by 30% over the next period. The two possible intrinsic values of an at-the-money call option over the next period are *most likely* which of the following?

- ○ 0, 10
- ● 10, 0
- ○ 10, –15

Rationale

This Answer is Correct

First calculate that the two possible stock prices are $60 (20% up) and $35 (30% down). This means if the stock goes up, the value of the call option is $S^+ - X$, or $60 – $50 = $10. Moreover, if the stock goes down, the value of the call option is $S^- - X$, or $35 – $50 = –$15 (or $0 because the call would not be exercised).

Question 7

L2DRR41-TB007-1610

LOS: LOS-9245

Lesson Reference: Lesson 5: The Black Model

Difficulty: medium

Which of the following is *most likely* an assumption of the Black option valuation model?

- ○ Futures prices are normally distributed.
- ○ Futures prices are lognormally distributed.
- ● Futures prices follow geometric Brownian motion.

Rationale

This Answer is Correct

Futures prices follow geometric Brownian motion (GBM).

Question 8
L2R41PQ-BS032-1609
LOS: LOS-9247
Lesson Reference: Lesson 6: Option Greeks and Implied Volatility
Difficulty: medium

Consider the following statements:

> **Statement 1**: For a put option, when the option is deep out-of-the-money, gamma approaches 0.
> **Statement 2**: For a call option, when the option is deep in-the-money, gamma approaches 0.

Which of the following is *most likely*?

- (●) Both statements are correct.
- ( ) Only one statement is correct.
- ( ) Both statements are incorrect.

Rationale

This Answer is Correct

For both calls and puts, when an option is deep out-of-the-money or deep in-the-money, gamma (change in option delta) approaches 0.

Question 9
L2R41PQ-BS012-1609
LOS: LOS-9235
Lesson Reference: Lesson 2: The Two-Period Binomial Model
Difficulty: medium

Consider the following statements:

> **Statement 1**: A long call option is equivalent to owning h shares of stock and borrowing $PV(-hS^{-} + c^{-})$.
> **Statement 2**: In order to hedge a long position on a call, one must short the underlying stock.

Which of the following is *most likely*?

- ○ Only Statement 1 is incorrect.
- ○ Only Statement 2 is incorrect.
- ◉ Both statements are correct.

Rationale

This Answer is Correct

A long call option is equivalent to owning h shares of stock and financing the purchase by borrowing $PV(-hS^{-} + c^{-})$. Essentially, a call option is equivalent to a leveraged position in the underlying.

The hedge ratio, h, is (mathematically) positive for call options. It means that in order to hedge a short position on a call, one must go long on the underlying stock, and vice versa. If the stock price increases, the stock position will benefit but the short call position loses out, and vice versa.

Question 10
L2R41PQ-BS025-1609
LOS: LOS-9246
Lesson Reference: Lesson 5: The Black Model
Difficulty: medium
Today is June 15. An investor plans to borrow funds in 1 month's time to fund the purchase of an asset that she intends to hold for only 3 months. Current 3-month Libor is 0.66%, and the FRA rate for the period from July 15 to October 15 is 0.75%. The investor is concerned that borrowing costs will rise, so she wants to purchase an interest rate option with an exercise rate of 0.68%. Which of the following is *least likely*?

- (selected) The discount factor used in the option valuation model will stretch from July 15 to October 15.
- The underlying rate would be 0.75%.
- To hedge the interest rate risk, the investor would purchase an interest rate call option.

Rationale

This Answer is Correct

The Black model will be used to price this option. The discount factor used in pricing this option will stretch from the period of **option initiation (June 15)**, until the date that the option settlement payment is made (October 15, which is also the date when the deposit underlying the FRA matures).

In using the Black model to value this interest rate call option, the underlying rate would be 0.75%, which is the rate on the FRA for the borrowing period. Recall that an FRA rate serves as the underlying of interest rate options, not the current 90-day rate (0.66%) or the exercise rate of the option (0.68%).

Question 11

L2R41PQ-BS029-1609

LOS: LOS-9246

Lesson Reference: Lesson 5: The Black Model

Difficulty: easy

Which of the following is *most likely*?

- (selected) Call option deltas are positive, whereas put option deltas are negative.
- Call option deltas are negative, whereas put option deltas are positive.
- Call option deltas and put option deltas are both positive.

Rationale

This Answer is Correct

As the price of the underlying increases, the value of a call option also increases, so its delta is positive.

As the price of the underlying increases, the value of a put option decreases, so its delta is negative.

Question 12
L2R41PQ-BS024-1609
LOS: LOS-9246
Lesson Reference: Lesson 5: The Black Model
Difficulty: medium

Consider the following statements:

> **Statement 1**: The underlying on an interest rate call option on 3-month Libor that expires in 6 months is a 3-month Libor deposit that is made after 6 months and matures 9 months from option initiation.
> **Statement 2**: An interest rate put option gives the put buyer the right to a certain cash payment when the underlying interest rate is below the exercise rate when depositing cash.

Which of the following is *most likely*?

- Only Statement 1 is correct.
- Only Statement 2 is correct.
- Both statements are incorrect.

Rationale

This Answer is Correct

For an interest rate call option on 3-month Libor that expires in 6 months:

- The underlying is a forward rate agreement (FRA) on 3-month Libor that expires in 6 months.
- The underlying of the FRA is a 3-month Libor deposit that is made after 6 months and matures 9 months from option initiation. (It is a 6 × 9 FRA.)

An interest rate put option gives the put buyer the right to a certain cash payment when the underlying interest rate is below the exercise rate when depositing cash. This is because if interest rates fall below the exercise rate, profits from exercising the put option cancel out losses on the interest rate on the deposit.

Question 13
L2R41PQ-BS035-1609
LOS: LOS-9248
Lesson Reference: Lesson 6: Option Greeks and Implied Volatility
Difficulty: hard
An investor has a short position in put options on 5,000 shares of stock. Call option delta is given as 0.542, while put option delta is given as –0.459. Each option has one share of stock as the underlying. Which of the following is *most likely* regarding the delta hedge strategy if the hedging instrument is (1) stock or (2) call options?

	Stock	Call Options
A.	Sell 2,295 units	Sell 4,234 units
B.	Buy 2,295 units	Buy 4,234 units
C.	Buy 5,000 units	Buy 5,904 units

- (selected) Row A
- Row B
- Row C

Rationale

This Answer is Correct

Since the investor has shorted puts, the delta of the position is +0.459. The delta of the preexisting portfolio of puts is calculated as 5,000 × 0.459 = 2,295.

The delta of the stock is +1.0. Therefore, the number of hedging units is calculated as −2,295/1.0 = −2,295 or short sell 2,295 units of stock.

The delta of call options is 0.542. Therefore, the number of hedging units is calculated as −2,295/0.542 = −4,234 or sell 4,234 call options.

Question 14
L2R41PQ-BS017-1609
LOS: LOS-9235
LOS: LOS-9238
Lesson Reference: Lesson 3: Interest Rate Options
Difficulty: medium

Consider the following statements:

> **Statement 1**: When valuing interest rate options using the binomial model, the risk-neutral probabilities are not dependent on the risk-free rate.
> **Statement 2**: When using the binomial model to value options on stocks, we assume that the term structure of interest rates is flat.

Which of the following is *most likely*?

- ○ Only Statement 1 is incorrect.
- ○ Only Statement 2 is incorrect.
- ◉ Both statements are correct.

Rationale

This Answer is Correct

When valuing interest rate options or options on bonds, the risk-neutral probabilities are assumed to be 50%. With equity options, the risk-neutral probabilities depend on u, d, and r.

When valuing equity options, the risk-free rate is assumed constant (i.e., the term structure is flat).

Question 15
L2R41PQ-BS019-1609
LOS: LOS-9243
Lesson Reference: Lesson 4: The Black-Scholes-Merton Model
Difficulty: medium

Consider the following statements:

> **Statement 1**: Buying a call option can be viewed as buying stock with borrowed money.
> **Statement 2**: Writing a put option can be viewed as taking a leveraged position on a stock.

Which of the following is *most likely*?

- ○ Only Statement 1 is incorrect.
- ○ Only Statement 2 is incorrect.
- ◉ Both statements are correct.

Rationale

This Answer is Correct

In taking a position on a call option, we are simply buying stock with borrowed money. Therefore, a call option can be viewed as a leveraged position in the stock.

For a put writer, n_S will be greater than 0 and n_B will be less than 0, which makes the position similar to that of the call option holder (who effectively takes a leveraged position on the stock). However, the put writer also receives the put premium today. This means that the put writer effectively takes such an extremely leveraged position on the stock that the amount borrowed actually exceeds the total cost of the underlying (hence the positive cash flow at position initiation).

Question 16
L2R41PQ-BS016-1609
LOS: LOS-9236
LOS: LOS-9237
Lesson Reference: Lesson 2: The Two-Period Binomial Model
Difficulty: medium

Consider the following statements:

> **Statement 1:** In a multi-period setting, the no-arbitrage approach can be used to value both American and European options.
> **Statement 2:** If the price of a call option is lower than the value computed from the binomial model, one could exploit this arbitrage opportunity by buying h units of the underlying stock for each option sold.

Which of the following is *most likely*?

- (selected) Only Statement 1 is correct.
- Only Statement 2 is correct.
- Both statements are incorrect.

Rationale

This Answer is Correct

In a multi-period setting, both American-style options and European-style options can be valued based on the no-arbitrage approach, which provides clear interpretations of the component terms. Option value is determined by working backward through the binomial tree to arrive at the correct current value.

If the price of the option is lower than the value computed from the model, the option is underpriced. To exploit this opportunity, we would **buy the option** and **sell** h units of the underlying stock for each option purchased.

Question 17
L2R41PQ-BS039-1609
LOS: LOS-9247
Lesson Reference: Lesson 6: Option Greeks and Implied Volatility
Difficulty: medium

Consider the following statements:

> **Statement 1**: The vega of a call option is the same as the vega of an otherwise identical put option.
> **Statement 2**: If volatility approaches 0, the value of a European put option will approach Max[0, $X - S_T$].

Which of the following is *most likely*?

- ○ Only Statement 1 is incorrect.
- ◉ Only Statement 2 is incorrect.
- ○ Both statements are correct.

Rationale

✔ **This Answer is Correct**

Statement 1 is correct. The vega of a call option is the same as the vega of an otherwise identical put option.
Statement 2 is incorrect. If volatility approaches 0, option values approach their lower bounds.

- The lower bound for a European call option is Max[0, $S_T - X/(1 + R_F)^T$].
- The lower bound for a European put option is Max[0, $X/(1 + R_F)^T - S_T$].

Question 18
L2R41PQ-BS033-1609
LOS: LOS-9247
Lesson Reference: Lesson 6: Option Greeks and Implied Volatility
Difficulty: medium
An increase in the price of both call and put options on stocks will *least likely* be caused by:

- ○ An increase in volatility.
- ◉ An increase in the risk-free rate.
- ○ An increase in time to expiration.

Rationale

This Answer is Correct

An increase in volatility increases the prices of put and call options.

An increase in time to expiration increases the prices of put and call options (time value).

An increase in the risk-free rate results in an increase in the price of call options, but a decrease in the price of put options.

Question 19

L2R41PQ-BS038-1609

LOS: LOS-9247

LOS: LOS-9248

LOS: LOS-9249

Lesson Reference: Lesson 6: Option Greeks and Implied Volatility

Difficulty: hard

Which of the following static risk measures pertaining to a portfolio can *most likely* be adjusted by undertaking stock trades?

- (selected) Delta
- Gamma
- Theta

Rationale

This Answer is Correct

Stocks have delta (long stock delta = +1.0, short stock delta = −1.0), so portfolio delta can be adjusted by undertaking stock trades. In contrast, stock gamma and theta both equal 0, so portfolio gamma and theta cannot be adjusted by undertaking stock trades.

Question 20

L2DRR41-TB003-1610

LOS: LOS-9236

Lesson Reference: Lesson 2: The Two-Period Binomial Model

Difficulty: medium

Star Media stock is currently trading at $50. Given that the stock can either go up by 40% or go down by 30% each period, and that the risk-free rate is 4% per period, the value of an at-the-money European call based on the two-period binomial model is *closest* to:

- (selected) 10.47
- 11.08
- 11.21

Rationale

This Answer is Correct

First, compute the possible values of the stock in each node of the binomial tree:

$$\begin{aligned}
&\mathrm{t} = 1\\
&\mathrm{S}^{+} = \mathrm{Su} = 50 * (1 + 0.40) = 70\\
&\mathrm{S}^{-} = \mathrm{Sd} = 50 * (1 - 0.30) = 45
\end{aligned}$$

$$\begin{aligned}
&\mathrm{t} = 2 = \mathrm{T}\\
&\mathrm{S}^{++} = 50 * (1 + 0.40)2 = 98\\
&\mathrm{S}^{+-} = 50 * (1 + 0.40)(1 - 0.30) = 49\\
&\mathrm{S}^{--} = 50 * (1 - 0.30)2 = 24.5
\end{aligned}$$

Next, we compute the intrinsic value of the call option at expiration in each scenario:

$$\begin{aligned}
&\mathrm{C}^{++} \quad = 98 - 50 = 48\\
&\mathrm{C}^{+-} = 49 - 50 = 0(\text{call would not be exercised})\\
&\mathrm{C}^{--} = 24.5 - 50 = 0(\text{call would not be exercised})
\end{aligned}$$

Next, we compute risk-neutral probabilities:

$$\pi = \frac{1 + \mathrm{r} - \mathrm{d}}{\mathrm{u} - \mathrm{d}}$$

π = 1 + 0.04 – 0.70/1.40 – 0.70 = 0.4857

1 – π = 1 – 0.4857 = 0.5142

Next, we compute the value of the call option at each node corresponding to t = 1:

$$c^{+} = \frac{\pi c^{++} + (1-\pi) c^{+-}}{1+r}$$
$$c^{-} = \frac{\pi c^{+-} + (1-\pi) c^{--}}{1+r}$$

c^{+} = (0.4857 * 48) + (0.5142) (0)/1 + 0.04 = 22.42

c^{-} = (0.4857 * 0) + (0.5142) (0)/1 + 0.04 = 0

Then we calculate the value of the call option as of today:

C = (22.42 * 0.4857) + (0 * 0.5142)/1 + 0.04 = 10.47

Question 21

L2DRR41-TB005-1610

LOS: LOS-9238

Lesson Reference: Lesson 3: Interest Rate Options

Difficulty: medium

In computing the value of a European-style interest rate call option using a two-period binomial model, risk-neutral probabilities are *most likely* used to calculate:

- (selected) The current value of the option.
- The exercise value of the option in the first period.
- The exercise value of the option in the second period.

Rationale

This Answer is Correct

Risk-neutral probabilities are used in calculating the current value of an option.

Question 22
L2R41PQ-BS021-1609
LOS: LOS-9244
Lesson Reference: Lesson 4: The Black-Scholes-Merton Model
Difficulty: medium

Consider the following statements:

> **Statement 1**: Higher dividends lower the number of bonds to sell short in the call replicating portfolio, and lower the number of bonds to purchase in the put replicating portfolio.
> **Statement 2**: Higher dividends lower the number of shares that must be bought in the call replicating portfolio, and increase the number of shares that must be sold short in the put replicating portfolio.

Which of the following is *most likely*?

- ○ Only Statement 1 is incorrect.
- ◉ Only Statement 2 is incorrect.
- ○ Both statements are correct.

Rationale

This Answer is Correct

Dividends lower the values of d_1 and d_2 and therefore of $N(d_1)$ and $N(d_2)$.

This means that higher dividends lower the number of bonds to sell short in the call replicating portfolio, and the number of bonds to purchase in the put replicating portfolio. Recall that these amounts are based on $N(d_2)$.

Further, higher dividends lower the number of shares that must be bought in the call replicating portfolio, and **reduce** the number of shares that must be sold short in the put replicating portfolio. Recall that these amounts are based on $N(d_1)$.

Question 23
L2R41PQ-BS011-1609
LOS: LOS-9236
Lesson Reference: Lesson 2: The Two-Period Binomial Model
Difficulty: hard
Consider a two-period binomial model. The underlying asset is priced at $50. The price of the underlying can go up 30% or down 25% in each period. The risk-free rate is 5% per period. The price of an at-the-money put option as of today is *closest to*:

- (selected) 4.66
- 6.47
- 13.52

Rationale

This Answer is Correct

First, we compute the possible values of the stock at expiration.

$$S^{++} = Su^2 = 50(1.3)^2 = 84.50$$
$$S^{+-} = Sud = 50(1.3)(0.75) = 48.75 S^{--} = Sdd = 50(0.75)^2$$
$$= 28.125$$

Then, we calculate the intrinsic value of the put option at expiration.

$$p^{++} = \text{Max}(0, 50 - 84.5) = 0$$
$$p^{+-} = \text{Max}(0{,}50 - 48.75) = 1.25$$
$$p^{--} = \text{Max}(0{,}50 - 28.125) = 21.875$$

Next, we compute the risk-neutral probabilities:

$$\pi = \frac{1+0.05-0.75}{1.3-0.75} = 0.5455$$
$$1 - \pi = 1 - 0.5455 = 0.4545$$

Then, we compute the value of the put option at each node corresponding to t = 1

$$p^{+} = \frac{\pi p^{++} + (1-\pi)p^{+-}}{(1+r)}$$
$$p^{+} = \frac{0.5455(0) + 0.4545(1.25)}{1.05} = \$0.54$$
$$p^{-} = \frac{\pi p^{+-} + (1-\pi)p^{--}}{(1+r)}$$
$$p^{-} = \frac{0.5455(1.25) + 0.4545(21.875)}{1.05} = \$10.12$$

Finally, we calculate the value of put option today as:

$$p = \frac{\pi p^{+} + (1-\pi) p^{-}}{(1+r)}$$

$$p = \frac{0.5455(0.54) + 0.4545(10.12)}{1.05} = \$4.6616$$

Question 24
L2R41PQ-BS037-1609
LOS: LOS-9249
Lesson Reference: Lesson 6: Option Greeks and Implied Volatility
Difficulty: easy

Consider the following statements:

> **Statement 1**: When the stock price moves up by a large amount, the delta-plus-gamma-based estimate overestimates the actual price of a call.
> **Statement 2**: Gamma measures how sensitive delta is to changes in the price of the underlying stock.

Which of the following is *most likely*?

- (●) Both statements are correct.
- ( ) Only one statement is correct.
- ( ) Both statements are incorrect.

Rationale

This Answer is Correct

When the stock moves up by a large amount, the delta-plus-gamma-based estimate overestimates the price of the call. Conversely, when the stock moves down by a large amount, the delta-plus-gamma-based estimate underestimates the price of the call.

Gamma measures how sensitive delta is to changes in the price of the underlying stock. Stated differently, gamma measures the non-linearity risk or the risk that remains once the portfolio is delta neutral.

Question 25
L2R41PQ-ITEMSET-BS006-1609
LOS: LOS-9235
Lesson Reference: Lesson 1: Introduction and the One-Period Binomial Model

Use the following information to answer the next 4 questions:

A stock currently trading at $80 can go up 15% or down 10% over the coming year. Consider a put option on the stock that expires in 1 year and has an exercise price of $80. The risk-free rate is 5%.

i.
If the stock price goes up 15%, the intrinsic value of the put is *closest to*:

- (selected) $0
- $12
- $92

Rationale
This Answer is Correct

$$S^+ = Su = 80 \times (1 + 0.15) = 92$$
$$p^+ = \text{Max}(0, X - S^+) = \text{Max}(0{,}80 - 92) = \mathbf{\$0}$$

ii.
If the stock price goes down 10%, the intrinsic value of the put option is *closest to*:

- $0
- (selected) $8
- $72

Rationale
This Answer is Correct

$$S^- = Sd = 80 \times (1 - 0.1) = 72$$
$$p^- = \text{Max}(0, X - S^-) = \text{Max}(0{,}80 - 72) = \mathbf{8}$$

iii.
The risk-neutral probability of up and down moves in the binomial model are *closest to*:

	π	$1-\pi$
A.	0.4	0.6
B.	0.6	0.4
C.	0.9	0.1

- Row A

- [x] Row B
- [ ] Row C

Rationale

This Answer is Correct

$$\pi = \frac{1+r-d}{u-d}$$

$$\pi = \frac{1+0.05-0.9}{1.15-0.9} = \mathbf{0.6}$$

$$1 - \pi = 1 - 0.6 = \mathbf{0.4}$$

iv.

The value of the put option today is *closest to*:

- [x] 3.05
- [ ] 4.57
- [ ] 6.53

Rationale

This Answer is Correct

$$p = \frac{\pi p^{+} + (1-\pi)p^{-}}{(1+r)}$$

$$p = \frac{0.6(0) + 0.4(8)}{1.05} = \$3.0476$$

Question 26
L2R41PQ-BS001-1609
LOS: LOS-9235
Lesson Reference: Lesson 1: Introduction and the One-Period Binomial Model
Difficulty: medium

Consider the following statements:

> **Statement 1**: The binomial option pricing model can be used to price both path-dependent and path-independent options.
> **Statement 2**: The Black-Scholes-Merton option valuation model can only be used to value path-dependent options.

Which of the following is *most likely*?

- (selected) Only Statement 1 is correct.
- Only Statement 2 is correct.
- Both statements are incorrect.

Rationale

This Answer is Correct

Statement 2 is incorrect. The Black-Scholes-Merton option valuation model can only be used to value path-**independent** options.

Question 27
L2R41PQ-BS034-1609
LOS: LOS-9248
Lesson Reference: Lesson 6: Option Greeks and Implied Volatility
Difficulty: medium
Consider a portfolio of options that has a delta of –1,500. The portfolio manager wants to use stock as the hedging instrument. The optimal number of hedging units is *closest to*:

- (selected) 1,500
- –1,500
- The number cannot be determined based on the information provided.

Rationale

This Answer is Correct

Stock has a delta of +1.0. Therefore, the optimal number of hedging units, N_H, is calculated as −(−1,500)/1.0 = +1,500, or buy 1,500 shares of stock.

Question 28
L2R41PQ-BS027-1609
LOS: LOS-9246
Lesson Reference: Lesson 5: The Black Model
Difficulty: hard

Consider the following statements:

> **Statement 1**: The issuer of a callable bond can effectively convert its position into a straight bond by selling a payer swaption.
> **Statement 2**: Being long a callable fixed-rate bond can be viewed as being long a straight fixed-rate bond and short a receiver swaption.

Which of the following is *most likely*?

- ○ Only Statement 1 is correct.
- ◉ Only Statement 2 is correct.
- ○ Both statements are incorrect.

Rationale

This Answer is Correct

The issuer of a callable bond can effectively convert its position into a straight bond by selling a **receiver** swaption. The issuer benefits from an interest rate decline as the option embedded in the callable bond increases in value. However, the decrease in interest rates also means that it would need to make settlement payments on the swap (once the holder of the swaption exercises it). The issuer's positions on the embedded call and the receiver swaption effectively cancel each other out, leaving the issuer with just a straight bond.

Being long a callable fixed-rate bond can be viewed as being long a straight fixed-rate bond and short a receiver swaption.

The holder of a callable bond effectively holds a straight bond and sells a call option on the bond to the issuer. The issuer, as the holder of this option, exercises this option when interest rates decline (when bond prices rise). Therefore, the holder of the callable bond loses out when interest rates decline as the value of the callable bond is effectively capped.

The holder of the receiver swaption (the issuer) will exercise this option when swap rates decline. As the writer of the swaption, the callable bondholder will have to make settlement payments on the swap, which means that the bondholder loses out when interest rates decline.

Question 29

L2R41PQ-BS028-1609

LOS: LOS-9246

Lesson Reference: Lesson 5: The Black Model

Difficulty: medium

A company with floating-rate debt outstanding is concerned about interest rates increasing over the next 6 months. The company wants to hedge its position by buying a payer swaption expiring in 6 months, which would offer it the choice to enter a 5-year swap, locking in its borrowing costs. The current 6-month forward, 5-year swap rate is 2.75%, the current 5-year swap rate is 2.65%, and the current 6-month risk-free rate is 2.35%. Which of the following is *least likely*?

- ○ The underlying rate on this swaption will be 2.75%.
- ◉ The discount rate that will be used in the swaption model is 2.65%.
- ○ The time to expiration of the swaption will be 6 months.

Rationale

This Answer is Correct

The discount rate that will be used in the swaption model is 2.35%, not the current 5-year swap rate of 2.65%.

Question 30
L2R41PQ-BS023-1609
LOS: LOS-9245
Lesson Reference: Lesson 5: The Black Model
Difficulty: easy
Suppose the S&P 500 index is currently trading at 2,120 and a futures contract on the index, which expires in 3 months, is trading at 2,150. An investor is considering taking a position on a call option on the S&P 500 futures contract with an exercise price of 2,130. Which of the following is *most likely* the underlying price used in the option valuation model?

- ○ 2,120
- ○ 2,130
- ◉ 2,150

Rationale

This Answer is Correct

Since this option is on a futures contract, the Black model will be used to value the option, with the futures contract serving as the underlying. Therefore, the futures price of 2,150 will serve as the underlying price in the valuation model.

Question 31
L2R41PQ-BS013-1609
LOS: LOS-9235
Lesson Reference: Lesson 2: The Two-Period Binomial Model
Difficulty: medium

Consider the following statements:

> **Statement 1**: In order to hedge a long position on a put, we would go short on the underlying stock.
> **Statement 2**: A put is equivalent to a short position in the underlying and lending the proceeds of the short sale.

Which of the following is *most likely*?

- ○ Only Statement 1 is correct.
- ◉ Only Statement 2 is correct.
- ○ Both statements are incorrect.

Rationale

This Answer is Correct

> Statement 1 is incorrect. The hedge ratio for puts is **negative**. This means that in order to hedge a long position on a put, we would actually go long on the underlying as well.
> Statement 2 is correct. A put is equivalent to a short position in the underlying (hS) and lending out the proceeds of the short sale.

Question 32
L2R41PQ-BS026-1609
LOS: LOS-9246
Lesson Reference: Lesson 5: The Black Model
Difficulty: hard

Consider the following statements:

> **Statement 1**: If the exercise rate equals the current FRA rate, then a long position on an interest rate call option combined with a short position on an interest rate put option is equivalent to a receive-fixed, pay-floating FRA.
> **Statement 2**: Taking a long position on an interest rate cap and short position on an interest rate floor with the same exercise rate is equal to a receive-fixed, pay-floating interest rate swap.

Which of the following is *most likely*?

- ○ Only Statement 1 is correct.
- ○ Only Statement 2 is correct.
- ● Both statements are incorrect.

Rationale

This Answer is Correct

If the exercise rate equals the current FRA rate, then a long position on an interest rate call option combined with a short position on an interest rate put option is equivalent to a **receive-floating, pay-fixed** FRA.

Taking a long position on an interest rate cap and short position on an interest rate floor with the same exercise rate is equal to a receive-floating, pay-fixed interest rate swap.

Question 33
L2R41PQ-ITEMSET-BS002-1609
LOS: LOS-9235
Lesson Reference: Lesson 1: Introduction and the One-Period Binomial Model

Use the following information to answer the next 4 questions:

A stock that is currently trading at $80 can go up 26% or down 20% over the coming year. Consider a call option on the stock that expires in 1 year and has an exercise price of $87. The risk-free rate is 8%.

i.
If the stock price goes up 26% over the period, the intrinsic value of the call option is *closest to*:

- ( ) $0
- ( ) $9
- (•) $13.80

Rationale

This Answer is Correct

$$S^{+} = Su = 80 \times (1 + 0.26) = 100.80$$
$$c^{+} = \mathrm{Max}(0, S^{+} - X) = \mathrm{Max}(0{,}100.80 - 87) = \mathbf{\$13.80}$$

ii.
If the stock price goes down 20% over the period, the intrinsic value of the call option is *closest to*:

- (•) $0
- ( ) $9
- ( ) $13.80

Rationale

This Answer is Correct

$$S^{-} = Sd = 80 \times (1 - 0.20) = 64$$
$$c^{-} = \mathrm{Max}(0, S^{-} - X) = \mathrm{Max}(0{,}64 - 75) = \mathbf{\$0}$$

iii.
The risk-neutral probabilities of up and down moves in the binomial model are *closest to*:

	π	**1 − π**
A.	0.4348	0.5652
B.	0.6087	0.3913

	π	$1-\pi$
C.	0.8302	0.1698

- ◯ Row A
- ◉ Row B
- ◯ Row C

Rationale

This Answer is Correct

$$\pi = \frac{1+r-d}{u-d}$$

$$\pi = \frac{1+0.08-0.8}{1.26-0.8} = 0.6087$$

$$1-\pi = 1-0.6087 = 0.3913$$

iv.

The value of the call option today is *closest to*:

- ◉ $7.78
- ◯ $9.00
- ◯ $10.61

Rationale

This Answer is Correct

$$c = \frac{\pi c^{+}+(1-\pi)c^{-}}{(1+r)}$$

$$c = \frac{0.6087(13.8)+0.3913(0)}{1.08} = \$7.78$$

Question 34

L2DRR41-TB008-1610

LOS: LOS-9246

Lesson Reference: Lesson 5: The Black Model

Difficulty: medium

Which of the following statements is *least likely*?

- (selected) An interest rate put option gives the put buyer the right to a certain cash payment when the underlying interest rate exceeds the exercise rate.
- An interest rate put option gives the put buyer the right to a certain cash payment when the underlying interest rate is below the exercise rate.
- An interest rate call option gives the call buyer the right to a certain cash payment when the underlying interest rate exceeds the exercise rate.

Rationale

This Answer is Correct

An interest rate put option gives the put buyer the right to a certain cash payment when the underlying interest rate is below the exercise rate, not above it.

Question 35

L2R41PQ-BS015-1609

LOS: LOS-9241

Lesson Reference: Lesson 2: The Two-Period Binomial Model

Difficulty: medium

In a multi-period setting, the expectations approach is *most likely* to be used to value which of the following options?

- (selected) An American call option on a non-dividend-paying stock.
- An American call option on a dividend-paying stock.
- An American put option.

Rationale

This Answer is Correct

The expectations approach can only be used to value an American option when early exercise has no value, which is the case with an American option on a non-dividend-paying stock. For American calls on dividend-paying stocks and for American puts, there may be situations where early exercise would be optimal.

Question 36
L2DRR41-TB006-1610
LOS: LOS-9242
Lesson Reference: Lesson 4: The Black-Scholes-Merton Model
Difficulty: medium
Which of the following is *least likely* to be an assumption of the Black-Scholes-Merton (BSM) option valuation model?

- (selected) Options are American.
- Markets are frictionless.
- Returns are lognormally distributed.

Rationale

This Answer is Correct

The Black-Scholes-Merton (BSM) option valuation model is used to value European options.

Question 37
L2R41PQ-BS018-1609
LOS: LOS-9242
Lesson Reference: Lesson 4: The Black-Scholes-Merton Model
Difficulty: medium
Which of the following is *least likely* an assumption of the Black-Scholes-Merton (BSM) model?

- ○ The volatility of the underlying asset is known and constant.
- ○ The risk-free rate is known and constant.
- ◉ The price of the underlying follows a normal distribution.

Rationale

This Answer is Correct

The BSM model assumes that the price of the underlying follows a **lognormal** distribution, whereas the returns of the underlying follow a **normal** distribution.

Question 38
L2R41PQ-BS022-1609
LOS: LOS-9244
Lesson Reference: Lesson 4: The Black-Scholes-Merton Model
Difficulty: easy
An American exporter expects to receive a fixed amount of GBP in 3 months' time. The current spot exchange rate is $1.31/£, and the exporter is worried about a decline in the exchange rate, so he wants to purchase an at-the-money put option. The U.S. risk-free rate is 0.50% and the GBP risk-free rate is 1.00%. Which of the following is *least likely*?

- (selected) The exporter should purchase a put option on the USD.
- The carry rate used in the BSM model to value the option will be the GBP risk-free rate.
- The exercise price of the option would be $1.31/£.

Rationale
This Answer is Correct

The exporter should buy a put option on the **GBP**, which in essence is a call option on the USD.

The risk-free rate used in the BSM model should be the U.S. risk-free rate, while the carry rate should be the GBP rate.

Since the option is at-the-money, the exercise price should be the current spot exchange rate.

Question 39

L2R41PQ-BS041-1609

LOS: LOS-9251

Lesson Reference: Lesson 6: Option Greeks and Implied Volatility

Difficulty: medium

Suppose that a 6-month out-of-the-money call on the S&P 500 index is available at 19% implied volatility, and a 3-month in-the-money put on Citigroup (C) is available at 24%. An investor believes that S&P 500 volatility should be around 24%, while C volatility should be around 16%. Which of the following pairs of trades would the investor *most likely* place based on her views?

- ○ Buy the S&P 500 index and sell C stock.
- ○ Sell the S&P 500 index and buy C stock.
- ◉ Buy the S&P 500 call and sell the C put.

Rationale

This Answer is Correct

The investor believes that S&P 500 call volatility is understated by the market, and that the C put volatility is overstated by the market. She expects S&P 500 volatility to rise and C volatility to fall. Therefore, she would buy the S&P 500 call and sell the C put.

Question 40

L2DRR41-TB004-1610

LOS: LOS-9236

Lesson Reference: Lesson 2: The Two-Period Binomial Model

Difficulty: medium

Which of the following option types would be *least likely* to be exercised early?

- ○ American call option on a dividend-paying stock
- ◉ American call option on a non-dividend-paying stock
- ○ American put option on a non-dividend-paying stock

Rationale

This Answer is Correct

An American-style call option on a non-dividend-paying stock will never be exercised early, because the minimum value of the option will exceed its exercise value.