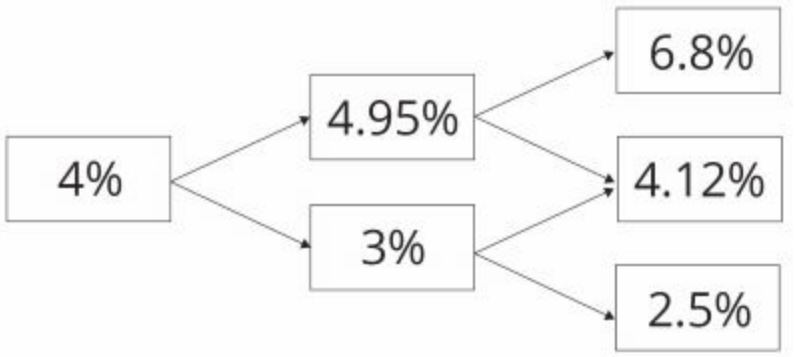


Wood has been asked help a colleague with the valuation of an interest rate put. The interest rate put option has 2 years to maturity and a strike price of 4.5% and is based on 360 day MRR. The option has a notional principal of $10m.

Wood has discovered that the Black model may be used to price options on interest rates by viewing the interest rate option as an option on a FRA. She is currently writing a research note for her team and makes the following three notes regarding the Black model:

Note 1:	"When using the Black model care needs to be taken to ensure that the payoff is discounted from the end of the borrowing and lending period (i.e., the maturity of the rate underlying the FRA), rather than the exercise date of the option."
Note 2:	"Given an interest rate option is an option on a FRA, call options will gain in value when interest rates rise and put options will fall in value."
Note 3:	"The accrual period needs to be factored in when valuing the option. This is because quoted rates are annual rates but in reality, the time between the FRA expiration and the maturity of borrowing and lending may not be one year. The accrual period can be viewed as a fraction of a year."

Wood asks for information about interest rate caps and floors. Newman makes the following comments:

Comment 1:	"A long FRA can be viewed as equivalent to a long interest rate call and a short interest rate put with the same strike and time to expiration."
Comment 2:	"Given a cap is a series of interest rate call options with identical strike prices and a floor is a series of interest rate put options also with identical strike prices, a short cap and long floor with identical strike prices would create a pay fixed receive floating interest rate swap."

Question #8 - 11 of 112

Question ID: 1686796

Using the information about the interest rate put and the spot and forward rates in Exhibit 1, which of the following is *closest* to the value of the put? Assume that the option cash settle at time 2.

A) $44,250.

B) $64,250.

C) $84,250.

Question #9 - 11 of 112

Question ID: 1686797

How many of Wood's notes regarding the Black model used to value interest options are correct?

A) All three notes are correct.

B) Only two of the notes are correct.

C) Only one of the notes is correct.

Question #10 - 11 of 112

Question ID: 1686798

Newman's Comment 1 is *best* described as:

A) correct.

B) incorrect as to the strike price of the options.

C) incorrect as to the equivalence to a long FRA.

Question #11 - 11 of 112

Question ID: 1686799

Newman's Comment 2 is *best* described as:

A) correct.

B) incorrect as buying a floor is not equivalent to buying interest rate put options.

C) incorrect as long floor, short cap would create a pay floating, receive fixed interest rate swap.

Question #12 of 112

Question ID: 1686878

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

A) must have a series of asset prices.

B) does not need to know the risk-free rate.

C) must have the market price of the option.

Question #13 of 112

Question ID: 1686822

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

A) writing a series of interest rate puts.

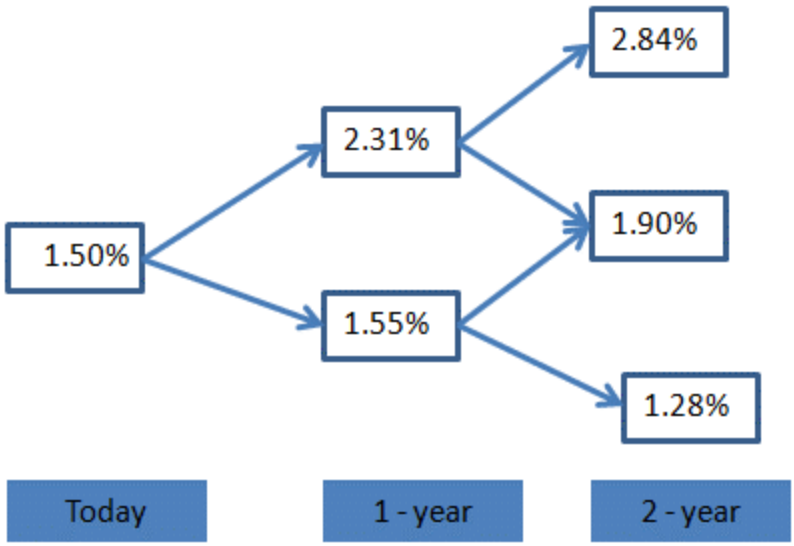
B) writing a series of puts on fixed income securities.

C) owning a series of calls on fixed income securities.

Question #14 of 112

Question ID: 1686776

Given the following interest rate tree:



The value of a 2-period European put option with strike rate of 2% and notional principal of $1 million is *closest* to:

A) $2,020

B) $3,109

C) $2,230

Question #15 of 112

Question ID: 1686835

Suppose a forward rate agreement (FRA) calls for us to receive the six-month MRR two years from now for a payment of a fixed rate of interest of 6%. Which of the following structures is equivalent to this long FRA? A long:

A) call on MRR with a strike rate of 6% and eighteen months to expiration.

B) call and a short put on MRR with a strike rate of 6% and two years to expiration.

C) put and a short call on MRR with a strike rate of 6% and two years to expiration.

Question #16 of 112

Question ID: 1686844

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

A) far in the money.

B) far out of the money.

C) at the money.

Question #17 of 112

Question ID: 1686772

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.

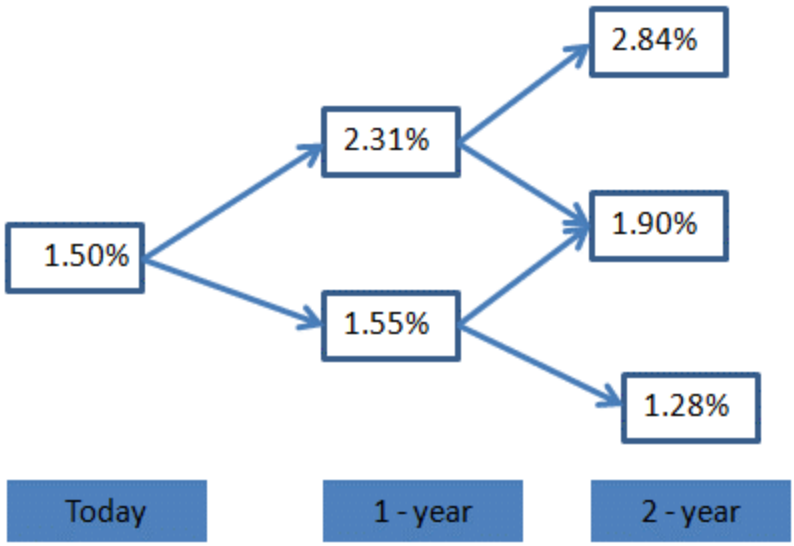
B) not possible.

C) possible by purchasing 100 calls and short selling 57 shares.

Question #18 of 112

Question ID: 1686775

Given the following interest rate tree:



The value of a 2-period European call option with strike rate of 2% and notional principal of $1 million is closest to:

A) $4,122

B) $3,549

C) $2,022

Question #19 of 112

Question ID: 1686837

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) Delta.

B) Gamma.

C) Theta.

Question #20 of 112

Question ID: 1686875

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) historical volatility.

C) option volatility.

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 #21 - 24 of 112

Question ID: 1686854

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) the option's delta has no minimum bound.

B) far out of the money.

C) at the money.

Question #22 - 24 of 112

Question ID: 1686855

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) Put options.

C) Call options.

Question #23 - 24 of 112

Question ID: 1686856

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) 67.36.

C) −32.64.

Question #24 - 24 of 112

Question ID: 1686857

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) 67.36.

B) −32.64.

C) −67.36.

You are interested in derivative products, particularly with a view to identifying arbitrage opportunities. You start with bond futures:

- The cheapest to deliver (CTD) bond underlying the T-bond futures contract maturing in five months is a 4.6% T-Bond currently priced at $1,002.33 (full price) per $1,000 par. The CTD paid its last coupon four months ago, and its conversion factor is 1.13. The risk free rate is 2.99%.

Peter Wang, one of your colleague, knew of your interest in derivative products advises you to consider interest rate options and swaptions. Wang makes the following comments:

Comment 1:	An investor having a long position in a call option on a bond has the same position as if he is long an interest rate floor.
Comment 2:	A borrower of a floating rate loan can create an interest rate collar by buying an interest rate cap and selling an interest rate floor and the cap sets the maximum interest rate payable by the borrower.
Comment 3:	A payer swaption is the right to enter into a specific swap at some date in the future as the fixed-rate payer. A payer swaption becomes more valuable if an equivalent swap at the market rate is higher than the strike rate.

Question #25 - 28 of 112

Question ID: 1686806

Which of the following is *closest* to the no-arbitrage price of the 5-month T-Bond futures contract?

A) $867.20.

B) $877.47.

C) $976.02.

Question #26 - 28 of 112

Question ID: 1686807

Comment 1 is *best* described as:

A) correct.

B) incorrect as long an interest rate floor should be short an interest rate floor.

C) incorrect as long an interest rate floor should be long an interest rate cap.

Question #27 - 28 of 112

Question ID: 1686808

Comment 2 is *best* described as:

A) correct.

B) incorrect as it should be buying an interest rate floor and selling an interest rate cap.

C) incorrect as it should be the floor that sets the maximum interest rate payable by the borrower.

Question #28 - 28 of 112

Question ID: 1686809

Comment 3 can be *best* described as:

A) correct.

B) incorrect as it is describing a receiver swaption, not a payer swaption.

C) incorrect as a payer swaption is more valuable if an equivalent swap at the market rate is lower than the strike rate.

Question #29 of 112

Question ID: 1686842

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) 1.00.

C) 0.10.

Question #30 of 112

Question ID: 1686773

Combining a short position in a stock with a long position in a call option on the stock will produce a payoff pattern equivalent to a:

A) risk-free security.

B) short position in a put option on the stock.

C) long position in a put option on the stock.

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 #31 - 34 of 112

Question ID: 1686849

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

A) small price changes in the underlying asset.

B) small price decreases in the underlying asset.

C) all price changes in the underlying asset.

Question #32 - 34 of 112

Question ID: 1686850

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) slope in the option price diagram.

B) curvature of the option price graph.

C) level in the option price diagram.

Question #33 - 34 of 112

Question ID: 1686851

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) at-the-money.

C) out-of-the-money.

Question #34 - 34 of 112

Question ID: 1686852

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) 75,000.

B) 0.

C) 14,785.

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 #35 - 38 of 112

Question ID: 1686761

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) may either increase or decrease.

B) will decrease.

C) will increase.

Question #36 - 38 of 112

Question ID: 1686762

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) $15.12.

B) $15.41.

C) $14.84.

Question #37 - 38 of 112

Question ID: 1686763

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) $4.84.

C) $1.97.

Question #38 - 38 of 112

Question ID: 1686764

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) Increase or decrease.

B) Increase.

C) Decrease.
