

Level I of the CFA® 2025 Exam

Questions with Answers - Derivatives

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Learning Module 1: Derivative Instrument and Derivative Market Features

Q.78 Which of these is *least likely* a characteristic of over-the-counter options?

- A. They are highly regulated.
- B. Large traders trade over large sums of money.
- C. They are often used to hedge interest rate risks and currency fluctuation risks.

The correct answer is **A**.

Over-the-counter options are largely UNREGULATED. It is often the place where large players (i.e.: banks) hedge themselves against interest rate risks and currency fluctuation risks.

High regulation is a characteristic present in exchange markets.

B is incorrect. Large traders indeed trade over large sums of money in the OTC options market. This statement is accurate and reflects the nature of OTC markets, where large financial institutions, corporations, and other entities engage in sizable transactions. The ability to negotiate terms directly and create customized contracts makes OTC options particularly appealing to large traders looking to hedge specific risks or take on positions that match their unique risk profiles. The size and scope of these transactions underscore the importance of OTC markets in global finance, particularly for hedging and risk management purposes.

C is incorrect. The flexibility and customization available in OTC markets enable entities to create specific contracts that can effectively hedge against these and other types of financial risks. For example, a corporation with exposure to foreign currency risk due to operations in multiple countries might use OTC options to hedge against potential losses from currency fluctuations. Similarly, financial institutions might use OTC options to manage exposure to changing interest rates. This characteristic of OTC options is a key reason why they are a vital tool in the risk management strategies of many large traders and institutions.

CFA Level I, Derivatives, Learning Module 1: Derivative Instrument and Derivative Market Features. LOS (b): Describe the basic features of derivative markets, and contrast over-the-counter and exchange-traded derivative markets.

Q.81 The implied volatility on S&P 500 options has decreased over the past month. An analyst would *most likely* conclude that:

- A. Interest rates have decreased.
- B. The value of the broad market has decreased.
- C. The level of market uncertainty has decreased.

The correct answer is **C**.

The implied volatility of an options contract is the value of the volatility of the underlying, in this case, the S&P 500 (broad market).

A is incorrect. A decrease in interest rates does not lead to a decrease in the implied volatility of the S&P 500.

B is incorrect. A decrease in implied volatility does not necessarily indicate that the value of the broad market has decreased. It only indicates that the market is expecting the price of the underlying security to be less volatile in the future. It is possible for the value of the broad market to increase or remain unchanged even if implied volatility is decreasing.

CFA Level I, Derivatives, Learning Module 1: Derivative Instrument and Derivative Market Features. LOS (b): Describe the basic features of derivative markets, and contrast over-the-counter and exchange-traded derivative markets.

Q.1048 Exchange-traded derivatives are *most likely*:

- A. Standardized and backed by a clearinghouse.
- B. Standardized but not backed by a clearinghouse.
- C. Backed but not standardized by a clearinghouse.

The correct answer is **A**.

Derivative instruments are created and traded either on an exchange or on the OTC market. Exchange traded derivatives are standardized, whereas OTC derivatives are customized. To standardize a derivative contract means that its terms and conditions are precisely specified by the exchange and there is very limited ability to alter those terms. Exchange traded derivatives provide guarantee through the use of their clearing house. Clearinghouses provide a guarantee to the winning party that if the loser does not pay, the clearinghouse will pay the winning party.

Exchange-traded derivatives are therefore always standardized and backed by a clearinghouse. For this reason, they are highly liquid and offer no counterparty risk to traders.

B is incorrect. This option inaccurately suggests that exchange-traded derivatives are standardized but not backed by a clearinghouse. In reality, one of the defining characteristics of exchange-traded derivatives is their backing by a clearinghouse. This backing is crucial for managing and mitigating the risk of counterparty default, thereby ensuring the integrity and stability of the derivatives market. Without the involvement of a clearinghouse, the risk profile of exchange-traded derivatives would be significantly different, potentially deterring investors due to increased counterparty risk.

C is incorrect. This option implies that exchange-traded derivatives might be backed by a clearinghouse but are not standardized. This is a misunderstanding of the nature of exchange-traded derivatives. Standardization is a fundamental aspect of these instruments, allowing for their commoditization and facilitating their trading on exchanges. The standardization process ensures that all market participants have a clear understanding of the contract terms, which is essential for the efficient functioning of the market. Moreover, the backing by a clearinghouse, while crucial, is not a standalone feature but works in conjunction with standardization to provide a secure and efficient trading environment.

CFA Level I, Derivatives, Learning Module 1: Derivative Instrument and Derivative Market Features. LOS (b): Describe the basic features of derivative markets, and contrast over-the-counter and exchange-traded derivative markets.

Q.1053 Which of the following is *least likely* accurate for exchange-traded derivatives?

- A. Exchange-traded derivatives are liquid.
- B. Exchange-traded derivatives are standardized contracts.
- C. Exchange-traded derivatives carry significant default risk.

The correct answer is **C**.

Exchange-traded derivatives have very low default risk because the clearinghouse stands between the counterparts involved in most contracts. The clearinghouse acts as a buyer for every seller and a seller for every buyer, thereby eliminating potential losses.

B is incorrect. Exchange-traded derivatives are standardized contracts. This means that its terms and conditions are precisely specified by the exchange and there is very limited ability to alter those terms.

A is incorrect. Exchange traded derivatives are highly liquid. The standardization of contract terms facilitates the creation of a more liquid market for derivatives. Additionally, through designated market makers, derivatives exchanges guarantee that derivatives can be bought and sold.

CFA Level I, Derivatives, Learning Module 1: Derivative Instrument and Derivative Market Features. LOS (b): Describe the basic features of derivative markets, and contrast over-the-counter and exchange-traded derivative markets.

Q.1132 Which of the following is *least likely* an exchange-traded derivative instrument?

- A. Option contract.
- B. Futures contract.
- C. Forward contract.

The correct answer is **C**.

Options and futures are exchange-traded instruments while forwards and swaps are traded on over the counter (OTC) markets.

A is incorrect. Option contracts are indeed exchange-traded derivative instruments. They provide the holder the right, but not the obligation, to buy or sell an underlying asset at a specified strike price before or at the contract's expiration. Options are standardized contracts that are traded on various exchanges around the world, offering liquidity and transparency to investors. The standardization includes specific quantities of the underlying asset, expiration dates, and strike prices, making them suitable for exchange trading.

B is incorrect. Futures contracts are also exchange-traded derivative instruments. They are standardized contracts that obligate the buyer to purchase, and the seller to sell, a specific quantity of an underlying asset at a predetermined price at a future date. Futures contracts are traded on regulated exchanges, which provide a marketplace for these contracts to be bought and sold among participants. The exchanges also facilitate the clearing and settlement of these contracts, thereby reducing the credit risk associated with the transactions. Futures contracts are used by participants to hedge against price movements in the underlying assets or to speculate on those movements.

CFA Level I, Derivatives, Learning Module 1: Derivative Instrument and Derivative Market Features. LOS (b): Describe the basic features of derivative markets, and contrast over-the-counter and exchange-traded derivative markets.

Q.3353 Sonia Bass works as a hedge fund manager at High-Yield Investments (HYIN). While talking to a colleague, Bass posed the following question: “How do the standardization of derivative investments and the presence of designated market makers help the trade of such securities?” The best answer to Bass' question is that they:

- A. Guarantee the buying and selling of a derivative.
- B. Increase liquidity and reduce the cost of liquidity.
- C. Guarantee the price at which a derivative is traded.

The correct answer is **B**.

While standardization and the presence of designated market makers do improve the efficiency and liquidity of the derivatives market, they do not guarantee the buying and selling of a derivative. Market conditions, such as lack of demand or excessive supply, can still make it challenging to execute trades, even in a standardized market with market makers. The primary role of market makers is to provide liquidity, not to guarantee transactions.

Although designated market makers help provide more predictable pricing by quoting buy and sell prices, they do not guarantee the price at which a derivative is traded. Market prices can fluctuate significantly due to changes in the underlying asset's value, market sentiment, or macroeconomic factors. Traders may still face slippage, which is the difference between the expected price of a trade and the price at which the trade is executed, especially in volatile market conditions.

CFA Level I, Derivatives, Learning Module 1: Derivative Instrument and Derivative Market Features. LOS (b): Describe the basic features of derivative markets, and contrast over-the-counter and exchange-traded derivative markets.

Q.3355 In contrast to OTC-traded derivatives, exchange-traded derivatives *least likely*:

- A. Have higher liquidity.
- B. Operate at a higher degree of regulation.
- C. Operate at a lower degree of regulation.

The correct answer is **C**.

Exchange-traded derivatives most likely have greater liquidity and operate at a higher degree of regulation as they are standardized which means that their terms and conditions are precisely specified by the exchange and there is very limited ability to alter those terms. In addition, they have a clearing and settlement operation.

A is incorrect. Suggesting that exchange-traded derivatives have higher liquidity is accurate and aligns with the characteristics of these financial instruments. The standardization and the presence of a centralized clearinghouse in exchange-traded markets facilitate easier trading among a larger number of participants, thereby increasing liquidity.

B is incorrect. Stating that exchange-traded derivatives operate at a higher degree of regulation is also correct. The standardized nature of these derivatives, combined with the oversight of a centralized clearinghouse and regulatory bodies, ensures a well-regulated trading environment. This regulatory framework is designed to protect investors and maintain the integrity of the financial markets.

CFA Level I, Derivatives, Learning Module 1: Derivative Instrument and Derivative Market Features. LOS (b): Describe the basic features of derivative markets, and contrast over-the-counter and exchange-traded derivative markets.

Q.3364 Derivatives are financial instruments which:

- A. Derive their performance from that of an underlying asset.
- B. Transform risk when transferring it from one party to another.
- C. Are created in the form of an informal agreement between buyer and seller.

The correct answer is **A**.

Derivatives are financial instruments that derive value and performance from an underlying asset.

B is incorrect. Derivatives merely transfer risk from one party to the other; they do not transform the risk. For instance, a credit default swap transfers credit risk from the protection buyer to the protection seller.

C is incorrect. Derivatives are created in the form of legally enforceable (and binding) contracts which always define the rights and obligations of each party.

CFA Level I, Derivatives, Learning Module 1: Derivative Instrument and Derivative Market Features. LOS (a): Define a derivative and describe basic features of a derivative instrument.

Q.3367 Relative to over-the-counter (OTC) derivatives, exchange-traded derivatives are:

- A. Traded in larger lot sizes.
- B. Transacted through a process that is verified by a central exchange.
- C. Traded in markets where there is zero potential to earn arbitrage profits.

The correct answer is **B**.

Exchange-traded derivatives trade on standardized exchanges which facilitate the creation of clearing and settlement operations. Clearing is the process by which the exchange verifies the execution of the transaction and records the participants' identities.

A is incorrect. OTC and exchange-traded derivatives do not differ based on the lot sizes being traded.

C is incorrect. Market makers and speculators are active participants in exchange-traded derivatives markets who stand ready to buy at one price and sell at a higher price, locking in arbitrage profits. Similarly, OTC derivatives trade on informal exchanges where dealers can participate on a desire to earn profits.

CFA Level I, Derivatives, Learning Module 1: Derivative Instrument and Derivative Market Features. LOS (b): Describe the basic features of derivative markets, and contrast over-the-counter and exchange-traded derivative markets.

Q.3384 Which of the following principles *most likely* form the basis of pricing derivatives?

- A. A hedge portfolio that earns the risk-free rate is constructed.
- B. The correct derivative price assures that the market has exploitable arbitrage opportunities.
- C. The expected payoff of the derivative must be discounted at the sum of the risk-free rate and risk premium.

The correct answer is **A**.

The value of the derivative is derived from the underlying by constructing a hypothetical combination of derivatives and underlyings that eliminates risk. The combination is called a hedged portfolio.

B is incorrect. Derivatives are priced assuming that the market is free of arbitrage opportunities.

C is incorrect. The expected dividend payoff must be discounted at the risk-free rate. The derivatives price is the price that guarantees that the risk-free combination of the derivative and underlying produces a risk-free return. Because risk-aversion is not a relevant factor in pricing derivatives, one can obtain the derivative price assuming the investor is risk-neutral; that is, the expected payoff of the derivative is discounted at the risk-free rate.

CFA Level I, Derivatives, Learning Module 1: Derivative Instrument and Derivative Market Features. LOS (b): Describe the basic features of derivative markets, and contrast over-the-counter and exchange-traded derivative markets.

Q.3394 In contrast with exchange-traded derivatives markets, over-the-counter derivatives markets provide:

- A. Liquidity.
- B. Flexibility.
- C. Transparency.

The correct answer is **B**.

Exchange-traded markets provide their participants with liquidity as contract terms are standardized. However, over-the-counter markets offer contracts that are flexible and customizable. Many OTC contracts can easily be created and offset by replicating the exact opposite transaction often with the same party. On the other hand, some exchange-traded derivatives may have very little trading interests and thus very little liquidity. Liquidity is driven by trading interest, which may be strong or weak in both markets.

Exchange-traded derivatives markets provide transparency to their participants as full information on all transactions is disclosed to exchanges and regulatory bodies. In contrast, many transactions in OTC markets will retain a degree of privacy with lower transparency.

A is incorrect. Liquidity refers to the ease with which an asset or security can be bought or sold in the market without affecting its price. Exchange-traded derivatives markets typically offer higher liquidity than OTC derivatives markets due to their standardized contracts and centralized trading venues, which attract a larger number of participants. The standardized nature of contracts in exchange-traded markets facilitates the matching of buy and sell orders, thereby enhancing liquidity. In contrast, the customized nature of OTC derivatives can make it more challenging to find a counterparty for a specific contract, potentially reducing liquidity.

C is incorrect. Exchange-traded derivatives are traded on centralized exchanges that require the disclosure of price and transaction information, making it accessible to all market participants and regulators. In contrast, OTC derivatives are traded directly between parties without the involvement of a centralized exchange, which can result in less publicly available information about prices, transactions, and market participants. This lower level of transparency can make it more difficult for participants to assess market conditions, pricing, and risk.

CFA Level I, Derivatives, Learning Module 1: Derivative Instrument and Derivative Market Features. LOS (b): Describe the basic features of derivative markets, and contrast over-the-counter and exchange-traded derivative markets.

Q.3896 Which of the following derivatives instruments *most likely* trade over the counter?

- A. Futures contracts and forwards contracts.
- B. Futures contracts, forwards contracts and swaps.
- C. Forwards contracts, swaps, and asset-backed securities.

The correct answer is **C**.

Forwards contracts, swaps, and asset-backed securities trade over the counter while futures contracts and options trade on regulated exchanges.

A is incorrect. Futures contracts, unlike forwards, are standardized contracts that trade on regulated exchanges. These exchanges provide a centralized marketplace where buyers and sellers come together, providing liquidity and price transparency. Futures contracts have standardized terms including quantity, delivery, and settlement dates, making them unsuitable for direct OTC trading.

B is incorrect. Similar to the explanation above, futures contracts are standardized derivatives that trade on regulated exchanges, not OTC. While forwards contracts and swaps are indeed traded OTC due to their flexibility and customization, futures contracts are not, due to their standardized nature and the regulatory environment of exchanges.

CFA Level I, Derivatives, Learning Module 1: Derivative Instrument and Derivative Market Features. LOS (b): Describe the basic features of derivative markets, and contrast over-the-counter and exchange-traded derivative markets.

Q.3897 Blackoil Traders Inc. is an American oil producing company that regularly sells oil futures to reduce the risk of fluctuating oil prices. This activity can *best* be described as:

- A. Clearing.
- B. Hedging.
- C. Speculating.

The correct answer is **B**.

Hedgers enter in future contracts to reduce the price risk of underlying assets.

C is incorrect. Speculation occurs when investors try to make profits from the change in the price of a security. Speculators are exposed to both downside and upside risks.

A is incorrect. Clearing is the process of managing financial market transactions between execution and settlement.

CFA Level I, Derivatives, Learning Module 1: Derivative Instrument and Derivative Market Features. LOS (b): Describe the basic features of derivative markets, and contrast over-the-counter and exchange-traded derivative markets.

Q.4125 Which of the following is *most likely* an example of a contingent claim?

- A. A puttable bond.
- B. A \$500 bond purchase.
- C. A contract to deliver gas at \$100 per barrel.

The correct answer is **A**.

In a contingent claim, the trade settlement depends on one of the counterparties. A puttable bond is an embedded derivative, a type of contingent claim.

B is incorrect. A \$500 bond purchase is a type of fixed-income security.

C is incorrect. It is a type of forward contract, a type of firm commitment. In firm commitment, an amount is pre-determined, and the parties involved agree to exchange it at a future date. Firm commitments include forward contracts, futures contracts, and swaps.

CFA Level I, Derivatives, Learning Module 1: Derivative Instrument and Derivative Market Features. LOS (a): Define a derivative and describe basic features of a derivative instrument.

Q.4126 Abson Limited is a Japanese company selling oil drilling machines globally. Consider the following draft commercial contract extracted from Clap company's records.

Contract Date	Today
Goods seller	Abson Limited, Japan
Goods buyer	Clap Company, USA
Goods description	Oil drilling machine
Quantity	Two
Delivery date	150 days from the contract date
Delivery terms	Delivered by ferry. Costs and taxes to be paid by the buyer
Payment terms	The amount is payable by the buyer upon delivery
Contract price	\$17,525

The financial manager is considering a forward commitment to hedge Abson's financial risk under the above commercial transaction. Which of the following is *most likely* an underlying asset in this case?

- A. Currency
- B. Oil drilling machine
- C. Contract price

The correct answer is **A**.

Abson Limited should consider a forward commitment with the currency as an underlying to sell the Japanese Yen at a fixed USD price.

B and C are incorrect. The oil drilling machine is not considered an underlying in this case since its price is fixed, which is affected by the currency risk.

CFA Level I, Derivatives, Learning Module 1: Derivative Instrument and Derivative Market Features. LOS (a): Define a derivative and describe basic features of a derivative instrument.

Learning Module 2: Forward Commitment and Contingent Claim

Features and Instruments

Q.33 Chris Dunkins bought a put option with a strike of \$59. If at expiration the stock is now worth \$42, then what is *most likely* the payoff of the option at expiration?

- A. \$17 negative payoff.
- B. \$0 payoff.
- C. \$17 positive payoff.

The correct answer is C.

The payoff of a put option at expiration is:

$$P_T = \max(0, X - S_T) = \max(0, \$59 - \$42) = \max(0, \$17) = \$17$$

Exam Capsule

Traders buy put options when they are bearish, implying that they expect the stock price to fall. The put buyer has a limited loss (premium paid). The put buyer gains as the price falls, but the gain is not completely unlimited since the price of the underlying cannot fall below zero. In many ways, purchasing a put option is like purchasing insurance. In the same vein as for call options, the put seller has nearly unlimited losses, and his gains are limited to the put premium paid to him by the put buyer.

A trader could buy a put purely for speculative reasons, hoping that the stock price will fall and therefore increase the value of the long put option.

A is incorrect. The payoff of a put option cannot be negative. The worst-case scenario for a put option holder is that the option expires worthless (i.e., the stock price is above the strike price), in which case the payoff is zero, not negative.

B is incorrect. A zero payoff would only be the case if the stock price at expiration was equal to the strike price. In this case, the stock price at expiration (\$42) is lower than the strike price (\$59), so the put option has value and the payoff is positive. Traders buy put options when they expect the stock price to fall. The put buyer's potential loss is limited to the premium paid for the option, while the potential gain increases as the stock price falls. The put seller, on the other hand, faces potentially unlimited losses if the stock price falls significantly, while their potential gain is limited to the premium received from the put buyer.

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (b): Determine the value at expiration and profit from a long or a short position in a call or put option.

Q.1039 How should the correlation between the interest rate and a futures contract be to result in a positive difference between the price of this contract and an equivalent forward contract?

- A. 0.
- B. Positive.
- C. Negative.

The correct answer is **B**.

For the price of a futures contract to be greater than the price of an otherwise equivalent forward contract, the interest rate should be positively correlated with the futures contract. That's because rising prices lead to futures profits that are reinvested in periods of rising interest rates, leading to high profits for future contracts as compared with the forward contracts.

A is incorrect. A correlation of 0.0 between the interest rate and the futures contract implies that there is no relationship between the two variables. In such a scenario, changes in interest rates have no systematic effect on the futures contract prices, and thus, there would be no specific reason for the futures contract price to be higher than that of an equivalent forward contract. The absence of correlation means that the futures profits cannot be systematically reinvested at higher rates to yield additional returns, which is crucial for creating a price difference favoring the futures contract over the forward contract.

C is incorrect. A negative correlation between the interest rate and the futures contract suggests that as interest rates rise, the value of the futures contract tends to decrease, and vice versa. In this scenario, any profits from the futures contract would likely be reinvested at lower interest rates, assuming the profits are realized in a period of falling interest rates as per the negative correlation. This would lead to lower overall returns on the futures contract compared to a scenario where the correlation is positive. Therefore, a negative correlation would not result in a higher price for the futures contract relative to an equivalent forward contract. Instead, it could potentially diminish the attractiveness of the futures contract due to the adverse impact of falling interest rates on reinvestment opportunities.

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (c): Contrast forward commitments with contingent claims.

Q.1040 What is *most likely* the difference between a fixed-for-floating swap and an equivalent series of forward contracts?

- A. The payment dates would be unlikely to match.
- B. All the fixed-rate payments in a swap are equal.
- C. The floating-rate payments in a swap are unknown.

The correct answer is **B**.

The difference between a fixed-for-floating swap and an equivalent series of forward contracts is that the fixed-rate payments in a swap are equal.

A is incorrect. While it is true that matching payment dates can be a logistical challenge in financial transactions, this is not a defining difference between swaps and forward contracts. Both swaps and forward contracts can be structured to have matching or differing payment dates, depending on the specific terms agreed upon by the parties involved. Therefore, the potential mismatch in payment dates does not inherently distinguish a fixed-for-floating swap from a series of forward contracts.

C is incorrect. The floating rate is typically tied to a benchmark interest rate (such as LIBOR, now being replaced by SOFR in many jurisdictions), which can fluctuate over time based on market conditions. The uncertainty of future interest rate movements means that the exact amount of the floating-rate payments will be determined at specified intervals throughout the life of the swap, based on the prevailing level of the benchmark rate. This variability contrasts with the fixed-rate payments, which are known and constant, highlighting a fundamental aspect of risk and uncertainty in swaps that involve floating rates.

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (c): Contrast forward commitments with contingent claims.

Q.1049 Which of the following *best* describes a forward commitment?

- A. A forward commitment is a claim (to a payoff) that depends on a particular event.
- B. A forward commitment is a legally binding promise to perform some action in the future.
- C. A forward commitment is a contingent claim that depends on a stock price at some future date.

The correct answer is **B**.

A forward commitment is a legally binding promise to perform some action in the future. Forward commitments include forward contracts, futures contracts, and swaps.

A is incorrect. A claim (to a payoff) that depends on a particular event is known as a contingent claim.

C is incorrect. A contingent claim dependent on a stock price at some future date is known as an option.

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (c): Contrast forward commitments with contingent claims.

Q.1050 Which of the following *best* describes an option contract?

- A. An option contract is a legally binding promise to perform some action in the future.
- B. An option contract is a contingent claim that depends on a stock price at some future date.
- C. An option contract is a legal agreement to buy or sell a financial instrument at a predetermined price at a specified time.

The correct answer is **B**.

An option also referred to as a contingent claim or option contract is a financial instrument that gives one party the right, but not the obligation, to buy or sell an underlying asset from or to another party at a fixed price over a specific period of time. In this case, an option contract is a contingent claim that depends on a stock price at some future date.

A is incorrect. In an option there is a right to perform some action but no obligation.

C is incorrect. There is no legal obligation to buy or sell. The holder of the option has the right but no obligation to buy or sell.

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (c): Contrast forward commitments with contingent claims.

Q.1051 A futures contract can *most likely* be categorized as:

- A. Customized.
- B. A contingent claim.
- C. A forward commitment.

The correct answer is **C**.

A forward commitment is a contractual agreement to carry out a transaction in the future. A futures contract is an example of a forward commitment because both the buyer and the seller have to abide by the contractual agreement and transact as planned. In other words, the transaction between the buyer and the seller is not preconditioned on certain future events.

Swaps and forward contracts are also forward commitments.

B is incorrect. A futures contract does not qualify as a contingent claim. The payoff in a contingent claim is dependent on the occurrence of a future event. Contingent claims confer the right to transact, but not the obligation. Options are an example of contingent claims.

A is incorrect. Futures contracts are standardized contracts while forward contracts are customized.

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (c): Contrast forward commitments with contingent claims.

Q.1054 A call option *most likely* gives:

- A. The right but not the obligation to sell an asset at a predetermined price.
- B. The right but not the obligation to buy an asset at a predetermined price.
- C. The obligation but not the right to buy an asset at a predetermined price.

The correct answer is **B**.

A call option gives the owner (holder) the right but not the obligation to buy the underlying asset at a predetermined price.

A is incorrect. It is a put option that will give the owner the right but not the obligation to sell an asset at a pre-determined price.

C is incorrect. Options give the right to transact but not the obligation.

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (b): Determine the value at expiration and profit from a long or a short position in a call or put option.

Q.1056 A European option *most likely*:

- A. Can be exercised only at the contract's expiration date.
- B. Can be exercised before expiration but only on set dates.
- C. Can be exercised at any time up to and including the contract's expiration date.

The correct answer is **A**.

European options can be exercised only at the contract's expiration date.

C is incorrect. American options can be traded at any time, before and including the contract's expiration date.

B is incorrect. Bermuda options are a restricted form of the American option that allows for early exercise but only at set dates.

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (a): Define forward contracts, futures contracts, swaps, options (calls and puts), and credit derivatives and compare their basic characteristics.

Q.1073 A put option *most likely* gives:

- A. The obligation to buy an underlying asset at a specified strike price prior to or on a specified date.
- B. The right but not the obligation to buy an underlying asset at a specified strike price prior to or on a specified date.
- C. The right but not the obligation to sell an underlying asset at a specified strike price prior to or on a specified date.

The correct answer is **C**.

A put option gives the holder the right but not the obligation to sell the underlying asset at a specified strike price prior to or on a specified date.

B is incorrect. A call option gives the holder the right but not the obligation to buy the underlying asset at a specified strike price prior to or on a specified date.

A is incorrect. An option gives the holder the right but not the obligation to buy or sell the underlying asset at a specified price prior to or on a specified date.

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (b): Determine the value at expiration and profit from a long or a short position in a call or put option.

Q.1133 Which of the following derivative contracts may *most likely* expose the owner of the contract to default risk?

- A. Swap contract.
- B. Option contract.
- C. Futures contract.

The correct answer is **A**.

Forwards and swaps are initiated against a counterparty and expose the holder to default risk if the counterparty refuses to honor their obligation.

Futures and most options are exchange-traded instruments and do not carry default risk since the clearinghouse acts as the counterparty to both parties.

B is incorrect. Exchange-traded options are cleared through a central clearinghouse that acts as the counterparty to both the buyer and the seller, effectively mitigating the risk of default. The clearinghouse ensures the integrity of the market by requiring participants to post margins and by regularly marking positions to market. Therefore, while there may be market risk associated with the performance of the underlying asset, the risk of counterparty default is substantially reduced in exchange-traded options.

C is incorrect. Futures contracts, like exchange-traded options, are standardized contracts that are traded on regulated exchanges and cleared through a central clearinghouse. This structure significantly reduces the default risk for participants. The clearinghouse guarantees the performance of each contract, stepping in if a party defaults, thereby insulating participants from counterparty risk. Additionally, the daily settlement and margin requirements associated with futures contracts further mitigate the risk of default. As a result, while futures contracts may carry market risk related to fluctuations in the underlying asset's price, the risk of counterparty default is minimal.

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (a): Define forward contracts, futures contracts, swaps, options (calls and puts), and credit derivatives and compare their basic characteristics.

Q.1134 The party in a forward transaction who agrees to deliver the physical or financial assets at a specific date *most likely* has a:

- A. Long forward position.
- B. Short forward position.
- C. Neutral forward position.

The correct answer is **B**.

The buyer of a forward contract has a long forward position, and the seller of the forward contract has a short forward position. The seller has a contractual obligation to deliver the physical or financial assets on the date specified in the contract.

A is incorrect. The buyer is essentially betting on the asset's value increasing over time. They are on the receiving end of the transaction, which is the opposite of the obligation held by the party in a short forward position.

C is incorrect. A neutral forward position does not exist in the context of forward contracts. Forward contracts inherently involve a commitment from one party to buy (long position) and another party to sell (short position) the underlying asset at a predetermined future date. The concept of neutrality suggests a lack of commitment or a balanced position, which does not apply to forward contracts as they necessitate clear obligations from both parties involved.

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (c): Contrast forward commitments with contingent claims.

Q.1135 Which of the following factors *most likely* differentiates futures contracts from forward contracts?

- A. Futures contracts trade on regulated markets.
- B. The value of a futures contract is derived from its underlying asset.
- C. Forwards contracts require physical assets for settlement, not cash.

The correct answer is **A**.

Futures contracts trade on regulated exchange markets such as the Chicago Board of Exchange, the Eurex Exchange, the New York Board of Trade, etc. On the other hand, forwards contracts are unregulated and trade over the counter.

C is incorrect. Both forward and futures contracts can be settled by both cash and physical delivery of the underlying assets.

B is incorrect. Both forward and futures contracts are derivatives. Derivatives derive their value from the value of the underlying assets.

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (a): Define forward contracts, futures contracts, swaps, options (calls and puts), and credit derivatives and compare their basic characteristics.

Q.1140 In order to protect themselves from the downside risk of stock prices, investors should *most likely*:

- A. Buy put options.
- B. Sell put options.
- C. Buy call options.

The correct answer is **A**.

Long put options give the owner the right, but not obligation to sell the underlying asset at a given price (strike price) when the price of asset is lower than the strike price. This protects investors from downside risk because the option gains value when the underlying asset's price drops.

B is incorrect. When selling a put option, an investor expects the stock to stay flat or rise above the stock price making the put worthless.

C is incorrect. The buyer of a call option purchases a call option with the hope that the price will rise beyond the strike price and before the expiration date.

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (b): Determine the value at expiration and profit from a long or a short position in a call or put option.

Q.1151 A derivative instrument that enables an investor to lock a certain interest rate for future borrowing or lending is *most likely* called:

- A. A credit interest swap.
- B. An interest rate contract..
- C. A forward rate agreement.

The correct answer is **C**.

A forward rate agreement (FRA) is a derivative that allows the investor to lock in a certain rate for borrowing or lending funds at a future date. It involves two parties exchanging a fixed rate for a variable one on a notional principal. The party that pays the fixed rate is known as the borrower. The party that pays the variable rate is known as the lender.

A is incorrect. A credit interest swap, which might be confused with an interest rate swap, is not a recognized financial instrument for locking in future interest rates. Interest rate swaps involve exchanging interest rate cash flows between two parties based on a specified notional amount, but they do not lock in borrowing or lending rates for future transactions in the same way an FRA does. The term "credit interest swap" seems to be a misnomer or confusion with credit default swaps or interest rate swaps, neither of which serves the specific purpose of locking in a borrowing or lending rate for a future date.

B is incorrect. An interest rate contract is a broad term that could encompass various types of derivatives, including FRAs, swaps, options, and futures that deal with interest rates. However, this choice is too vague and does not specifically describe an instrument designed to lock in a borrowing or lending rate for a future transaction. Forward rate agreements are a more precise category of interest rate contracts tailored for this purpose.

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (c): Contrast forward commitments with contingent claims.

Q.1152 Which of the following derivative instrument is more standardized and liquid?

- A. Futures.
- B. Forwards.
- C. Credit swaps.

The correct answer is **A**.

Futures and options trade on exchanges. Derivatives that trade on exchanges have higher standardization, higher liquidity, and less counterparty risk. Forwards and swaps trade over-the-counter and are therefore less standardized.

B is incorrect. Forwards are private agreements between two parties and are traded over-the-counter (OTC), not on exchanges. This means that each forward contract can be customized to the specific needs of the counterparties, leading to a lack of standardization. While this customization can be beneficial for meeting specific hedging requirements, it also results in lower liquidity compared to futures. The OTC nature of forwards means there is also a higher counterparty risk, as there is no centralized clearinghouse to guarantee the performance of the contract.

C is incorrect. Credit swaps, specifically credit default swaps (CDS), are also traded over-the-counter and allow one party to transfer the credit risk of an underlying asset to another party. Like forwards, credit swaps are highly customizable, which can limit their liquidity compared to exchange-traded instruments. The OTC trading of credit swaps also introduces counterparty risk, as the failure of one party to meet its obligations can lead to significant losses for the other party. While the market for credit swaps is significant, it does not match the standardization and liquidity found in the futures market.

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (a): Define forward contracts, futures contracts, swaps, options (calls and puts), and credit derivatives and compare their basic characteristics.

Q.1154 Rabi Koch took a long position in a March put option with a strike price of \$65. What is the outcome of the position if the spot price is \$78 at expiration?

- A. \$0 payoff.
- B. \$13 positive payoff.
- C. \$13 negative payoff.

The correct answer is **A**.

Since the spot price is higher than the strike price of the put option, the option is out-of-the-money. The payoff to the option buyer is 0, i.e.

$$P_T = \max(0, X - S_T) = \max(0, 65 - 78) = 0$$

A note on puts

A short put refers to the opening of an options trade by selling or writing a put option. The trader who buys the put option is said to be long (holds the long position), and the trader who writes the option is said to be short (holds the short position).

For the long position (buyer), the option is in-the-money (ITM) if and only if the prevailing spot price at expiry is less than the strike price. In such circumstances, the buyer would be able to "cut" their loss by selling the underlying at the strike price which would be considerably higher than the prevailing market price. Buyers of puts are bearish, i.e, they expect the underlying to lose value over time.

B is incorrect. This would only be the case if the spot price were below the strike price, making the option in-the-money. However, with the spot price at \$78 and the strike price at \$65, the option is out-of-the-money, and there is no incentive for the option holder to exercise the option, resulting in a \$0 payoff.

C is incorrect. The holder has the right but not the obligation to exercise the option. Therefore, the worst outcome for the holder is a \$0 payoff, not a negative value.

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (b): Determine the value at expiration and profit from a long or a short position in a call or put option.

Q.1158 What is the intrinsic value for the buyer of one hundred \$37 call options on shares of MZJ Corp if the underlying shares are trading at \$35?

- A. \$0.
- B. \$2.
- C. \$200.

The correct answer is **A**.

Since the strike price of the call options on MZJ Corp. is higher than the spot price, the value of the option is

$$\$0(S - X < 0 \text{ or } 35 - 37 < -3)$$

Note: Value of a call option = $\text{Max}(0, S_t - X)$

Value of a put option = $\text{Max}(0, X - S_t)$

Where S_t is price of the underlying stock and X is the strike price.

B is incorrect. It suggests that the intrinsic value of the call options is \$2. This would imply that the market price of the underlying shares is higher than the strike price by \$2, which is not the case here. The market price is actually lower than the strike price, making the intrinsic value \$0.

C is incorrect. It suggests that the intrinsic value of the call options is \$200. This interpretation might arise from misunderstanding the calculation of intrinsic value or misapplying the number of options to the calculation. The intrinsic value is determined per option contract and not by the total number of contracts or the total potential profit or loss from exercising all contracts. In this case, since the intrinsic value per option is \$0, regardless of the number of options held, the total intrinsic value remains \$0.

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (b): Determine the value at expiration and profit from a long or a short position in a call or put option.

Q.1245 Which of the following instruments *most likely* gives the right but not the obligation to a commodities investor to purchase the underlying commodities?

- A. Futures.
- B. Options.
- C. Forwards.

The correct answer is **B**.

Options give the right but not the obligation to an investor to buy or sell the underlying commodities. Futures and forwards are obligations to buy or sell a specific amount of a given commodity at a fixed price, location, and date in the future.

A is incorrect. Futures contracts obligate the buyer to purchase, and the seller to sell, a specific quantity of a commodity at a predetermined price on a specified date in the future. Unlike options, futures contracts carry an obligation to execute the transaction, which means both parties must fulfill the terms of the contract regardless of the market conditions at the time of settlement. This characteristic of futures contracts exposes investors to potentially unlimited losses if the market moves against their position, making it a more risky instrument compared to options.

C is incorrect. Forwards are similar to futures in that they are contracts to buy or sell a commodity at a predetermined price on a specified future date. However, forwards are private agreements between two parties and are not traded on an exchange, making them customizable but also subject to counterparty risk. Like futures, forwards carry an obligation to execute the transaction, which distinguishes them from options that offer the right but not the obligation to buy or sell the underlying commodity. This fundamental difference makes forwards and futures more suitable for hedging purposes, while options are often used for both hedging and speculative purposes due to their flexibility.

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (a): Define forward contracts, futures contracts, swaps, options (calls and puts), and credit derivatives and compare their basic characteristics.

Q.3348 In contrast to interest rate options, forward rate agreements (FRAs) *most likely*:

- A. Impose obligations on the counterparties.
- B. Are contracts with an interest rate as the underlying.
- C. Are usually offered for purchase and sale by different dealers.

The correct answer is **A**.

FRAs represent a commitment to make one interest payment and receive another at a future date. Thus the contract imposes obligations on both sides of the agreement.

The underlying in both agreements is an interest rate. FRAs and interest rate options are offered for purchase and sale by the same dealers.

B is incorrect. Suggesting that interest rate options impose obligations on the counterparties is misleading. Unlike FRAs, interest rate options give the holder the right, but not the obligation, to enter into an interest rate transaction at a predetermined rate. This fundamental difference means that the holder of an interest rate option can choose whether to exercise the option based on the prevailing market conditions, providing a level of flexibility and risk management that is not available with FRAs.

C is incorrect. Stating that FRAs are usually offered for purchase and sale by different dealers does not accurately capture the nature of these financial instruments. Both FRAs and interest rate options are typically available through a wide range of financial institutions, including banks, investment firms, and specialized derivatives dealers. The availability of these products across various dealers allows for a competitive and liquid market, enabling participants to find counterparties for their transactions with relative ease. The key distinction between FRAs and interest rate options lies not in their availability or the entities offering them, but in their contractual obligations and the rights they confer to the involved parties.

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (c): Contrast forward commitments with contingent claims.

Q.3352 Which of the following best describes a distinguishing feature of an equity swap relative to an interest rate or currency swap? In an equity swap, the payment is not known until the end of the settlement period whereas in a (an):

- A. Currency swap all payments are known at the beginning of the period.
- B. Interest rate swap all payments are known at the beginning of the period.
- C. Interest rate or currency swap all payments are known at the beginning of the period.

The correct answer is **B**.

In an equity swap, the payment is not known until the end of the settlement period.

Similarly, currency swap payments are not known until the end of the settlement period. The exchange rate keeps on changing up until the settlement date.

In an interest rate swap, however, all payments are known at the beginning of the period. In other words, both the fixed and floating payments are known at the beginning of each period. The floating rate is set in advance and paid in arrears.

A is incorrect. This option suggests that in a currency swap, all payments are known at the beginning of the period. However, this is not accurate. Currency swaps involve exchanging principal and interest payments in one currency for principal and interest payments in another currency. The exchange rates at the time of the initial exchange are known, but future cash flows depend on interest rate fluctuations in the respective currencies.

C is incorrect. It generalizes both interest rate and currency swaps. While the fixed payments in an interest rate swap are known in advance, the floating payments are known at the start of each settlement period. In currency swaps, the interest payments depend on the prevailing interest rates in the respective currencies, and thus, not all payments are known at the beginning of the period.

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (a): Define forward contracts, futures contracts, swaps, options (calls and puts), and credit derivatives and compare their basic characteristics.

Q.3366 In contrast to contingent claims, forward commitments:

- A. Limit losses in one direction.
- B. Obligate the counterparties to transact on pre-agreed terms.
- C. Generate an outcome that is determined at the contract expiration date.

The correct answer is **B**.

Contingent claims give the right to transact but not the obligation. The holder of the contingent claim has the option as to whether to transact or not.

Forward commitments, on the other hand, require both parties to transact in the future at a pre-specified terms. The parties have to transact, they are **obligated** to do so. The parties and the identity and quantity of the underlying are specified as well as the date of the future transaction (expiration) and the nature of the settlement.

A is incorrect. Forward commitments do not limit losses in one direction but actually have a linear payoff. As the underlying goes up (down) the derivative gains (loses). Contingent claims are different because they limit losses in one direction. What's more, options can pay off as the underlying tumbles. Therefore, they transform the payoff profile of the underlying asset.

C is incorrect. The outcome of a forward contract (buying or selling price) is agreed upon on the contract initiation date.

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (c): Contrast forward commitments with contingent claims.

Q.3373 Consider the following statement: “A currency swap exposes parties to two sources of risk – interest rate risk and currency risk – but provides protection against default risk.” The statement is *least likely* correct with respect to:

- A. Default risk.
- B. Currency risk.
- C. Interest rate risk.

The correct answer is **A**.

A currency swap involves two parties making interest payments to each other in different currencies. Therefore, a currency swap has two sources of risk – interest rate and currency risk. Because the parties are making payments directly to each other and there is no clearinghouse to guarantee payments, this type of swap also exposes them to default risk.

B is incorrect. The swap involves exchanging principal and/or interest payments in different currencies. The value of these currencies can fluctuate relative to each other due to various factors, including changes in exchange rates, economic conditions, and monetary policy. These fluctuations can affect the amount of payments when converted into the home currency, leading to potential losses or gains. Therefore, currency risk is an inherent part of currency swaps and must be carefully managed.

C is incorrect. Interest rate risk is another real risk associated with currency swaps. This risk stems from the possibility that interest rates may change, affecting the value of the fixed or floating interest payments exchanged between the parties. For swaps involving fixed interest rates, a rise in interest rates can decrease the value of the fixed payments, leading to potential losses. Conversely, for swaps with floating interest rates, fluctuations in the reference rate can lead to variability in payment amounts. Thus, interest rate risk is a significant concern in currency swaps, impacting the cost and benefits of the swap for the parties involved.

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (b): Determine the value at expiration and profit from a long or a short position in a call or put option.

Q.3388 A forward rate agreement (FRA) *most likely*:

- A. Eliminates a lender's exposure to default risk.
- B. Creates the ability to speculate on interest rates.
- C. Trades on exchanges such as the CME, CBOE, and Eurex.

The correct answer is **B**.

An FRA is a contract in which the underlying is an interest rate.

A is incorrect. The lender of the loan is not exposed to default risk as the borrower locks in the rate at which he will receive payments and pass on to the lender.

C is incorrect. FRAs trade on over-the-counter markets. Only exchange-traded derivatives trade on the CME, CBOE, and Eurex.

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (c): Contrast forward commitments with contingent claims.

Q.3389 Which of the following derivatives will involve one party paying a variable series of cash flows determined by an asset or rate?

- A. Swap contract.
- B. Option contract.
- C. Futures contract.

The correct answer is **A**.

A swap contract is a contract in which one party agrees to pay a variable series that will be determined by an underlying asset or rate while the other party either pays 1) a variable series determined by a different underlying asset or rate or 2) a fixed series.

B is incorrect. An option contract gives the holder the right but not the obligation to transact at a pre-determined price and time.

C is incorrect. A futures contract is an exchange-traded derivative between two parties to trade a commodity at a specified time in the future at a pre-determined price.

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (a): Define forward contracts, futures contracts, swaps, options (calls and puts), and credit derivatives and compare their basic characteristics.

Q.3893 Consider a call option with a premium of \$21 and a strike price of \$198. What is the maximum possible profit for the writer of the call?

- A. \$21.
- B. \$177.
- C. \$198.

The correct answer is **A**.

The greatest profit the writer can make is the \$21 premium. That's achievable when the price of the underlying at expiry is less than or equal to \$198. The writer of an option only makes a profit below or equal to the premium that he sells the option for.

B is incorrect. Suggesting a maximum profit of \$177 for the writer of the call option misunderstands the nature of options trading. The profit for the writer of a call option is capped at the premium received, regardless of how much the market price of the underlying asset may fall below the strike price. The figure of \$177 seems to mistakenly consider the difference between the strike price and the premium, which is not relevant to calculating the writer's profit.

C is incorrect. It disregards the fact that the writer's profit is limited to the premium received. The strike price of the option does not directly influence the maximum profit for the writer; rather, it determines the price at which the option can be exercised. The premium, in this case, \$21, is the only income the writer receives and thus represents the maximum profit.

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (b): Determine the value at expiration and profit from a long or a short position in a call or put option.

Q.3895 In a credit default swaps (CDS), the short position is betting on:

- A. The borrower defaulting.
- B. The borrower not defaulting.
- C. The long position not defaulting.

The correct answer is **B**.

The CDS seller (short position) will receive compensation in the form of premium income and in return agrees to pay out a percentage of the notional amount if a credit event occurs.

The long position is taken by the protection buyer, who has no outstanding obligation but is actually owed by the bond issuer.

A is incorrect. This option suggests that the short position in a CDS is betting on the borrower defaulting. This is a misunderstanding of the roles within a CDS contract. In reality, it is the buyer of the CDS (long position) who is hedging against or betting on the default of the borrower. The buyer pays premiums to the seller (short position) in exchange for the assurance of compensation in the event of the borrower's default. Thus, the short position benefits when the borrower does not default, as it allows them to collect premiums without having to pay out a claim.

C is incorrect. This option misrepresents the nature of a CDS contract by suggesting that the short position is betting on the long position not defaulting. In a CDS, the focus is on the creditworthiness of the reference entity (the borrower), not on the parties to the CDS contract themselves. The long position (buyer) pays premiums to the short position (seller) in anticipation of a potential default by the borrower. The financial health or default risk of the long position is not directly relevant to the contract's primary purpose, which is to transfer the credit risk of the reference entity from the buyer to the seller.

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (a): Define forward contracts, futures contracts, swaps, options (calls and puts), and credit derivatives and compare their basic characteristics.

Q.4128 Companies A and B have entered a swap contract with a notional principal of £256 million. Company A pays a semiannual fixed rate of 5% and receives the 6-month LIBO. If the 6-month LIBO rate is 4.32%, how much money will company B *most likely* pay or receive?

- A. Pay £0.87 million.
- B. Receive £0.87 million.
- C. Receive £256.81 million

The correct answer is **B**.

Company A pays fixed and receives floating. On the other hand, company B receives fixed and pays floating.

Company A owes Company B: $\frac{0.05}{2} \times £256 \text{ million} = £6.4 \text{ million}$

Company B owes company A: $\frac{0.0432}{2} \times £256 \text{ million} = £5.5296 \text{ million}$

Since the fixed amount is greater than the floating amount, company A will give company B the net difference between the two amounts, i.e., £6.4 million – 5.5296 million = £0.87 million

A is incorrect. Since the fixed amount was higher than the floating amount, company B will receive and not pay the £0.8704 million.

C is incorrect. It has been incorrectly obtained by adding the principal amount to the net difference. The principal in a swap contract does not exchange hands.

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (a): Define forward contracts, futures contracts, swaps, options (calls and puts), and credit derivatives and compare their basic characteristics.

Q.4129 Which of the following is *least likely* a linear derivative?

- A. Swaps.
- B. Options.
- C. Forward contracts.

The correct answer is **B**.

Contingent claims, such as options, are considered non-linear derivatives because their payoff profile is asymmetric – losses are limited to one direction. Contingent claims include options, credit derivatives, and asset-backed securities.

A is incorrect. Forward commitments, such as swaps, are called linear derivatives because the price of a forward commitment is a linear function of the underlying.

C is incorrect. Forward commitments, including forward contracts, are linear derivatives because their value changes linearly with the price of the underlying asset.

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (a): Define forward contracts, futures contracts, swaps, options (calls and puts), and credit derivatives and compare their basic characteristics.

Q.4130 Which of the following *best* describes the payoff of a short position in a forward contract if the forward price falls below the underlying price at maturity?

- A. Zero payoff.
- B. Positive payoff.
- C. Negative payoff.

The correct answer is **C**.

If at the expiration date, the current spot price is greater than the forward price [$S_T > F_0(T)$] (or the forward price is less than the underlying price, $F_0(T) < S_T$ the buyer (long) receives a payoff of

$$\text{Payoff} = S_T - F_0(T) > 0$$

Intuitively, the short incurs a loss of $-(S_T - F_0(T)) < 0$ because the seller must deliver an asset at S_T and receive less amount $F_0(T)$.

A and B are incorrect. The following table gives the summary of the outcomes of a forward contract at expiry:

Outcome at Expiry	Buyer(long) Payoff	Seller(short) Payoff
$S_T > F_0(T)$	$[S_T - F_0(T)] > 0$	$[F_0(T) - S_T] < 0$
$S_T < F_0(T)$	$[S_T - F_0(T)] < 0$	$[F_0(T) - S_T] > 0$

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (b): Determine the value at expiration and profit from a long or a short position in a call or put option.

Q.4131 Which of the following is *least likely* correct regarding a futures contract?

- A. No cash changes hands at the futures contract initiation.
- B. Futures contracts are directly executed between the counterparties.
- C. Like a forward contract, the payoff is based on the difference between the futures price and the underlying price at the expiration date.

The correct answer is **B**.

Futures contracts must be executed using specialized financial intermediaries. The Financial intermediary clears and settles payments at the exchange on behalf of the counterparties.

A is incorrect. Like forward contracts, no cash changes hands at the initiation of the futures contract. However, both counterparties must deposit the initial *margin* into a *futures margin account* at the exchange.

C is incorrect. At the expiration of the futures contract, the payoff is based on the difference between the futures price and the underlying price

$$\text{Payoff} = S_T - f_0(T)$$

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (b): Determine the value at expiration and profit from a long or a short position in a call or put option.

Q.4132 Which of the following *least likely* distinguishes a futures contract from a forward contract?

- A. Initial cash outlay.
- B. Mark-to-market process.
- C. Margining requirements.

The correct answer is **A**.

Like forward contracts, no cash is exchanged at futures contract initiation. However, in futures contracts both counterparties must deposit the initial margin into a futures margin account at the exchange.

B and C are incorrect. Margining and daily settlements (mark-to-market) distinguish futures contracts from forward contracts.

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (a): Define forward contracts, futures contracts, swaps, options (calls and puts), and credit derivatives and compare their basic characteristics.

Q.4133 Which of the following is *most likely* associated with a margin call?

- A. Initial margin.
- B. Maintenance margin.
- C. Variation margin.

The correct answer is **C**.

When the futures margin account funds fall below the maintenance margin, the seller typically receives a margin call to top up the account back to the initial margin requirement. The added sum to replenish the futures margin account is the variation margin, which represents the change in the value of the futures contract from the time it was entered into until the time of the margin call.

A is incorrect. A minimum amount of money is deposited by both counterparties to settle the daily mark to market.

B is incorrect. The maintenance margin is the amount (lower than the initial margin) that each party must maintain in the margin account from the initiation to the maturity of the trade.

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (b): Determine the value at expiration and profit from a long or a short position in a call or put option.

Q.4134 Devco Construction limited enters a 3-month Futures contract on an exchange through a financial intermediary to buy 1,000 barrels of gasoline at USD 78 per barrel. The exchange requires an initial margin of USD 2,340 per futures contract and a maintenance margin of USD 2,280 per contract. If, at first today's close, the futures price is USD 77.80 per barrel, the Devco's margin account balance for the day is *closest to*:

- A. USD 200
- B. USD 2,140
- C. USD 2,540

The correct answer is **B**.

Since at the day's close, the futures price is USD 77.80 per barrel, Devco (buyer) realizes a loss of

$$\text{Loss} = (78 - 77.80) \times 1,000 = \text{USD } 200$$

As such, Devco's margin account and ending balance of

$$\text{Ending balance for the day} = \text{USD } 2,340 - \text{USD } 200 = \text{USD } 2,140$$

A is incorrect. It is the day's MTM loss by the Devco company.

C is incorrect. It adds the day's MTM loss to the initial margin.

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (b): Determine the value at expiration and profit from a long or a short position in a call or put option

Q.4136 Which of the following is *most likely* true regarding a short position in a put option?

- A. The profit is equal to the put option premium if the underlying price falls below the exercise price.
- B. The profit is equal to the put option premium if the underlying price exceeds the exercise price.
- C. Has counterparty credit risk to the long position once the option premium has been paid

The correct answer is **B**.

Recall that for a put option, the buyer has the right but not an obligation to exercise the option at expiry. Exercising the option means that at expiration, the buyer sells the underlying S_T at the exercise price X . As such, the put option is only exercisable if $S_T < X$.

As such, if the underlying price is greater than the exercise price at maturity, the option expires worthless, and thus the profit to the put option seller (short) is equal to zero, as shown below:

$$\begin{aligned}\Pi &= -(\max(0, X - S_T)) + p_0 \\ &= -(0) + p_0 \\ &= p_0\end{aligned}$$

A is incorrect. If the underlying price falls below the exercise price, the put option is exercisable, and as such, the profit is not equal to the premium as shown below:

$$\begin{aligned}\Pi &= -(\max(0, X - S_T)) + p_0 \\ &= -(X - S_T) + p_0 \neq p_0\end{aligned}$$

C is incorrect. An option seller is not exposed to counterparty credit risk once the option buyer pays the upfront option premium.

CFA Level I, Derivatives, Learning Module 2: Forward Commitment and Contingent Claim Features and Instruments. LOS (b): Determine the value at expiration and profit from a long or a short position in a call or put option.

Learning Module 3: Derivative Benefits, Risks, and Issuer and Investor Uses

Q.1139 Which of the following is *most likely* a benefit of investing in derivatives markets?

- A. Derivatives markets are highly leveraged.
- B. Derivatives markets provide risk-free return.
- C. Derivatives markets distribute risk among market participants.

The correct answer is **C**.

The benefits of the derivatives markets are:

1. The market aids in price discovery. The futures price of oil, for instance, can be thought of as a forecast of the future spot price.
2. Derivatives have lower transaction costs than transacting in the equivalent underlying asset.
3. Derivatives also help to distribute risk among different participants, thus ensuring the long-term stability of financial markets.

A is incorrect. While it is true that derivatives markets are highly leveraged, which can amplify gains, it also significantly increases the risk of losses. Leverage allows investors to gain a large exposure to a financial asset with a relatively small initial investment. However, this can lead to substantial losses if the market moves against the investor's position. Therefore, high leverage is not inherently a benefit of investing in derivatives markets; rather, it is a feature that must be carefully managed to avoid excessive risk.

B is incorrect. Suggesting that derivatives markets provide a risk-free return is misleading. All investments, including derivatives, carry some level of risk. Derivatives are complex financial instruments that can be used for hedging purposes, which might reduce risk, but they can also be used for speculative purposes, which can significantly increase risk. It is crucial for investors to understand these risks and manage them appropriately.

CFA Level I, Derivatives, Learning Module 3: Derivative Benefits, Risks, and Issuer and Investor Uses. LOS (a): Describe the benefits and risks of derivative instruments.

Q.3358 “Derivatives have benefits relative to trading the underlying.” Which of the following would *least likely* refute the above statement?

- A. Higher transaction costs
- B. The use of a large amount of leverage
- C. Increase in the amount of speculative trading

The correct answer is **A**.

Derivatives have lower transaction costs relative to trading directly the underlying.

The other two options talk about the other benefits that come with derivatives.

B is incorrect. The use of a large amount of leverage is indeed a characteristic of derivatives that can amplify both gains and losses. While leverage allows investors to gain a larger exposure to the market with a relatively small amount of invested capital, it also increases the risk of significant losses. This aspect of derivatives could be seen as a drawback rather than a benefit, especially for investors who do not properly manage risk.

C is incorrect. An increase in the amount of speculative trading is another aspect of derivatives that could be viewed negatively. While derivatives can be used for hedging and risk management, they are also widely used for speculative purposes. Speculative trading can lead to increased volatility in the markets and can contribute to the formation of asset bubbles and subsequent crashes.

CFA Level I, Derivatives, Learning Module 3: Derivative Benefits, Risks, and Issuer and Investor Uses. LOS (a): Describe the benefits and risks of derivative instruments.

Q.3370 Speculation through derivatives has a destabilizing consequence on markets as:

- A. Speculators employ high levels of leverage.
- B. Speculators are thought to engage in price manipulation.
- C. Derivatives are highly complex and easily misunderstood.

The correct answer is **A**.

Speculation through derivatives has a destabilizing consequence on markets as speculators use large amounts of leverage, thereby subjecting themselves and their creditors to substantial risk. If markets do not move in the hoped-for-direction, defaults by speculators can lead to defaults by their creditors and their creditors' creditors, and so on. The effects can be systematic and reflect an epidemic contagion whereby instability can spread throughout markets and the economy.

B is incorrect. While speculators are thought to engage in price manipulation and trade at extreme prices, this act does not have a destabilizing effect on the market.

C is incorrect. The highly complex nature of derivatives means they require a high level of understanding. This single fact has caused many to distrust derivatives.

CFA Level I, Derivatives, Learning Module 3: Derivative Benefits, Risks, and Issuer and Investor Uses. LOS (a): Describe the benefits and risks of derivative instruments.

Q.4137 Which of the following is *least likely* a way derivative markets lead to efficient financial markets?

- A. Offering an effective way to exploit mispricing.
- B. Reflecting fundamental values earlier in the derivative market than in the cash market.
- C. Providing a price discovery function outside cash or spot markets.

The correct answer is **C**.

Providing a price discovery function outside cash or spot markets is a benefit of derivative instruments but not explicitly related to market efficiency.

A and B are incorrect. Offering an effective way to exploit mispricing and reflecting fundamental values earlier in the derivative market than in the cash market contribute to market efficiency.

CFA Level I, Derivatives, Learning Module 3: Derivative Benefits, Risks, and Issuer and Investor Uses. LOS (b): Compare the use of derivatives among issuers and investors.

Q.4138 Which of the following is *least likely* an operational advantage of derivatives?

- A. Lower transaction costs.
- B. High liquidity.
- C. High upfront cash requirements.

The correct answer is **C**.

Cash market transactions refer to the buying and selling of assets, such as stocks or commodities, at their current market price. In these transactions, the buyer pays the full cost of the asset at the time of purchase.

Derivatives, on the other hand, are financial instruments whose value is derived from an underlying asset, such as a stock or commodity. Examples of derivatives include options and futures contracts.

Compared to cash market transactions, derivatives are typically associated with lower initial costs. This is because when trading derivatives, investors are only required to put up a small percentage of the total value of the contract as collateral, known as the "initial margin." This is in contrast to cash market transactions, where the full value of the asset must be paid upfront.

Additionally, derivatives also have lower premiums compared to cash market transactions. Premiums refers to the upfront cost of an option or futures contract. This is because derivatives have a built-in leverage, allowing investors to gain exposure to the underlying asset at a fraction of the cost of buying it outright in the cash market.

It's important to note that while the initial margin and premiums may be lower, derivatives also carry a higher level of risk, as the value of the contract is dependent on the performance of the underlying asset. It's important to understand the nature of the underlying asset, the terms and conditions of the derivatives contracts and the level of risk associated before investing in derivatives.

A and C are incorrect. Lower transaction costs and high liquidity are both operational advantages of derivatives.

CFA Level I, Derivatives, Learning Module 3: Derivative Benefits, Risks, and Issuer and Investor Uses. LOS (a): Describe the benefits and risks of derivative instruments.

Q.4139 Which of the following is *least likely* a way in which counterparty credit risk can vary with different derivatives instruments and markets?

- A. Over-the-counter markets are associated with low counterparty risk due to the mark-to-market process and margining procedures.
- B. Exchange-traded derivatives are associated with low counterparty risk due to the mark-to-market process and margining procedures.
- C. Counterparty credit risk is prevalent in over-the-counter markets due to privately negotiated credit terms between counterparties.

The correct answer is **A**.

Over-the-counter (OTC) markets are generally associated with higher counterparty risk because the trades are privately negotiated between two parties and not cleared through a central counterparty, so there is more potential for default by one of the parties. The mark-to-market process and margining procedures used to mitigate counterparty risk may not be found in OTC markets.

B is incorrect. Exchange-traded derivatives typically have lower counterparty risk because trades are cleared through a central counterparty, which reduces the potential for default by one of the parties. Additionally, the mark-to-market process and margining procedures that are used to mitigate counterparty risk are more effectively enforced in exchange-traded markets.

C is incorrect. Over-the-counter markets entail higher counterparty risk due to the privately negotiated credit terms between the parties involved. This is because the counterparties often have more leeway to negotiate the terms of the trade, and the lack of a central counterparty further increases this risk.

CFA Level I, Derivatives, Learning Module 3: Derivative Benefits, Risks, and Issuer and Investor Uses. LOS (a): Describe the benefits and risks of derivative instruments.

Q.4140 Which of the following is *most likely* an operational benefit of derivative instruments?

- A. Increased liquidity.
- B. Informational discovery.
- C. Greater potential for speculative use.

The correct answer is **A**.

Increased liquidity is one of the four operational benefits of using derivatives. Since less capital is needed to trade derivatives than to hold an equivalent amount of cash in underlying, derivative markets often have more liquidity. The other three operational benefits include low transaction costs, low upfront cash requirements, and a cheaper short position process.

B is incorrect. Information discovery is a benefit of using derivatives but not an operational advantage.

C is incorrect. Greater potential for speculative use is a risk of using derivatives.

CFA Level I, Derivatives, Learning Module 3: Derivative Benefits, Risks, and Issuer and Investor Uses. LOS (a): Describe the benefits and risks of derivative instruments.

Q.4141 Which of the following is *most likely* the use of derivatives by both the issuers and the investors?

- A. Replicating cash market strategy.
- B. Changing exposure to an underlying asset price without transacting in the cash market.
- C. Offsetting or hedging market-based underlying exposures related to commercial operations and financing activities.

The correct answer is **B**.

Both the issuers and investors mainly use it to increase, decrease, or modify exposure to an underlying to meet their financial goals without transacting in the cash market.

A is incorrect. The investors use derivatives to replicate a cash market strategy, but not issuers.

C is incorrect. The issuers use derivatives to offset or hedge market-based underlying exposures related to their commercial operations and financing activities.

CFA Level I, Derivatives, Learning Module 3: Derivative Benefits, Risks, and Issuer and Investor Uses. LOS (b): Compare the use of derivatives among issuers and investors.

Q.4142 Which of the following is *most likely* an example of a fair value hedge?

- A. Selling commodities forward in expectation of lower prices.
- B. An interest rate swap of a floating rate for a fixed debt.
- C. A currency forward to offset the foreign exchange risk of a foreign business operation.

The correct answer is **A**.

Selling commodities forward in anticipation of lower prices is an example of a fair value hedge because a fair value hedge applies when a derivative is deemed to offset the fluctuation in the fair value of an asset or liability.

B is incorrect. It is an example of a cash-flow hedge. A cash flow hedge is a type of hedge designation for derivatives that absorb the variable cash flow of a floating-rate asset or liability, such as foreign exchange, interest rates, or commodities. These hedges may be either forward commitments or contingent claims. Cash flow is used to reduce financial statement volatility by offsetting a hedging instrument (usually a derivative) against a hedged transaction or balance sheet item.

C is incorrect. It is an example of a net investment hedge. A net investment hedge is a type of hedge designation for derivatives used to offset the exchange rate risk of the equity of a foreign operation. This is achieved using either a foreign currency bond or a derivative such as an FX swap or forward. Using a net investment hedge is to reduce financial statement volatility by linking the recognition of derivative gains and losses with their designated risk management purpose.

CFA Level I, Derivatives, Learning Module 3: Derivative Benefits, Risks, and Issuer and Investor Uses. LOS (a): Describe the benefits and risks of derivative instruments.

Learning Module 4: Arbitrage, Replication, and the Cost of Carry in Pricing Derivatives

Q.1141 Arbitrage profit is the risk-free profit that is earned when two securities with different prices have:

- A. Low market liquidity.
- B. Identical cash flows.
- C. Identical term structures.

The correct answer is **B**.

The law of one price states that two securities with identical cash flows should have the same price. Any mispricing in such securities will earn an arbitrage return.

A is incorrect. Market liquidity refers to the ease with which an asset can be bought or sold in the market without affecting its price. While low liquidity can contribute to price discrepancies, it is not a fundamental condition for arbitrage. Arbitrage opportunities arise from price differences in securities with identical cash flows, regardless of the market's liquidity level. In fact, low liquidity can sometimes hinder arbitrage by making it difficult to execute trades quickly at the desired prices.

C is incorrect. The term structure of interest rates, which is the relationship between interest rates or bond yields and different terms or maturities, can influence the pricing of securities. However, the key condition for arbitrage is not identical term structures but identical cash flows. Securities can have the same term to maturity and yet offer different cash flows due to differences in coupon rates, credit quality, or other factors. Therefore, identical term structures alone do not guarantee the presence of an arbitrage opportunity.

CFA Level I, Derivatives, Learning Module 4: Arbitrage, Replication, and the Cost of Carry in Pricing Derivatives. LOS (b): Explain the difference between the spot and expected future price of an underlying and the cost of carry associated with holding the underlying asset.

Q.1147 In the context of commodity forwards and futures contracts, the benefit of holding the commodity and possibly selling it in the midst of a shortage is known as the:

- A. Cost of carry.
- B. Risk premium.
- C. Convenience yield.

The correct answer is **C**.

Convenience yield is the additional value that comes with holding an asset rather than a long forward or futures contract on the asset. For instance, the holder can take advantage of shortages. Jet fuel, for example, has a convenience yield because the holder can sell at higher prices during shortages.

A is incorrect. Cost of carry refers to the costs associated with holding an asset. These could be financial costs or even storage costs.

B is incorrect. The risk premium is an extra return expected by investors for bearing some specified risk.

CFA Level I, Derivatives, Learning Module 4: Arbitrage, Replication, and the Cost of Carry in Pricing Derivatives. LOS (b): Explain the difference between the spot and expected future price of an underlying and the cost of carry associated with holding the underlying asset.

Q.1150 If the cost and benefit of holding a forward contract until expiration is zero, then which one of these is *most likely* the payoff of a long forward contract at expiration?

- A. Spot price at expiration minus forward price.
- B. Forward price minus spot price at expiration.
- C. Spot price at initiation minus the forward price.

The correct answer is **A**.

Recall that a forward contract is an agreement to buy or sell an asset at a predetermined future date for a price agreed upon today (the forward price). If you're long in a forward contract, you've agreed to buy the asset at this predetermined price.

Spot price at expiration minus forward price is the correct representation of the payoff for a long forward contract. At expiration, if you are long, you buy the asset at the forward price ($F_0(T)$), and the asset is worth the spot price at expiration. The difference between these two prices is your payoff.

B is incorrect. It is the reverse of what the payoff for a long forward contract would be. If you are long in a forward contract, your payoff would be the spot price at expiration minus the forward price you agreed to pay (not the other way around).

C is incorrect. This option represents the difference between the initial spot price (S_0) and the forward price at time T ($F_0(T)$). This does not accurately represent the payoff of a long forward contract at expiration, as the relevant prices for calculating payoff are the spot price at expiration, not the initial spot price, and the forward price agreed upon at the start of the contract.

CFA Level I, Derivatives, Learning Module 4: Arbitrage, Replication, and the Cost of Carry in Pricing Derivatives. LOS (b): Explain the difference between the spot and expected future price of an underlying and the cost of carry associated with holding the underlying asset.

Q.3294 A hedge fund analyst is assessing a futures contract with the following characteristics:

Spot price	\$80.96
Interest costs	\$11.90
PV of Convenience yield	\$5.50
PV of Storage costs	\$7.80

The 'cost of carry' for the futures contract is *closest to*:

- A. -\$2.3.
- B. \$13.3.
- C. \$14.2.

The correct answer is **A**.

The cost of carry (or carry) = PV(benefits of holding the asset)– PV(costs of holding the asset).

Hence,

$$\text{The cost of carry (or carry)} = \$5.5 - \$7.8 = \$ - 2.3.$$

B is incorrect. It mistakenly adds the interest costs to the calculation, which is not part of the correct formula for calculating the net cost of carry in this context. The interest costs are a separate component and should not be included in the calculation of the net benefits minus the net costs of holding the asset.

C is incorrect. It represents a misunderstanding of the cost of carry calculation. This does not accurately reflect the true cost of carry for the futures contract.

CFA Level I, Derivatives, Learning Module 4: Arbitrage, Replication, and the Cost of Carry in Pricing Derivatives. LOS (b): Explain the difference between the spot and expected future price of an underlying and the cost of carry associated with holding the underlying asset.

Q.3369 Which of the following conditions will *least likely* make it difficult for the process of arbitrage to correct a mispricing?

- A. The asset class is illiquid.
- B. Transaction costs are high.
- C. Information on asset prices is easily available.

The correct answer is **C**.

If there is a free flow of information, arbitrageurs will know that different prices exist which will in turn facilitate the process of arbitrage. The asset can be purchased in the cheaper market and sold in the more expensive market earning a riskless profit. The combined actions of all parties will push the lower price up and the higher price down until the prices converge.

A is incorrect. Illiquidity will make it difficult to purchase and/or short sell an asset making arbitrage less feasible.

B is incorrect. High transaction costs will make the process of arbitrage, and hence the correction of mispricing, not worthwhile.

CFA Level I, Derivatives, Learning Module 4: Arbitrage, Replication, and the Cost of Carry in Pricing Derivatives. LOS (b): Explain the difference between the spot and expected future price of an underlying and the cost of carry associated with holding the underlying asset.

Q.3379 When the convenience yield exceeds storage costs, the forward transaction will return:

- A. Less than the spot transaction.
- B. More than the spot transaction.
- C. The present value of the forward price.

The correct answer is **A**.

When the convenience yield (benefits) exceeds storage costs, the forward transaction will return less than the spot transactions. The forward price will be adjusted downwards to reflect the net loss over the spot transaction. In other words, acquiring the asset in the forward market would be cheaper because it forgoes the benefits that exceed the costs.

B is incorrect. This misunderstanding might stem from not considering how the forward price is adjusted to reflect the net benefits of holding the asset. In reality, the forward price decreases to account for the higher convenience yield over storage costs, making the forward transaction less lucrative compared to the spot transaction.

C is incorrect. Suggesting that the forward transaction will yield the present value of the forward price does not directly address the impact of the convenience yield exceeding storage costs on the returns of forward versus spot transactions. While it is true that the forward price can be thought of in terms of its present value, this option does not capture the essence of how the excess of convenience yield over storage costs affects the relative attractiveness of forward transactions. The key issue is not the present value per se but how the net convenience yield influences the forward price and, consequently, the returns from engaging in forward transactions.

CFA Level I, Derivatives, Learning Module 4: Arbitrage, Replication, and the Cost of Carry in Pricing Derivatives. LOS (b): Explain the difference between the spot and expected future price of an underlying and the cost of carry associated with holding the underlying asset.

Q.3398 Assuming all else is held constant, when a commodity stock is in short supply, investors can expect a:

- A. Positive cost of carry.
- B. High convenience yield.
- C. Positive expected return.

The correct answer is **B**.

Since the commodity is believed to be short in supply, investors should expect to earn a high convenience yield. In such a scenario, the holder of a commodity has the benefit of holding a commodity if market conditions suggest that the commodity should be sold.

A is incorrect. Assuming all else is held constant, high convenience yields should decrease the cost of carry. The cost of carry measures the net cost of carrying an asset and is equal to storage costs minus convenience yield.

C is incorrect. If the commodity is in short supply, the holders of the commodity may even expect to earn a price premium that is higher than otherwise justifiable in well-functioning financial markets. The spot price of the commodity can rise above the market's expectation of its futures price and result in a negative expected implied return.

CFA Level I, Derivatives, Learning Module 4: Arbitrage, Replication, and the Cost of Carry in Pricing Derivatives. LOS (b): Explain the difference between the spot and expected future price of an underlying and the cost of carry associated with holding the underlying asset.

Q.4143 The spot price of a barrel of oil is \$1,000. A trader enters into a one-year forward contract to purchase oil at a forward price of \$1,200 per barrel. Assuming a no-arbitrage opportunity and a risk-free rate of 10%, the cost of carry associated with the forward contract is *closest to*:

- A. \$90.91
- B. \$100
- C. \$320

The correct answer is **A**.

Considering the cost of carry, the relationship between the spot price and futures price changes as follows:

$$F_0(T) = [S_0 - PV_0(I) + PV_0(C)](1 + r)^T$$

This can be written as:

$$F_0(T) = [S_0 - (PV_0(I) - PV_0(C))](1 + r)^T$$

Clearly,

$$\text{Cost of Carry} = PV_0(I) - PV_0(C)$$

Solve for the cost of carry to get:

$$\text{Cost of Carry} = 1200(1.10)^{-1} - 1,000 = \$90.91$$

B is incorrect. It applies the following reasoning: the oil's forward price, assuming a no-arbitrage opportunity, would have been:

$$F_0(T) = S_0(T)[1 + r]^T = \$1000(1 + 0.1)^1 = \$1,100$$

However, the forward price is \$1,200. It assumes that the cost of carry of \$100 (-1,200 - 1,100).

C is incorrect. It calculates the cost of carry as:

$$\text{Cost of Carry} = 1200(1.10)^1 - 1,000 = \$320$$

CFA Level I, Derivatives, Learning Module 4: Arbitrage, Replication, and the Cost of Carry in Pricing Derivatives. LOS (b): Explain the difference between the spot and expected future price of an underlying and the cost of carry associated with holding the underlying asset.

Q.4144 Two identical assets, assets A and B, have the same spot price. However, asset A has more associated costs than asset B. Assuming that there are no associated benefits in both assets which of the following statements is *most likely* correct regarding the forward prices of forward contracts on assets A and B?

- A. Asset A has a lower forward price than asset B.
- B. Asset A has a higher forward price than asset B.
- C. Assets A has a higher spot price than asset B at maturity.

The correct answer is **B**.

Costs increase an underlying's forward price, whereas benefits reduce an underlying's forward price. Costs are incurred by the underlying owner. These costs will have to be factored in (added) onto the forward price, thereby increasing the forward price, as seen in the formula below.

Denote the costs (**C**) and benefits/income (**I**). Considering the cost of carry, the relationship between the spot price and futures price changes as follows:

$$F_0(T) = [S_0 - PV_0(I) + PV_0(C)](1 + R)^T$$

Where

$F_0(T)$ = Forward price

S_0 = Spot price of the underlying at time $t=0$

$PV_0(I)$ = present value of the associated benefits.

$PV_0(C)$ = present value of the associated costs.

r = risk-free rate of interest.

A is incorrect. Contradicts option B.

A is incorrect. Since assets A and B have the same spot prices, they must have similar spot prices at maturity, assuming no-arbitrage conditions hold. Assume that the spot of the assets is equal to $S_0 = S_A = S_B$ then, based on no-arbitrage conditions, the spot price at maturity S_T is given by:

$$S_T = S_0(1 + r)^T$$

CFA Level I, Derivatives, Learning Module 4: Arbitrage, Replication, and the Cost of Carry in Pricing Derivatives. LOS (b): Explain the difference between the spot and expected future price of an underlying and the cost of carry associated with holding the underlying asset.

Q.4146 Miles discovers an arbitrage opportunity in a market. She notices that the spot share price of a company share is \$70, and a 3-month forward contract on the same shares sells at a forward price of \$74. In order to take advantage of the apparent arbitrage opportunity, Miles borrows money at a risk-free rate of 5% and buys the shares at a price of \$70 per share. At the same time, she takes a short position in the forward contract. Assuming that the asset has no associated costs or benefits, the arbitrage profit per share that Miles earns from the trade at the contract maturity is *closest* to:

- A. \$0.50
- B. \$3.14
- C. \$4.00

The correct answer is **B**.

Rhoda borrows EUR70 at the risk-free rate to purchase the shares today. After three months, the amount Rhoda returns to the lender, i.e., principal plus interest, is:

$$S_0(1 + r)^T = 70(1 + 0.05)^{0.25} = \$70.86$$

She then delivers the shares and receives \$74 per share, earning her an arbitrage profit of;

$$(74 - 70.86) = \$3.14 \text{ per share}$$

A is incorrect. 0.5 has been incorrectly obtained by assuming the maturity of the forward contract is one year and not three months as stated in the question, i.e.,

$$74 - 70(1 + 0.05)^1 = \$0.50$$

C is incorrect. The value 4 has been obtained by directly subtracting the asset's spot price from its forward price without factoring in borrowing costs.

CFA Level I, Derivatives, Learning Module 4: Arbitrage, Replication, and the Cost of Carry in Pricing Derivatives. LOS (b): Explain the difference between the spot and expected future price of an underlying and the cost of carry associated with holding the underlying asset.

Q.4147 Given a stock index that pays a dividend yield of 2% and is trading at a spot price of \$65, and assuming a risk-free rate of 5%, the stock's six-month forward price is *closest* to:

- A. \$65.98

B. \$66.64

C. \$68.25

The correct answer is **A**.

Since the dividend has been given as a percentage (dividend yield), we will calculate the forward price using the equation;

$$F_0(T) = S_0 e^{(r+c-i)T}$$

Where,

$F_0(T)$ =forward price,

S_0 = spot price,

r = risk-free rate,

i =benefits expressed as a rate of return

c = costs expressed as a rate of return

T = time to maturity.

$$F_0(T) = 65e^{(0.05+0-0.02)0.5} = 65.98$$

The forward price is slightly greater than the spot price since the cost (the risk-free rate) is higher than the benefit (the dividend yield).

B is incorrect. The option suggests a forward price of \$66.64, which does not correctly apply the formula for calculating the forward price of an asset that pays a continuous dividend yield. This value might result from a miscalculation or misunderstanding of the formula's components, such as an incorrect adjustment for the dividend yield or the risk-free rate over the specified time period.

C is incorrect. The option suggests a forward price of \$68.25, which significantly overestimates the impact of the risk-free rate and the dividend yield on the forward price. It might result from an overestimation of the risk-free rate, the dividend yield, or both, or from a misunderstanding of how these factors influence the forward price over the specified time period.

CFA Level I, Derivatives, Learning Module 4: Arbitrage, Replication, and the Cost of Carry in Pricing Derivatives. LOS (b): Explain the difference between the spot and expected future price of an underlying and the cost of carry associated with holding the underlying asset.

Q.4148 A trader borrows \$1,000 at a risk-free rate of 5% to purchase an asset whose spot price is \$1,000. He then sells the asset after two years at a spot price of \$1,200 and uses some of the proceeds from the sale to repay his loan plus interest. The trader has *most likely* used which of the following replication strategies?

- A. Long-forward replication.
- B. Short-forward replication.
- C. Risk-free trade replication.

The correct answer is **A**.

From the trade, the trader makes a profit of

$$S_T - F_0(T) = 1,200 - 1,000 \times (1 + 0.05)^2 = 97.5$$

which is equivalent to a long-forward commitment. The strategy presented is, therefore, a long-forward replication.

B is incorrect. A short-forward replication is the opposite of a long-forward replication. It results in a return equal to $F_0(T) - S_T$. A trader can replicate a short forward by short-selling an asset at a spot price of S_0 at time $t = 0$, then lend the proceeds from the sale at the risk-free rate, r , and buy back the asset at time $t = T$, at a spot price of S_T .

C is incorrect. A risk-free trade replication would have earned the trader a return equal to the risk-free rate. A trader can replicate a risk-free trade by buying an asset at a spot price of S_0 , at time $t = 0$, then simultaneously enter into a forward contract to sell the asset at the forward price, $F_0(T)$.

CFA Level I, Derivatives, Learning Module 4: Arbitrage, Replication, and the Cost of Carry in Pricing Derivatives. LOS (b): Explain the difference between the spot and expected future price of an underlying and the cost of carry associated with holding the underlying asset.

Q.4149 The present value of the benefits of holding a barrel of oil is \$1,000. If the barrel of oil is trading at a spot price of \$5,000 and assuming that the present value of the storage cost is \$2,000 and the risk-free rate is 5%, the one-year forward price of a forward contract on a barrel of oil is *closest to*:

A. \$4,200

B. \$6,000

C. \$6,300

The correct answer is **C**.

Recall that,

$$F_0(T) = [S_0 - PV_0(I) + PV_0(C)](1 + r)^T$$

Where;

$F_0(T)$ = forward price.

S_0 = Spot price.

$PV_0(I)$ = Present value of benefits.

$PV_0(C)$ = Present value of costs.

$$F_0(T) = [5,000 - 1,000 + 2,000](1 + 0.05)^1 = 6,300$$

A is incorrect. \$4,200 has been incorrectly obtained by adding instead of subtracting the present value of benefits (and subtracting instead of adding the present value of costs) to the spot price.

B is incorrect. \$6,000 has been incorrectly obtained by failing to compound the sum of the spot price, the present value of costs, and the present value of benefits, for one year at the risk-free rate.

CFA Level I, Derivatives, Learning Module 4: Arbitrage, Replication, and the Cost of Carry in Pricing Derivatives. LOS (b): Explain the difference between the spot and expected future price of an underlying and the cost of carry associated with holding the underlying asset.

Learning Module 5: Pricing and Valuation of Forward Contracts and For An Underlying with Varying Maturities

Q.1052 The party to a forward contract who agrees to buy the financial or physical asset has a:

- A. Long call position.
- B. Long forward position.
- C. Short forward position.

The correct answer is **B**.

The party that takes the long forward position agrees to buy the underlying asset at a specified future date for a specified price. The party holding the long position is said to be “long.”

A is incorrect. A long call position is a term used when talking about options, not forward contracts. It is a term used to describe a bullish investor gets into an option contract to purchase an underlying asset in the hope of making a profit when the price increases.

C is incorrect. A short forward position is a term used to describe the seller, not the buyer, in a forward contract. The “short” pledges to sell the underlying asset at a specified future date for a specified price.

CFA Level I, Derivatives, Learning Module 5: Pricing and Valuation of Forward Contracts and For An Underlying with Varying Maturities. LOS (a): Explain how the value and price of a forward contract are determined at initiation, during the life of the contract, and at expiration.

Q.3346 A U.S. based company has a subsidiary in Germany from which it expects to receive €8 million in the next 3 months. If the company's management is concerned about foreign currency, it will *most likely* enter into a:

- A. Currency forward contract by taking a short position in the \$.
- B. Currency forward contract by taking a short position in the €.
- C. Forward rate agreement (FRA) by taking a long position in the €.

The correct answer is **B**.

The company is basically long the €, so it needs to sell those € to convert them into \$. The company will *most likely* enter into a currency forward contract by taking a short position in the € and a long position in the \$. That will give the company the right to exchange the euros for dollars at a pre-determined rate.

A is incorrect. Taking a short position in the dollar would imply that the company is committing to sell dollars in the future, which does not align with its need to convert euros into dollars. This action would not protect the company against the risk of the euro depreciating against the dollar. Instead, it would expose the company to potential losses should the dollar strengthen against the euro, as the company would be obligated to sell dollars at a rate potentially less favorable than the market rate.

C is incorrect. A Forward Rate Agreement (FRA) is a financial contract that is used to hedge against interest rate risk, not currency risk. Taking a long position in the euro through an FRA would not address the company's need to manage the currency risk associated with its euro receivables. Furthermore, FRAs do not involve the actual exchange of currencies, which is what the company requires to convert its euro receivables into dollars. Therefore, entering into an FRA would not be an appropriate strategy for managing the company's exposure to currency risk.

CFA Level I, Derivatives, Learning Module 5: Pricing and Valuation of Forward Contracts and For An Underlying with Varying Maturities. LOS (b): Explain how forward rates are determined for an underlying with a term structure and describe their uses.

Q.3393 Which of the following statements is *most likely* correct regarding the value of a forward contract to a short party at expiration?

The value of the forward contract is:

- A. Zero.
- B. Equal to the value to the long party multiplied by -1.
- C. Positive if the spot price of the underlying exceeds the forward price.

The correct answer is **B**.

The value of the forward contract to a party holding a short position can be calculated by multiplying the value to the long party by -1.

A is incorrect. The forward contract most likely has a value at expiration, and this value is equal to the difference between the forward price and the underlying current spot price.

C is incorrect. The value of the forward contract to the party with a short position is positive if the futures price exceeds the spot price. In these circumstances, the short position delivers the asset in return for a price that's higher than the asset would fetch if it was to be sold today in the open market.

CFA Level I, Derivatives, Learning Module 5: Pricing and Valuation of Forward Contracts and For An Underlying with Varying Maturities. LOS (a): Explain how the value and price of a forward contract are determined at initiation, during the life of the contract, and at expiration.

Q.4150 From a forward contract seller's perspective, what will *most likely* happen to the contract's MTM value if the risk-free rate increases?

- A. The MTM value will increase.
- B. The MTM value will decrease
- C. The MTM value will remain the same.

The correct answer is **B**.

The contract's marked-to-market (MTM) value will decrease. From the forward contract seller's perspective, the MTM value is;

$$V_0(T) = F_0(T)(1 + r)^{-(T-t)} - S_t$$

Therefore, an increase (decrease) in the risk-free rate will decrease (increase) the forward price and the forward contract's MTM value.

From the forward contract buyer's perspective, an increase (decrease) in the risk-free rate will increase (decrease) the forward price and the forward contract's MTM value.

A and C are incorrect. The forward contract's MTM value will decrease, as explained above.

CFA Level I, Derivatives, Learning Module 5: Pricing and Valuation of Forward Contracts and For An Underlying with Varying Maturities. LOS (a): Explain how the value and price of a forward contract are determined at initiation, during the life of the contract, and at expiration.

Q.4151 Assuming that trading and transaction costs are negligible, which of the following derivatives *least likely* has an initial valuation value of zero?

- A. Options.
- B. Swap contracts
- C. Forward contracts.

The correct answer is **A**.

All forward commitments (forwards, futures, and swap contracts) have an initial value of zero since no money changes hands at contract inception.

However, for contingent claims like options, traders have to part with an option premium to secure the right but not the obligation to buy (call option) or sell (put option) the underlying at a fixed price at the specified maturity date. Therefore, unlike forward commitments, options have a value at contract initiation.

B is incorrect. The terms of the swap are structured in such a way that the present value of the expected benefits to each party is equal at the outset of the agreement. Therefore, neither party is required to make an initial payment to the other, leading to an initial value of zero. Swap contracts involve the exchange of cash flows based on specified variables (e.g., interest rates, currency exchange rates, or commodity prices), and the initial equality in value is a fundamental aspect of their design.

C is incorrect. The forward price is set in such a way that the contract has no net value at the time of inception. The forward price is calculated based on the spot price of the underlying asset, adjusted for factors such as time to maturity, interest rates, and storage costs (in the case of physical commodities). As a result, the initial exchange in a forward contract involves no immediate payment, leading to an initial valuation of zero.

CFA Level I, Derivatives, Learning Module 5: Pricing and Valuation of Forward Contracts and For An Underlying with Varying Maturities. LOS (a): Explain how the value and price of a forward contract are determined at initiation, during the life of the contract, and at expiration.

Q.4153 Lisa Junior owns 10,000 shares of Unifier Limited. She enters into a six-month forward contract to sell 3,500 shares at a forward price of \$70 per share. The contract value at maturity from the buyer's perspective, assuming the spot price at maturity is \$100 per share, is *closest* to:

A. -\$105,000.

B. \$105,000.

C. \$300,000.

The correct answer is **B**.

At contract initiation, the value is zero to both the buyer and the seller since no money exchanges hands. At contract maturity, the buyer and seller's value equals the contract's settlement value. From the buyer's perspective, the value can be obtained using the equation;

$$\begin{aligned}V_T(T) &= S_T - F_0(T) \\ &= 100 - 70 = \$30\end{aligned}$$

Instead of purchasing the shares at the current price of \$100, the buyer buys them at the lower forward price of \$70, making a return of \$30 per share. For the 3,500 shares;

$$3,500 \times 30 = \$105,000$$

A is incorrect. -\$105,000 is the contract's value at initiation from the seller's (Lisa's) perspective, i.e.,

$$V_0(T) = F_0(T) - S_T = \$ (70 - 100) \times 3,500 = -\$105,000$$

C is incorrect. It assumes that Junior sold all the shares so that from the buyer's perspective, the profit is:

$$\begin{aligned}V_T(T) &= S_T - F_0(T) \\ &= (100 - 70) \times 10,000 \text{ Shares} = \$300,000\end{aligned}$$

CFA Level I, Derivatives, Learning Module 5: Pricing and Valuation of Forward Contracts and For An Underlying with Varying Maturities. LOS (a): Explain how the value and price of a forward contract are determined at initiation, during the life of the contract, and at expiration.

Q.4154 A trader enters into a one-year forward contract to purchase ABC Company's shares at a forward price of INR 528.01 per share. The current spot price of the shares is INR 502.87 per share. Assuming that the spot price increases instantaneously to INR 504.66 per share at contract inception and assuming a risk-free rate of 5%, the forward contract MTM from the trader's perspective is *most likely*:

- A. -INR 1.79
- B. INR 0
- C. INR 1.79

The correct answer is **C**.

As the forward contract buyer, the MTM value at any time $T = t$ will be given by the equation;

$$V_t(T) = S_t - F_0(T)(1 + r)^{-(T-t)}$$

At contract inception ($t=0$), $F_0(T)(1 + r)^{-(T-t)}$ can be rewritten as

$$F_0(T)(1 + r)^{-T} = S_0$$

Therefore, the value of the contract from the trader's perspective simplifies to:

$$V_t(T) = S_t - S_0$$

where,

S_t = the spot price after the instantaneous change, and

S_0 = the original spot price.

$$V_0(T) = \text{INR}(504.66 - 502.87) = \text{INR } 1.79$$

A is incorrect. The value is positive from the seller's (ABC Company's) perspective.

B is incorrect. The value is not zero because of the instantaneous change in the spot prices at contract inception.

CFA Level I, Derivatives, Learning Module 5: Pricing and Valuation of Forward Contracts and For An Underlying with Varying Maturities. LOS a: Explain how the value and price of a forward contract are determined at initiation, during the life of the contract, and at expiration.

Q.4155 XYZ shylock gives out fixed-interest loans to borrowers. It obtains the money to lend by borrowing at the one-month variable MRR. To protect itself against interest rate risk, it enters into a one-month forward FRA contract on the one-month MRR. Which of the following *best* describes XYZ's interest rate exposure and the position it should take in the FRA contract?

- A. Exposed to a rise in the one-month MRR and should therefore be the fixed-rate payer
- B. Exposed to a rise in the one-month MRR and should therefore be the fixed-rate receiver.
- C. Exposed to a decline in the one-month MRR and should therefore be the floating rate receiver.

The correct answer is **A**.

XYZ loans its borrowers at a fixed interest rate but obtains its loans at a floating interest rate. Therefore, it faces a risk if the floating interest rate it pays rises relative to the fixed interest rate it receives from borrowers. In other words, if the floating interest rate increases, it will pay more than it receives. To hedge against this risk, it should enter into an FRA and pay the fixed rate while receiving the floating rate.

B is incorrect. If XYZ receives the fixed rate, it will increase its exposure to interest rate risk.

C is incorrect. The exposure is to an increase, not a decline, in the one-month MRR.

CFA Level I, Derivatives, Learning Module 5: Pricing and Valuation of Forward Contracts and For An Underlying with Varying Maturities. LOS b: Explain how forward rates are determined for an underlying with a term structure and describe their uses.

Q.4156 Elliot Ltd. enters into a six-month forward contract with a financial intermediary to sell 800 shares in its possession at a forward price of \$80.25 per share. The spot price at the initiation is \$75.12 per share, and the risk-free rate of return is 4%. The forward contract MTM value from Elliot Ltd.'s perspective after four months, if the share price falls to \$70.10, is *closest to*:

- A. \$9.11
- B. \$9.63
- C. \$10.68

The correct answer is **B**.

Elliot is a seller (short position). We know that for a seller, the value of the forward contract at any time t is given by:

$$V_t(T) = F_0(T) (1 + r)^{-(T-t)} - S_t$$

Where,

S_t = Spot price of the underlying at time t , during the contract's life.

r = Risk-free rate of return.

$F_0(T)$ = Forward price (satisfies the no-arbitrage conditions).

Therefore,

$$\begin{aligned} V_t(T) &= F_0(T) (1 + r)^{-(T-t)} - S_t = \$80.25(1.04)^{-\left(\frac{6}{12} - \frac{4}{12}\right)} - \$70.10 \\ &= \$80.25(1.04)^{-\left(\frac{2}{12}\right)} - \$70.10 \\ &= \$9.63 \end{aligned}$$

A is incorrect. It does not accurately reflect the calculation based on the given formula and parameters. The MTM value must consider the time value of money, the agreed forward price, the current spot price, and the risk-free rate of return.

C is incorrect. It overestimates the MTM value.

CFA Level I, Derivatives, Learning Module 5: Pricing and Valuation of Forward Contracts and For An Underlying with Varying Maturities. LOS (a): Explain how the value and price of a forward contract are determined at initiation, during the life of the contract, and at expiration.

Q.4157 Consider a two-year forward contract purchased on the Japanese Yen. The short position has to deliver one Japanese Yen in exchange for a Canadian dollar. Assume the interest rates in Japan and Canada are 4% and 7%. Suppose the exchange rate of the Japanese Yen against the Canadian dollar is 1.80; the forward price is *closest to*:

A. 1.4572

B. 1.5572

C. 1.6952

The correct answer is **C**.

For foreign exchange forward,

$$F_{0,f/d}(T) = S_{0,f/d} e^{(r_f - r_d)T}$$

Where:

$F_{0,f/d}(T)$ = Forward price

$S_{0,f/d}$ = Spot price

r_f = Risk-free foreign rate

r_d = Risk-free domestic rate

T = Time to maturity. Therefore,

Therefore,

$$F_{\{0,f/d\}} = 1.80e^{(0.04-0.07)2} = 1.6952$$

A is incorrect. It suggests a forward price of 1.4572, which does not align with the calculation based on the given interest rates and the spot exchange rate.

B is incorrect. It indicates a forward price of 1.5572, which also does not match the calculated forward price using the correct formula and given data.

CFA Level I, Derivatives, Learning Module 5: Pricing and Valuation of Forward Contracts and For An Underlying with Varying Maturities. LOS (a): Explain how the value and price of a forward contract are determined at initiation, during the life of the contract, and at expiration.

Q.4158 Paul Nasir plans to enter a forward contract to purchase gold, whose spot price is \$120, both at initiation and maturity. The net present value cost of carry for the gold is \$15. Suppose

the risk-free rate is 4%; the value of a two-year-long forward contract on the asset at expiration is *closest to*:

A. \$4.00

B. \$16.40

C. \$6.43

The correct answer is **C**.

We know that:

$$F_{0(T)} = [S_0 - PV_0(I) + PV_0(C)] (1 + r)^T$$

Where,

$PV_t(I)$ = Present value of income or benefits at any time t .

$PV_t(C)$ = Present value of costs at any time t .

I = income.

C = cost of carry.

S_0 = Spot price of the underlying at the initiation.

r = Risk-free rate of return.

$F_0(T)$ = Forward price (satisfies the no-arbitrage conditions).

We can rewrite the above equation as:

$$F_{0(T)} = [S_0 - (PV_0(I) - PV_0(C))] (1 + r)^T$$

Now recall that the cost of carry is defined as "net of the costs and benefits related to owning an underlying asset for a specific period"

Therefore, the above equation can be written as:

$$\begin{aligned} F_0(T) &= (S_0 - \text{Cost of carry}) (1 + r)^T \\ &= (\$120 - \$15) (1 + 0.04)^2 \\ &= \$113.56 \end{aligned}$$

Therefore,

$$V_0(T) = S_T - F_0(T) = 120 - 113.56 = \$6.43$$

A is incorrect. A value of \$4.00 for the forward contract at expiration does not correctly account for the given parameters, including the cost of carry and the risk-free rate applied over the two-year term. This calculation likely omits the compounding effect of the risk-free rate over the contract's duration.

B is incorrect. A value of \$16.40 for the forward contract at expiration significantly overestimates the impact of the cost of carry and the risk-free rate over the two-year period.

CFA Level I, Derivatives, Learning Module 5: Pricing and Valuation of Forward Contracts and For An Underlying with Varying Matrutities. LOS (a): Explain how the value and price of a forward contract are determined at initiation, during the life of the contract, and at expiration.

Q.4159 Paul Nasir plans to enter a forward contract to purchase gold, whose spot price is \$120. The net cost of carry for the gold is \$15. Suppose the risk-free rate is 4%; the value of a two-year-long forward contract on the asset at expiration is *closest to*:

- A. \$4
- B. \$6.4
- C. \$8.5

The correct answer is **B**.

We know that:

$$F_{0(T)} = S_0(1 + r)^T - (PV_0(I) - PV_0(C))(1 + r)^T$$

Where,

$PV_t(I)$ = Present value of income or benefits at any time t.

$PV_t(C)$ = Present value of costs at any time t.

I = income.

C = cost of carry.

S_0 = Spot price of the underlying at the initiation.

r = Risk-free rate of return.

$F_0(T)$ = Forward price (satisfies the no-arbitrage conditions).

Therefore.

$$\begin{aligned}
 F_0(T) &= (S_0 - \text{Cost of carry})(1 + r)^T \\
 &= (\$120 - \$15)(1 + 0.04)^2 \\
 &= \$113.568
 \end{aligned}$$

Therefore,

$$V_0(T) = S_T - F_0(T) = 120 - 113.568 = \$6.432$$

A is incorrect. A value of \$4 for the forward contract at expiration does not accurately reflect the calculation based on the given spot price, net cost of carry, and risk-free rate. This option underestimates the impact of the cost of carry and the compounding effect of the risk-free rate over the two-year period.

C is incorrect. A value of \$8.5 for the forward contract at expiration overestimates the outcome of the calculation.

CFA Level I, Derivatives, Learning Module 5: Pricing and Valuation of Forward Contracts and For An Underlying with Varying Maturities. LOS (a): Explain how the value and price of a forward contract are determined at initiation, during the life of the contract, and at expiration.

Q.4160 Steph Ellie enters into a forward contract on a non-dividend paying stock that matures in 3 months. Suppose the current stock price is \$84 and the risk-free rate of 2.5% per year. The forward price is *closest to*:

A. \$81.25

B. \$83.14

C. \$84.52

The correct answer is **C**.

We know that:

$$F_0(T) = S_0(1 + r)^T$$

Where:

S_0 = Spot price of the underlying at the initiation.

r = Risk-free rate of return.

$F_0(T)$ = Forward price (satisfies the no-arbitrage conditions).

T = Time to maturity.

Therefore,

$$F_0(T) = \$84(1 + 0.025)^{\frac{3}{12}} = 84.52$$

< A is incorrect. It suggests a forward price of \$81.25, which would imply a decrease in the stock's value over the contract period. This does not align with the formula for calculating the forward price of a non-dividend paying stock, which accounts for the risk-free rate of return over the time to maturity.

B is incorrect. It indicates a forward price of \$83.14, which is also not in line with the calculated forward price using the given formula.

CFA Level I, Derivatives, Learning Module 5: Pricing and Valuation of Forward Contracts and For An Underlying with Varying Maturities. LOS (a): Explain how the value and price of a forward contract are determined at initiation, during the life of the contract, and at expiration.

Q.4161 A portfolio manager purchases a two-year zero coupon bond with a par value of \$84.96. The two-year zero rate is *closest to*

- A. 1.34%
- B. 2.62%
- C. 8.49%

The correct answer is **C**.

Recall that the discount factor is given by:

$$DF_i = \frac{1}{(1 + Z_i)^i}$$

Where:

DF_i = The discount factor for a given period.

Z_i = The zero rate for a given period.

i = The period.

We need z_2 . To solve for the two-year zero rate z_2 , solve the equation:

$$84.96 = \frac{100}{(1 + z_2)^2}$$

Using BA II Plus financial calculator, $z_2 = 8.49$.

A is incorrect. A rate of 1.34% would result in a much higher present value for the bond, given the formula for calculating the present value of a zero-coupon bond. A lower interest rate means the discounting effect is less pronounced, leading to a present value closer to the bond's par value. This does not align with the given purchase price of \$84.96.

B is incorrect. A rate of 2.62% also does not provide the correct present value for the bond. Similar to option A, a rate of 2.62% would result in a present value that is higher than \$84.96, as the discounting effect would be less significant than what is observed with an 8.49% rate. The calculation process clearly shows that only an 8.49% rate accurately reflects the relationship between the bond's purchase price and its par value, considering the time until maturity.

CFA Level I, Derivatives, Learning Module 5: Pricing and Valuation of Forward Contracts and For An Underlying with Varying Maturities. LOS (b): Explain how forward rates are determined for an underlying with a term structure and describe their uses.

Learning Module 6: Pricing and Valuation of Futures Contracts

Q.1059 In the case of a futures contract, the initial margin is *most likely*:

- A. The profits or losses settled daily.
- B. The minimum amount that must be maintained at any time.
- C. The amount that must be deposited before a trade may be made.

The correct answer is **C**.

The initial margin is the amount that must be deposited in the futures account before a trade may be performed.

B is incorrect. It describes the maintenance margin, which is the minimum amount of equity that must be maintained in the margin account.

A is incorrect. Settling of profits or losses is a mechanism used to reduce counterparty risk for future contracts called marking the market. This has the effect of resetting the contract price and cash flows to buyers and sellers.

CFA Level I, Derivatives, Learning Module 6: Pricing and Valuation of Futures Contracts. LOS (b): Explain why forward and futures prices differ.

Q.1143 If Michael Emery takes a long position in copper futures, which of the following parties will *most likely* take the opposite position in the contract?

- A. The clearinghouse.
- B. Another investor/trader.
- C. A large commercial bank.

The correct answer is **A**.

Options and futures are traded on exchange-traded markets. The clearinghouse act as the opposite party to each transaction in futures markets.

B is incorrect. In OTC markets, the counterparties are typically the actual buyers and sellers, which can include individuals, institutions, or banks. However, in the context of exchange-traded futures contracts, like the copper futures mentioned, the clearinghouse is the central counterparty, not an option for the opposite position.

C is incorrect. While a large commercial bank may participate in futures markets, either for hedging or speculative purposes, it is not automatically the counterparty to every futures contract. In the structured environment of exchange-traded futures, the clearinghouse assumes the role of the counterparty to all positions. Banks, like other market participants, engage in transactions with the clearinghouse as their counterparty. This ensures a level of neutrality and risk management that would not be possible if individual institutions were to directly take opposite positions in every contract. The role of banks and other financial institutions in the futures market is significant, but their participation is mediated through the clearinghouse system.

CFA Level I, Derivatives, Learning Module 6: Pricing and Valuation of Futures Contracts. LOS (b): Explain why forward and futures prices differ.

Q.1144 The everyday process of adjusting the margin to take into account the gains and losses on the value of futures contracts is known as:

- A. Clearing.
- B. Value adjusting.
- C. Marking to market.

The correct answer is **C**.

The process of adjusting the margin balance to reflect gains and losses on the value of futures contracts due to changes in the prices of underlying assets is called mark-to-market or marking-to-market, MtM.

A is incorrect. Clearing is the process by which the exchange verifies the execution of a transaction and records the participants' identities.

B is incorrect. While "value adjusting" might seem like a term that could describe the process of marking to market, it is not a recognized term within the financial industry for this specific process. Marking to market is the correct and widely used term for the daily adjustment of the margin account to reflect gains and losses on futures contracts. The term "value adjusting" does not capture the specific mechanisms and implications of this process, particularly its role in managing credit risk and ensuring the financial integrity of futures contracts.

CFA Level I, Derivatives, Learning Module 6: Pricing and Valuation of Futures Contracts. LOS (b): Explain why forward and futures prices differ.

Q.3361 Which of the following floor traders in a futures exchange is *more likely* to benefit from the bid-ask spread?

- A. Scalpers.
- B. Day traders.
- C. Position traders.

The correct answer is **A**.

Scalpers often try to buy at the bid and sell at the ask price. They purchase stocks and resell them after very small price increases. To be successful, a scalper monitors price movement with a keen eye and is therefore in a position to take advantage of sudden changes in the bid-ask spread. A pure scalper will make multiple trades each day—perhaps in the hundreds.

B is incorrect. Day traders adopt a more relaxed approach to trading and take a little more time before executing trades. A day trader pays close attention to price movement for several hours, but they will usually hold shares for more than eight hours.

C is incorrect. Position traders hold assets for long periods of time, such as months or years.

CFA Level I, Derivatives, Learning Module 6: Pricing and Valuation of Futures Contracts. LOS (b): Explain why forward and futures prices differ.

Q.3380 Long positions in futures contracts are more desirable than forward contracts when the correlation between futures prices and interest rates is:

- A. Zero.
- B. Positive.
- C. Negative.

The correct answer is **B**.

When the correlation between interest rates and futures prices is positive, futures contracts are more desirable to holders of long positions than forward contracts. That's because rising prices will lead to futures profits that are reinvested in periods of rising interest rates, and falling prices will lead to losses that occur during periods of falling interest rates. Therefore, it is far better to receive cash flows in the interim than the expiration under such conditions.

A is incorrect. A zero correlation between futures prices and interest rates implies that there is no predictable relationship between the two. In such a scenario, the advantage of receiving interim cash flows from futures contracts, which could potentially be reinvested at favorable interest rates, does not inherently exist. The lack of correlation means that futures and forward contracts may not differ significantly in terms of desirability based solely on the relationship between interest rates and price movements.

C is incorrect. A negative correlation between futures prices and interest rates suggests that when futures prices increase, interest rates tend to decrease, and vice versa. In this scenario, profits from futures contracts would be reinvested at lower interest rates, and losses would occur in an environment of rising interest rates. This could exacerbate the impact of losses and diminish the benefits of gains, making futures contracts less desirable compared to forward contracts for long position holders. Forward contracts, which do not involve daily settlement or the interim reinvestment of gains, would not be affected by this negative correlation in the same way, potentially making them a more stable choice in such market conditions.

CFA Level I, Derivatives, Learning Module 6: Pricing and Valuation of Futures Contracts. LOS (a): Compare the value and price of forward and futures contracts.

Q.4162 A stock that pays an annual dividend of \$5 is trading at a spot price of \$72. If the stock's futures price is \$75.6, assuming a risk-free rate of 5%, which of the following statements is *most likely* correct? The stock is trading

- A. at its no-arbitrage futures price.
- B. below its no-arbitrage futures price.
- C. above its no arbitrage futures price.

The correct answer is **C**.

We can obtain the stock's no-arbitrage futures price using the equation below.

$$F_0(T) = [S_0 - PV_0(I)](1 + r)^T$$

Where:

$F_0(T)$ = futures price.

S_0 = spot price.

$PV_0(I)$ = Present value of benefits

r = risk-free rate

T = Maturity time

We first obtain the present value of the benefit (dividend) and then substitute it into the equation to get the futures price.

$$PV_0(I) = \frac{\$5}{(1 + 0.05)^1} = \$4.76$$

So that,

$$F_0(T) = [72 - 4.76](1 + 0.05)^1 = 70.6$$

The stock's no-arbitrage futures price is \$70.6., yet it is trading at a futures price of \$75.6, meaning that it is trading at a price above its no-arbitrage futures price.

A is incorrect. It suggests that the stock is trading at its no-arbitrage futures price. However, as calculated, the no-arbitrage futures price is \$70.6, not \$75.6. This discrepancy indicates that the stock is not trading at its no-arbitrage price but rather above it.

B is incorrect. It implies that the stock is trading below its no-arbitrage futures price. The calculation shows that the actual futures price of \$75.6 is higher than the no-arbitrage futures price of \$70.6, indicating that the stock is trading above, not below, its no-arbitrage futures price.

CFA Level I, Derivatives, Learning Module 6: Pricing and Valuation of Futures Contracts. LOS (a): Compare the value and price of forward and futures contracts.

Q.4163 How do futures and forward prices *best* compare in situations where futures prices are positively correlated with interest rates over the contract's maturity period?

- A. They are the same.
- B. Futures prices exceed forward prices.
- C. Forward prices exceed futures prices

The correct answer is **B**.

Futures prices fluctuate depending on interest rates, whereas forward prices remain constant until contract maturity. Therefore, futures prices will exceed forward prices in situations where futures prices are positively correlated with interest rates.

The higher futures prices mean that futures profits will be reinvested at higher rates while losses will be refinanced at lower rates.

The opposite is true when the futures prices negatively correlate with interest rates over the contract's maturity period.

A is incorrect. The prices will be the same when interest rates are constant over the contract's maturity period.

C is incorrect. Forward prices will exceed futures prices in cases where futures prices are negatively correlated with interest rates

CFA Level I, Derivatives, Learning Module 6: Pricing and Valuation of Futures Contracts. LOS (b): Explain why forward and futures prices differ.

Q.4164 Which of the following statements is *least likely* correct?

- A. Both futures and forward contracts have an initial value of zero.
- B. The futures price is obtained by compounding the spot price at the risk-free rate.
- C. The gains and losses of both futures and forward contracts are settled daily via a margin account.

The correct answer is **C**.

Since futures are traded on an exchange, their gains and losses are settled daily via a margin account. A trader gets a margin call once their margin account decreases below the minimum amount. The daily settlement of gains and losses of futures accounts resets the futures value to zero at the current futures price, a process that continues until maturity. At maturity, the futures value converges to the spot price.

On the other hand, forward contracts trade in the OTC market. Their gains and losses are not settled daily.

A and B are incorrect. They are correct statements. Both futures and forwards have an initial value of zero. The value may change during the life of the contract. The futures price, like the forward price, is obtained by compounding the spot price at the risk-free rate.

CFA Level I, Derivatives, Learning Module 6: Pricing and Valuation of Futures Contracts. LOS (b): Explain why forward and futures prices differ.

Q.4165 The 90-day futures price of a barrel of oil is EUR 500. At the end of the second trading day, the spot price of the barrel of oil is EUR 525. Assuming that trading opens at the former day's closing spot and future prices and taking a risk-free rate of 4%, the contract's MTM value on day three is closest to:

- A. EUR 0.
- B. EUR 29.71.
- C. EUR 495.24.

The correct answer is **B**.

The MTM value is obtained by subtracting the current spot price from the present value of the futures price.

Since trading opens at the former day's spot and future prices, we first have to calculate the present value of the future price on day 2.

At the contract inception date, day 1, the contract has 90 days until maturity. Therefore, at the end of day 2, there are 88 days remaining until maturity.

$$F_0(T) = 500(1 + 0.04)^{-\frac{88}{365}} = 495.29$$

So that,

$$\text{MTM value} = \text{EUR } (525 - 495.29) = \text{EUR } 29.71$$

A is incorrect. The MTM value would have been zero if the current spot price had been equal to the present value of the futures price.

C is incorrect. EUR 495.24 is the present value of the forward price.

CFA Level I, Derivatives, Learning Module 6: Pricing and Valuation of Futures Contracts. LOS (a): a: Compare the value and price of forward and futures contracts.

Q.4166 The implied six-month forward rate for an interest rate futures contract initiated at time $t=0$ with a maturity period of one year, trading at \$89.10, is *closest to*:

- A. 0%
- B. 8.9%
- C. 10.9%

The correct answer is **C**.

The interest rate futures trade on a price basis given by:

$$f_{A, B-A} = 100 - (100 \times MRR_{A, B-A})$$

Where;

$f_{A, B-A}$ = Futures price for a market reference rate for B-A periods that begin at period A.

$MRR_{A, B-A}$ = Implied forward rate.

Therefore,

$$\begin{aligned} 89.10 &= 100 - (100 \times MRR_{6,12-6}) \\ -10.9 &= -(100 \times MRR_{6,6}) \\ \Rightarrow MRR_{6,6} &= 0.109 \end{aligned}$$

The implied six-months forward rate for an interest rate futures contract initiated at time 0 with a one-year maturity period is 10.9%

A is incorrect. Suggesting a 0% implied six-month forward rate does not align with the calculation based on the futures trading price of \$89.10. This option fails to account for the inverse relationship between futures prices and implied interest rates, which is fundamental to understanding how futures contracts are priced in relation to interest rate expectations.

B is incorrect. The calculation based on the given futures price of \$89.10 directly leads to an implied rate of 10.9%, not 8.9%. This option does not accurately reflect the mathematical relationship between the futures price and the implied forward rate as dictated by the formula.

CFA Level I, Derivatives, Learning Module 6: Pricing and Valuation of Futures Contracts. LOS (a): Compare the value and price of forward and futures contracts.

Q.4167 Which of the following statements is *most likely* correct regarding a futures and forwards contract?

- A. MTM gains and losses are settled daily.
- B. The contract price is constant throughout the contract period.
- C. The presence of benefits will reduce the difference between the spot and the forward commitment contract price.

The correct answer is **C**.

Benefits in both forward and futures contracts will reduce the forward/ futures price. With a lower forwards/futures price, the difference between the spot price and the forward commitment contract price will also decrease.

On the other hand, costs will increase the forward commitment contract price in both forward and futures contracts. A higher forward commitment contract price will increase the difference between the spot price and the forward commitment contract price.

A is incorrect. The daily settlement of MTM gains and losses happens only for futures but not forward contracts.

B is incorrect. Only forward contracts will have a constant price throughout the contract period. A futures contract's price will change depending on interest rate changes over the contract period.

CFA Level I, Derivatives, Learning Module 6: Pricing and Valuation of Futures Contracts. LOS (b): Explain why forward and futures prices differ.

Q.4168 In cases of rising interest rates, which of the following positions should a trader who wishes to hedge his liability of paying MRR in the future *most likely* take?

- A. Long FRA.
- B. Short FRA.
- C. Long futures contract.

The correct answer is **A**.

An FRA (Forward Rate Agreement) is a financial contract between two parties where one party agrees to pay a fixed rate of interest on a specified notional amount at a future date while the other party agrees to pay the floating market rate of interest (MRR) on that date. In the context of rising interest rates, a trader who wishes to hedge his liability of owning a market reference rate (MRR) in the future should take a long position in an FRA. By doing so, the trader agrees to receive a fixed rate of interest and pay the floating MRR. This allows the trader to hedge against the risk of rising interest rates by locking in the current fixed rate, thereby protecting against the cost of future liability.

B is incorrect. A short position in an FRA means that the trader agrees to pay the fixed rate of interest and receive the floating MRR on a specified date in the future. In a rising interest rate environment, the MRR would increase, which would be unfavorable for the trader who is paying the fixed rate.

C is incorrect. A long position in a futures contract means that the trader agrees to buy the underlying asset at a specified price on a future date. This does not directly hedge the interest rate risk associated with owning an MRR in the future. In a rising interest rate environment, the cost of financing the purchase of the underlying asset would increase, which is not the desired outcome for hedging interest rate risk.

CFA Level I, Derivatives, Learning Module 6: Pricing and Valuation of Futures Contracts. LOS (b): Explain why forward and futures prices differ.

Learning Module 7: Pricing and Valuation of Interest Rate and Other Swaps

Q.1145 ZE Bank enters into a plain vanilla swap contract with Lux Financiers with the intent of receiving floating-rate payments. In these circumstances, ZE Bank *most likely* takes the:

- A. Short position.
- B. Pay-fixed side.
- C. Pay-floating side.

The correct answer is **B**.

In a plain vanilla swap or interest rate swap, two private parties, usually firms or financial institutions, agree to exchange a floating interest rate for a fixed rate. The party that wants to receive floating-rate payments while making fixed-rate payments on the notional principal is called the pay-fixed side.

C is incorrect. The pay floating side is the party that wants to receive fixed rate payments and make floating-rate payments.

A is incorrect. A short position occurs when an investor sells borrowed securities intending to buy them back at a future date. An investor who takes a short position is bearish, i.e., they believe that the security's price will go down soon.

CFA Level I, Derivatives, Learning Module 7: Pricing and Valuation of Interest Rate and Other Swaps. LOS (b): Contrast the value and price of swaps.

Q.3349 Tiara Enterprises (TIEN) has just announced its plans to establish a facility in New York, USA, to meet the increased demand for its products. TIEN plans to fund the expansion with debt and in order to hedge the risk of borrowing, TIEN has entered into a plain vanilla interest rate swap with a notional principal of \$50 million. TIEN would make semiannual payments at the rate of 12% with the counterparty making floating rate payments at the Euribor rate. Assuming a 360-day year, if the Euribor was 13.5% on the last settlement date and is 11.0% on the current settlement date, the amount that TIEN would receive on the current settlement date is *closest to*:

- A. \$250,000.
- B. \$375,000.
- C. \$3,375,000.

The correct answer is **B**.

TIEN's payment:

$$(\$50 \text{ million}) \times \left(\frac{180}{360}\right) \times (12\%) = \$3,000,000$$

Counterparty's payment:

$$(\$50 \text{ million}) \times \left(\frac{180}{360}\right) \times (0.135) = \$3,375,000$$

Therefore, TIEN would receive a net amount of \$375,000.

Note that the amount payable under the floating leg of the swap is based on the interest rate at time **t-1**.

A is incorrect. It suggests TIEN would receive \$250,000, which does not align with the corrected calculations based on the current Euribor rate.

C is incorrect. It vastly overestimates the amount TIEN would receive, not aligning with the calculations based on the given interest rates and the terms of the swap.

CFA Level I, Derivatives, Learning Module 7: Pricing and Valuation of Interest Rate and Other Swaps. LOS (b): Contrast the value and price of swaps.

Q.3372 Which of the following statements is *most likely* correct regarding credit default swaps (CDS)?

- A. They represent exchange-traded derivatives.
- B. The CDS seller is betting on the borrower not defaulting.
- C. The credit protection buyer has an underlying loan obligation which requires protection.

The correct answer is **B**.

The CDS seller receives compensation in the form of premium income and in return agrees pay out a percentage of the notional amount if a credit event occurs.

A is incorrect. CDSs are over-the-counter derivatives.

C is incorrect. The protection buyer is a lender who seeks credit protection on a loan advanced to a third party. They do not have an outstanding obligation; rather, they expect interest and debt repayments from the security's issuer.

CFA Level I, Derivatives, Learning Module 7: Pricing and Valuation of Interest Rate and Other Swaps. LOS (b): Contrast the value and price of swaps.

Q.4169 Peter Gregg enters into a floating-for-fixed 5-year swap contract to hedge against a decline in interest rates. He agrees to pay the six-month MRR and receive the 4% fixed interest rate over a notional principal of \$5 million. Assuming that the sixth-month MRR is 2.3%, the swap's periodic settlement value from Peter's perception in six months is *most likely*:

- A. A. \$42,500
- B. B. \$85,000
- C. C. \$100,000

The correct answer is **A**.

The periodic settlement value from Peter's perspective, who is the fixed rate receiver) can be obtained using the equation below.

$$\begin{aligned}\text{Periodic Settlement Value} &= \text{Fixed rate} - \text{Floating rate} \times \text{Notional Principal} \times \text{Period} \\ &= (4\% - 2.3\%) \times 5,000,000 \times 0.5 = 42,500\end{aligned}$$

Peter will receive \$42,500. His net value is positive since the present value of fixed payments to be received exceeds that of floating payments to be paid.

B is incorrect. \$85,000 has been obtained by assuming that the payments are made after one year and not after six months.

C is incorrect. \$100,000 is the amount received by Peter, not the contract's value.

CFA Level I, Derivatives, Learning Module 7: Pricing and Valuation of Interest Rate and Other Swaps. LOS (b): Contrast the value and price of swaps.

Q.4171 To hedge against increasing interest rates, Laura Smith, an investor, should *most likely* enter into which of the following swaps?

- A. Pay a fixed rate, and receive a fixed rate.
- B. Pay a fixed rate and receive a floating rate.
- C. Pay a floating rate and receive a fixed rate.

The correct answer is **B**.

Since the risk is towards an increase in interest rates, by paying the fixed rate and receiving the floating rate, Laura Smith will receive more if interest rates increase, thereby hedging her risk against a rise in interest rates.

A is incorrect. The trader is still exposed to the risk of increased interest rates by paying a fixed rate and receiving a fixed rate.

C is incorrect. A trader who enters into an interest rate swap that pays floating while receiving the fixed rate is trying to hedge against a decline and not an increase in interest rate.

CFA Level I, Derivatives, Learning Module 7: Pricing and Valuation of Interest Rate and Other Swaps. LOS (b): Contrast the value and price of swaps.

Q.4172 Which of the following *best* illustrates a scenario that leads to a fixed-rate receiver having a positive MTM value on the settlement day of a floating-for-fixed swap contract? The present value of the:

- A. fixed payments to be received equals that of the floating payments to be paid.
- B. fixed payments to be received is less than that of the floating payments to be paid.
- C. fixed payments to be received is greater than that of the floating payments to be paid.

The correct answer is **C**.

A floating-for-fixed swap contract means that the receiver is getting the fixed rate and paying the floating rate over the notional principal.

Therefore, the value of a swap after inception from a fixed-rate receiver's perspective is given by the equation;

$$\sum PV(\text{Fixed Payments Received}) - \sum PV(\text{Floating Payments Received})$$

For the above equation to be positive, the sum of the present value of the fixed payments received must be greater than the sum of the present value of the floating payments paid.

A is incorrect. This option suggests that the MTM value is positive when the present value of the fixed payments equals that of the floating payments. However, for the MTM value to be positive, the present value of the fixed payments must exceed the present value of the floating payments. Equality between these values would result in a neutral (zero) MTM value, not a positive one. The MTM value reflects the net benefit or cost of the swap to the fixed-rate receiver, and a positive value indicates a net benefit, which is not achieved through equality of payments.

B is incorrect. This option indicates that the MTM value would be positive when the present value of the fixed payments is less than that of the floating payments. The essence of a positive MTM value for the fixed-rate receiver is to have the fixed payments they receive be more valuable than the floating payments they make, which is not the case in this scenario. A positive MTM value signifies a favorable position for the fixed-rate receiver, which cannot be achieved if the fixed payments are less valuable.

CFA Level I, Derivatives, Learning Module 7: Pricing and Valuation of Interest Rate and Other Swaps. LOS (b): Contrast the value and price of swaps.

Q.4173 Consider the following exhibit:

Maturity	Annual coupon rate (%)	PV	YTM (%)	Zero rates (%)
1	1.25	98.5	2.46	2.46
2	1.75	98.0	2.86	2.90
3	2.25	97.5	3.12	3.20

The implied forward rate in two years is *most likely*:

A. 2.46%

B. 3.34%

C. 3.80%

The correct answer is **C**.

The general formula for the relationship between the two spot rates and the implied forward rate (IFR) is:

$$(1 + Z_B)^B = (1 + Z_A)^A \times (1 + \text{IFR}_{A,B-A})^{B-A}$$

Where:

Z_A = spot rate on short-term bond.

Z_B = spot rate on long-term bond.

$\text{IFR}_{A,B-A}$ = Implied forward rate between period A and period B, with a tenor of B-A.

$$\begin{aligned} (1 + \text{IFR}_{A,B-A})^{B-A} &= \frac{(1 + Z_B)^B}{(1 + Z_A)^A} \\ \Rightarrow (1 + \text{IFR}_{2,3-2})^{3-2} &= \frac{(1 + 0.032)^3}{(1 + 0.029)^2} \\ \text{IFR}_{2,1} &= 1.038 - 1 = 0.038 \text{ or } 3.80\% \end{aligned}$$

A is incorrect. 2.46% is the zero rate in year zero.

B is incorrect. 3.34% is the implied forward rate in year one.

CFA Level I, Derivatives, Learning Module 7: Pricing and Valuation of Interest Rate and Other Swaps. LOS (b): Contrast the value and price of swaps.

Q.4174 A trader enters into a 5-year swap contract to pay the fixed rate and receive the 6-month floating rate. If the floating rate decreases below the fixed rate six months after contract inception, the trader will *most likely*?

- A. Realize a loss and make a net payment.
- B. Realize a loss and receive a net payment.
- C. Realize a gain and receive a net payment.

The correct answer is **A**.

Since the trader is paying the fixed rate and receiving the floating, s(he) will realize a loss if the floating rate decreases below the fixed rate, i.e., s(he) will receive less than what s(he) will pay.

Since the principal in a swap contract is notional, the trader will make a net payment to the fixed-rate receiver.

B is incorrect. A loss necessitates the trader to make and not receive a net payment.

C is incorrect. The trader will realize a loss, not a gain. If the floating rate had increased above the fixed rate, the trader would have realized a profit and received a net payment.

CFA Level I, Derivatives, Learning Module 7: Pricing and Valuation of Interest Rate and Other Swaps. LOS (b): Contrast the value and price of swaps.

Q.4845 What happens if the market reference rate (MRR) is set at a rate higher than the agreed-on fixed rate for a fixed-rate payer on a swap or forward rate agreement (FRA)?

- A. Realize a loss; pay; to
- B. Realize a gain; receive; from
- C. Realize a gain; pay; to

The correct answer is **B**.

Realize a gain if the MRR sets at a rate higher than the agreed-on fixed rate and will receive a net payment from the floating-rate payer. When the MRR sets at a rate higher than the agreed-on fixed rate, a fixed-rate payer on a swap or FRA realizes a gain and receives a net payment from the floating-rate payer.

A is incorrect. When the MRR is higher than the fixed rate, the fixed-rate payer actually realizes a gain, not a loss.

C is incorrect. When the MRR exceeds the fixed rate, the fixed-rate payer receives a net payment from the floating-rate payer, rather than paying.

CFA Level I, Topic 8 - Derivatives, Learning Module 7: Pricing and Valuation of Interest Rate and Other Swaps. LOS (a): Describe how swap contracts are similar to but different from a series of forward contracts.

Q.4846 Which characteristic corresponds to the implied forward rate, or the breakeven reinvestment rate, for a period starting in the future?

- A. Interest rate swap
- B. Forward rate agreement
- C. Both an interest rate swap and an interest rate forward contract

The correct answer is **B**.

The breakeven reinvestment rate, or implied forward rate, corresponds to a forward rate agreement, where the price of the contract represents this rate for a future period.

A is incorrect. While interest rate swaps involve future cash flows, the implied forward rate specifically corresponds to forward rate agreements.

C is incorrect. While both swaps and forward rate agreements have future cash flows, the implied forward rate is specifically associated with forward rate agreements.

CFA Level I, Topic 8 - Derivatives, Learning Module 7: Pricing and Valuation of Interest Rate and Other Swaps. LOS (a): Describe how swap contracts are similar to but different from a series of forward contracts.

Q.4847 What features do interest rate swaps and forward rate agreements have in common regarding risk?

- A. No counterparty credit risk
- B. Interest rate risk
- C. Counterparty credit risk

The correct answer is **C**.

Both interest rate swaps and forward rate agreements involve counterparty credit risk, as they are agreements between two parties, and default by one party poses a risk to the other.

A is incorrect. Both swaps and forward rate agreements involve counterparty credit risk; there is always a risk associated with the counterparties defaulting.

B is incorrect. While both swaps and forward rate agreements are related to interest rates, the question specifically refers to the risk aspect, which is counterparty credit risk.

CFA Level I, Topic 8 - Derivatives, Learning Module 7: Pricing and Valuation of Interest Rate and Other Swaps. LOS (a): Describe how swap contracts are similar to but different from a series of forward contracts.

Q.4848 What is the characteristic unique to an interest rate swap?

- A. Involves a series of future cash flows
- B. No cash flow exchanged upfront
- C. Constant fixed rate for multiple periods

The correct answer is **C**.

An interest rate swap is characterized by a constant fixed rate over multiple periods, unlike forward rate agreements, which involve single cash flow exchanges, and swaps have periodic settlements.

A is incorrect. Both interest rate swaps and forward rate agreements involve future cash flows.

B is incorrect. While it's true that no cash flow is exchanged upfront in both swaps and forward rate agreements, it's not a unique characteristic of interest rate swaps.

CFA Level I, Topic 8 - Derivatives, Learning Module 7: Pricing and Valuation of Interest Rate and Other Swaps. LOS (a): Describe how swap contracts are similar to but different from a series of forward contracts.

Q.4849 Why do issuers and investors tend to prefer interest rate swaps over individual forward rate agreements?

- A. Higher liquidity
- B. Lower cost
- C. Greater flexibility

The correct answer is **A**.

Interest rate swaps are preferred due to their greater liquidity compared to individual forward rate agreements, allowing for more efficient management of interest rate exposures.

B is incorrect. While interest rate swaps may or may not have lower costs compared to forward rate agreements, the primary reason for preferring swaps is their liquidity.

C is incorrect. While interest rate swaps do offer flexibility, liquidity is the primary reason for their preference over forward rate agreements.

CFA Level I, Topic 8 - Derivatives, Learning Module 7: Pricing and Valuation of Interest Rate and Other Swaps. LOS (a): Describe how swap contracts are similar to but different from a series of forward contracts.

Learning Module 8: Pricing and Valuation of Options

Q.1041 Consider a call option on a stock currently selling at \$95/share, and with a strike price of \$ 90/share. By how much is this option in the money or out of the money?

- A. \$5 at the money.
- B. \$5 in the money.
- C. \$5 out of the money.

The correct answer is **B**.

The call is \$5 in the money because the strike price is less than the current market price.

$$S - X = \$5$$

In these circumstances, the buyer stands to make a profit of \$5 if they decide to exercise the option (ignoring the premium paid).

A is incorrect. If the strike price is almost equal to spot price, then the option is considered to be at the money.

C is incorrect. If the strike price is more than the current market price the call option is considered to be out the money.

CFA Level I, Derivatives, Learning Module 8: Pricing and Valuation of Options. LOS (a): Explain the exercise value, moneyness, and time value of an option.

Q.1042 Consider a November 110 put on a stock currently selling at \$115/share. The option is:

- A. \$5 in the money.
- B. \$5 at the money.
- C. \$5 out of the money.

The correct answer is **C**.

The put is \$5 out of the money because the current market price is greater than the strike price.

$$X - S = -\$5$$

In these circumstances, the buyer of the option would have no incentive to exercise the option.

A is incorrect. If the strike price is more than the current market price the call option is considered to be out the money.

B is incorrect. If the strike price is almost equal to spot price, then the option is considered to be at the money.

CFA Level I, Derivatives, Learning Module 8: Pricing and Valuation of Options. LOS (a): Explain the exercise value, moneyness, and time value of an option.

Q.1043 Which of the following relationships is *most likely* correct?

- A. Option Premium = Intrinsic Value - Time Value.
- B. Option Premium = Time Value - Intrinsic Value.
- C. Option Premium = Intrinsic Value + Time Value.

The correct answer is **C**.

$$\text{Option Premium} = \text{Intrinsic Value} + \text{Time Value.}$$

The intrinsic value of an option represents the current value of the option. It's the difference between the price of the underlying asset and the strike price of the option. In other words, it's the option's moneyness.

The time value of an option is an additional amount the investor is willing to pay over the current intrinsic value. The investor is willing to pay this in cognizance of the possibility that the option will increase in value before its expiration date.

A is incorrect. It suggests that the option premium is calculated by subtracting the time value from the intrinsic value, which is not accurate. The intrinsic value and time value are not opposing forces in the calculation of an option's premium; rather, they are additive. The intrinsic value represents the current, tangible value of the option, while the time value represents the potential for additional value before expiration. Subtracting the time value from the intrinsic value would not provide a meaningful measure of the option's worth.

B is incorrect. It represents the option's immediate exercisable value. The time value is considered an extra cost that investors are willing to pay for the possibility of the option gaining value over time, not a primary value from which the intrinsic value is subtracted.

CFA Level I, Derivatives, Learning Module 8: Pricing and Valuation of Options. LOS (a): Explain the exercise value, moneyness, and time value of an option.

Q.1044 Which of the following is *least likely* a factor that determines the value of an option?

- A. The inflation rate.
- B. The price of the underlying asset.
- C. The volatility of the underlying asset.

The correct answer is **A**.

Both the price and the volatility of the underlying asset play an important role in determining the value of an option. The exercise price is directly proportional to the value of a put option and inversely proportional to the value of a call option. Volatility is directly proportional to the value of both call and puts options.

The risk-free rate, not the inflation rate, is directly proportional to the value of a call option and inversely proportional to the value of a put option.

B is incorrect. The price of the underlying asset is one of the most critical determinants of an option's value. For a call option, as the price of the underlying asset increases, the value of the option typically increases. Conversely, for a put option, as the price of the underlying asset decreases, the value of the option typically increases. This direct relationship between the price of the underlying asset and the option's value is fundamental to options pricing.

C is incorrect. Volatility measures the degree of variation in the price of the underlying asset over time. Higher volatility increases the probability that the option will end up in-the-money by expiration, thereby increasing its value. This applies to both call and put options. Volatility is a critical component in options pricing models because it reflects the underlying asset's risk level.

CFA Level I, Derivatives, Learning Module 8: Pricing and Valuation of Options. LOS (c): Identify the factors that determine the value of an option and describe how each factor affects the value of an option.

Q.1046 A deep out-of-the-money option is *most likely* priced:

- A. At its time value.
- B. Under its time value.
- C. Higher than its time value.

The correct answer is **A**.

A deep out of the money call (put) option is an option whose strike price is greater (less) than the current market price of the underlying.

An option's value has 2 components: (1) time value and (2) intrinsic value. A deep out-of-the-money option is priced at its time value since the intrinsic value is close to zero. The time value of an option measures the benefits of holding an option with the time remaining to maturity with some chance that the price of the underlying will move towards the desired strike price.

The time value of an option reduces as the option nears its expiry date. Even though a deep out of the money option appears worthless, its time value means that the derivative still has some value. Some investors are willing to pay some money for the remaining time value. Such options will therefore be priced at their time value.

B is incorrect. This option suggests that a deep out-of-the-money option would be priced under its time value. This is not possible since the intrinsic value is zero or close to zero, and the option's entire worth is derived from its time value. Pricing it under its time value would imply the option has negative value, which contradicts the principles of option pricing.

C is incorrect. Suggesting that a deep out-of-the-money option is priced higher than its time value implies there is additional value beyond the time value, which is not the case. The intrinsic value is zero, and the time value is the only component contributing to the option's price. Therefore, it cannot be priced higher than its time value without contradicting the fundamental principles of how options are valued.

CFA Level I, Derivatives, Learning Module 8: Pricing and Valuation of Options. LOS (a): Explain the exercise value, moneyness, and time value of an option.

Q.1047 What is the *most likely* result of a decrease in the risk-free rate of return on put and call option prices?

- A. Both put and call prices will increase.
- B. Put option prices will decrease while call option prices will increase.
- C. Put option prices will increase while call option prices will decrease.

The correct answer is **C**.

The result of a decrease in the risk-free rate of interest will increase put option prices and decrease call option prices.

A call option can be looked at as the right to delay a purchase. The higher the interest rate you can earn on the cash you will use to make the purchase, the greater the benefit of being able to delay it.

A put option can be looked at as the right to delay a sale. The higher the interest rate you can earn on the cash generated from the sale, the less desirable it is to delay it.

A is incorrect. This option suggests that both put and call prices will increase with a decrease in the risk-free rate. While it is true that put option prices increase, call option prices actually decrease for the reasons explained above. The differential impact on put and call options is a direct consequence of how each option's value is influenced by changes in the risk-free rate.

B is incorrect. This option states that put option prices will decrease while call option prices will increase with a decrease in the risk-free rate. This is the opposite of the actual relationship between risk-free rates and option prices. As explained, a decrease in the risk-free rate makes put options more valuable (due to the lower opportunity cost of holding cash) and call options less valuable (due to the reduced benefit of deferring the purchase of the underlying asset).

CFA Level I, Derivatives, Learning Module 8: Pricing and Valuation of Options. LOS (c): Identify the factors that determine the value of an option and describe how each factor affects the value of an option.

Q.1146 Which of the following *best* describes the obligation of the writer of a put option?

- A. To sell the option at its strike price if the option is exercised.
- B. To buy the underlying security at the option's strike price if the option is exercised.
- C. To sell the underlying security at the option's strike price if the option is exercised.

The correct answer is **B**.

When you write (sell) a put option, you receive the premium and, in exchange, have the obligation to purchase the underlying security at the option's strike price if the buyer decides to exercise the option.

The buyer of an option (either a call or a put) has “the right to transact, but not the obligation” whereas the writer (seller) of an option has an obligation.

A is incorrect. This option describes the obligation of the writer of a call option, not a put option. In the case of a call option, the writer is obligated to sell the underlying security at the option's strike price if the option is exercised by the buyer. This is fundamentally different from the obligation associated with writing a put option, where the writer must buy the underlying security.

C is incorrect. This choice also inaccurately describes the obligation of a put option writer. It mistakenly suggests that the writer of a put option must sell the underlying security at the option's strike price if the option is exercised. This misunderstanding could lead to confusion about the roles and responsibilities in options trading, where clear distinctions between the types of options and their respective obligations are crucial for effective market participation.

CFA Level I, Derivatives, Learning Module 8: Pricing and Valuation of Options. LOS (c): Identify the factors that determine the value of an option and describe how each factor affects the value of an option.

Q.1153 If the spot price is less than the strike price of a call option on the underlying, the option is said to be:

- A. In-the-money.
- B. At-the-money .
- C. Out-of-the-money.

The correct answer is **C**.

If the exercise of an option generates a negative value, then the option is out of the money. For instance assume that the spot price is \$50 and the strike price is \$55. In this case, exercising the call option implies that the option holder will have to spend \$55 to buy the underlying, but they can only get \$50 if they decide to sell it in the open market.

A is incorrect. An in-the-money (ITM) call option is characterized by a strike price that is lower than the current market price of the underlying asset. This means that if the option were exercised, the holder could buy the asset at a price below the market value, potentially resulting in an immediate profit if sold at the current market price.

B is incorrect. An at-the-money (ATM) call option occurs when the strike price and the current market price of the underlying asset are equal. This means the option holder would neither gain nor lose money if they were to exercise the option and immediately sell the asset at the market price (ignoring transaction costs and premiums paid for the option).

CFA Level I, Derivatives, Learning Module 8: Pricing and Valuation of Options. LOS (a): Explain the exercise value, moneyness, and time value of an option.

Q.1156 Which condition will *most likely* increase the value of a call option?

- A. A decrease in volatility.
- B. A decrease in stock price.
- C. An increase in the risk-free rate.

The correct answer is **C**.

An increase in any/all of the risk-free rate, volatility, or the stock price will increase the value of a call option.

A is incorrect. A decrease in volatility generally leads to a decrease in the value of a call option. Volatility is a measure of the stock's price fluctuations. Higher volatility increases the probability that the stock price will hit higher highs, which is beneficial for a call option since it gives the option holder the right but not the obligation to buy the stock at a predetermined price. Lower volatility means there is less chance of the stock price moving significantly, which reduces the potential upside and, consequently, the value of the call option.

B is incorrect. A decrease in the stock price typically leads to a decrease in the value of a call option. The intrinsic value of a call option is calculated as the current stock price minus the strike price (the price at which the option holder can buy the stock), provided this difference is positive. If the stock price decreases, the difference between the stock price and the strike price narrows (or becomes negative), reducing the intrinsic value of the call option. Since the value of a call option is partly derived from its intrinsic value, a decrease in the stock price generally results in a lower call option value.

CFA Level I, Derivatives, Learning Module 8: Pricing and Valuation of Options. LOS (c): Identify the factors that determine the value of an option and describe how each factor affects the value of an option.

Q.1160 Which of the following options on assets that have cash flows during the term of the option will *most likely* have the greater price?

- A. Fiduciary option.
- B. American option.
- C. European option.

The correct answer is **B**.

An American option is exercisable at any time before and on the expiration date. This increases its buying price when compared to an European option that is only exercisable on the expiration date.

A is incorrect. The term "fiduciary option" does not directly apply to the context of options pricing in the manner described by the question. Fiduciary duties refer to the responsibilities that one party has to another in a relationship of trust. While fiduciary principles might influence the behavior of parties in financial transactions, they do not constitute a type of option or directly impact option pricing in the way that the exercise rights of American or European options do.

C is incorrect. A European option, which can only be exercised on the expiration date, lacks the flexibility of an American option. This limitation generally results in a lower price compared to an American option for assets that have cash flows during the term of the option. The inability to exercise the option early and capture cash flows such as dividends reduces the European option's value. While European options might be preferred for their simplicity and potentially lower cost, they do not offer the same level of strategic flexibility as American options, which is a critical factor in pricing.

CFA Level I, Derivatives, Learning Module 8: Pricing and Valuation of Options. LOS (c): Identify the factors that determine the value of an option and describe how each factor affects the value of an option.

Q.3347 Hailey Moore, a derivatives expert, made the following comments during a meeting with her fellow colleagues: Comment 1: "Call options are very lucrative investments since they offer the buyer unlimited gains and a limited loss potential." Comment 2: "Selling a call option, without taking offsetting positions, is probably the worst investment strategy since it exposes the investor to unlimited losses." Which of the following would *most likely* refute the aforementioned conclusions presented by Moore?

- A. Frequently closing out positions.
- B. Changing frequencies with which gains and losses occur.
- C. Most options being deep-in-the-money or deep out-of-money.

The correct answer is **B**.

Changing the frequency with which gains and losses occur can significantly impact the perceived benefits and risks associated with call options, thus refuting Hailey Moore's conclusions. Moore's first comment highlights the lucrative aspect of buying call options due to their structure of offering unlimited gains while limiting losses to the premium paid. This characteristic indeed makes call options attractive to investors who are bullish on the underlying asset. However, the frequency of gains and losses plays a crucial role in determining the actual profitability of engaging in call options. If the underlying asset's price does not increase above the strike price frequently enough to cover the cost of the premiums for the options that expire worthless, the strategy may not be as lucrative as suggested.

A is incorrect. Frequently closing out positions does not directly refute Moore's conclusions about the nature of call options. While managing and closing positions can be part of a broader strategy to mitigate risks or lock in gains, it does not inherently change the fundamental characteristics of call options that Moore describes. The decision to close out positions frequently is more about tactical execution rather than a fundamental critique of the investment strategy itself.

C is incorrect. The fact that most options being deep-in-the-money or deep out-of-money does not directly challenge Moore's conclusions. While the moneyness of an option at expiration can affect the outcome for the option holder or writer, Moore's comments are more focused on the inherent structure and risk/reward profile of call options in general. Whether an option is deep-in-the-money or deep out-of-money affects the value and potential profitability of specific positions but does not refute the general advantages and disadvantages of buying or selling call options as described by Moore.

CFA Level I, Derivatives, Learning Module 8: Pricing and Valuation of Options. LOS (c): Identify the factors that determine the value of an option and describe how each factor affects the value of an option.

Q.3360 The value of European call option is:

- A. Inversely related to the exercise price and the value of the underlying.
- B. Directly related to the time to the expiration and the value of the underlying.
- C. Directly related to the exercise price and inversely related to the value of the underlying.

The correct answer is **B**.

The value of a call option is directly related to the time to expiration. That means the call's value increases as the time to expiration increases. Over a longer duration, there is a greater chance that the spot price will rise above the exercise price.

The value of a call is also directly related to the value of the underlying. This means that the option's value increases with an increase in the price of the underlying and vice versa. That's because a call option is equivalent to buying the underlying.

However, there is an inverse relationship between a call option's value and its exercise price. As the exercise price increases, the call's value decreases and vice versa. As the exercise increases, the chances of the call being in-the-money at expiration decrease because the underlying would have to show even more positive price movement.

A is incorrect. This option suggests that the value of a European call option is inversely related to both the exercise price and the value of the underlying asset. While it is true that the value of a call option is inversely related to the exercise price (meaning the call option's value decreases as the exercise price increases), it is directly related to the value of the underlying asset. An increase in the value of the underlying asset increases the likelihood that the call option will be in-the-money at expiration, thereby increasing its value.

C is incorrect. It increases the likelihood that the option will be in-the-money at expiration.

CFA Level I, Derivatives, Learning Module 8: Pricing and Valuation of Options. LOS (c): Identify the factors that determine the value of an option and describe how each factor affects the value of an option.

Q.3363 James Porter is analyzing the following option contracts on a security with a current market price of \$20

Call Options	Exercise Price	Time to Expiration
A	\$25	36 months
B	\$29	8 months
C	\$30	22 months

Which of the above option contracts is *most likely* to have the lowest premium?

- A. Call A.
- B. Call B.
- C. Call C.

The correct answer is **B**.

Call option B has a higher exercise price and a lower time to expiration than option A. Even though its exercise price is slightly lower than that of Option C, the latter has a much longer time to expiration, and hence, is more expensive.

Note: Exercise price is inversely proportional to the value of a call option. As the exercise price increases, the value of a call option decreases and vice versa. Time to expiration is directly proportional to the value of a call option. A longer time to expiration implies more potential for price movements, thereby increasing the option's value. The opposite is true.

A and C are incorrect. As explained above.

CFA Level I, Derivatives, Learning Module 8: Pricing and Valuation of Options. LOS (c): Identify the factors that determine the value of an option and describe how each factor affects the value of an option.

Q.3365 An American style put option on a bond expires in 80 days and has an exercise price of \$0.90 per \$1 of par. The bond is currently worth \$1.20 per \$1 par and makes no cash payments during the life of the option. The risk-free rate of interest is 3.5%, and the notional principal of the contract is \$1,000. The bond is expected to be worth \$1.40 per \$1 par at option expiration. The highest and lowest possible prices (per \$1 par value) for the put option are respectively *closest to*:

- A. Highest price: \$0.89; Lowest price: \$0.20.
- B. Highest price: \$0.90; Lowest price: \$0.00.
- C. Highest price: \$1.40; Lowest price: \$1.20.

The correct answer is **B**.

The maximum value of an American put is the exercise price, \$0.90 per 1 par value while the minimum value of any option is 0.

A is incorrect. It suggests that the highest price for the put option could be \$0.89, which is less than the exercise price of \$0.90. This does not align with the principle that the maximum value of an American put option can be its exercise price.

C is incorrect. These values do not align with the principles of option pricing. The highest price cannot exceed the exercise price for a put option, and the lowest price cannot be greater than 0.

CFA Level I, Derivatives, Learning Module 8: Pricing and Valuation of Options. LOS (a): Explain the exercise value, moneyness, and time value of an option.

Q.3378 Which of the following conditions will make a long-term European put option worth more than an otherwise identical short-term put option?

- A. The volatility in the market is low.
- B. Interest rates are lower than they have ever been in the past.
- C. Interest rates are higher than they have ever been in the past.

The correct answer is **B**.

A long-term European put option will be worth a lot more than an otherwise identical short-term put option if interest rates are lower and volatility is higher. Since European options can only be exercised on their expiration date, a longer time to expiration suggests that the option holder will need to wait longer to receive money from the sale of the underlying. The lost interest will be a disadvantage of the additional time; lower interest rates will reduce this lost interest. Higher volatility will increase the chances that the underlying price will move in favor of the option holder.

A is incorrect. The volatility of the market is a critical factor in determining the value of options. Higher volatility increases the potential for the underlying asset's price to move significantly, which can increase the value of options, including put options. Therefore, low volatility would not make a long-term European put option worth more than an identical short-term put option. In fact, higher volatility is generally favorable for the value of long-term options, as it increases the chances of the option ending in the money.

C is incorrect. The cost of carrying or holding an option (the opportunity cost of not investing the funds at the risk-free rate) increases with higher interest rates. For long-term options, this cost is more significant due to the longer period until expiration. Therefore, higher interest rates would not make a long-term European put option more valuable than an otherwise identical short-term option; it would likely have the opposite effect.

CFA Level I, Derivatives, Learning Module 8: Pricing and Valuation of Options. LOS (c): Identify the factors that determine the value of an option and describe how each factor affects the value of an option.

Q.3381 An investor purchases a European put option that is deep in the money. Increasing the risk-free rate and time to expiration will have an effect on the value of the option, that is:

- A. Neutral.
- B. Positive.
- C. Negative.

The correct answer is **C**.

Increasing the risk-free rate and time to expiration for a European put option that is deep in the money generally has a negative effect on the option's value. Recall that a put option that is deep in the money means that the strike price is significantly above the current market price of the underlying asset.

An increase in the risk-free interest rate tends to decrease the value of a put option. This is because the risk-free rate is a component of the option pricing models, such as the Black-Scholes model. Higher risk-free rates increase the cost of carrying the underlying asset, as it becomes more expensive to hold the asset when the returns from risk-free investments are higher. This makes the put option less attractive, as the opportunity cost of holding the asset rather than investing in risk-free securities increases. Additionally, the present value of the option's payoff decreases as the risk-free rate rises because the future payoff is discounted back at a higher rate.

Similarly, increasing the time to expiration can have a complex effect on the value of a deep-in-the-money put option. While longer time frames generally increase the value of options due to the higher uncertainty and potential for the underlying asset's price to move in a favorable direction, for deep in-the-money put options, this effect might be offset by the time value decay and the increased cost of carry. The net effect tends to be negative, as the benefits of having more time for the asset price to decrease further (which would be beneficial for a put option) are outweighed by the costs associated with holding the option for a longer period.

A is incorrect. Suggesting that the effect is neutral overlooks the impact of the risk-free rate and time to expiration on the option's value. The risk-free rate affects the cost of carry and the present value of the option's payoff, while the time to expiration influences the option's time value and the uncertainty regarding the underlying asset's future price movements.

B is incorrect. Indicating a positive effect contradicts the principles of option pricing. While certain factors, such as an increase in the underlying asset's volatility, could increase a put option's value, an increase in the risk-free rate and time to expiration for a deep in-the-money European put option generally leads to a decrease in its value due to the reasons explained above.

CFA Level I, Derivatives, Learning Module 8: Pricing and Valuation of Options. LOS c: Identify the factors that determine the value of an option and describe how each factor affects the value of an option

Q.3382 Consider two otherwise identical 3-month European call and put options on BBT Company's stock. Who will benefit *most* from an increase in carrying costs?

- A. The call option issuer.
- B. The put option holder.
- C. The call option holder.

The correct answer is **C**.

A call option holder will benefit from an increase in carrying costs. Holding the call option will enable the investor to participate in the movements of the underlying without having to incur these costs.

A is incorrect. On the other hand, a call option issuer will hold the underlying and bear the costs associated with storing an asset.

B is incorrect. Similarly, holding put options will make it more expensive to participate in movements of the underlying than by short selling because short sellers benefit from carrying costs, which are borne by owners of the asset.

CFA Level I, Derivatives, Learning Module 8: Pricing and Valuation of Options. LOS (c): Identify the factors that determine the value of an option and describe how each factor affects the value of an option.

Q.3390 The value of a European put option will increase with higher:

- A. Volatility.
- B. Carrying costs.
- C. Risk-free interest rates.

The correct answer is **A**.

Higher volatility will increase the value of a European put option because it increases the chances of the underlying price declining relative to the exercise price.

B is incorrect. Carrying costs will raise the effective cost of holding or shorting the asset. Holding put options will make it more expensive to participate in the movements of the underlying than by short selling because short sellers benefit from carrying costs, which are borne by the owners of the assets.

C is incorrect. A higher risk-free interest rate will lower the present value of the amount received once the option is exercised. This will decrease the value of the European put.

CFA Level I, Derivatives, Learning Module 8: Pricing and Valuation of Options. LOS (c): Identify the factors that determine the value of an option and describe how each factor affects the value of an option.

Q.4182 Which of the following is *most likely* true regarding a call option replication strategy only?

- A. At option contract inception, borrow at a risk-free rate and then utilize the proceeds to buy the underlying asset at a price at the option inception.
- B. At option contract inception, lend an amount equal to the option's exercise value at a risk-free rate and sell the underlying at a price at the option inception.
- C. The replication strategy requires adjustment over time depending on the likelihood of option exercise.

The correct answer is **A**.

Replication of a call option at the contract initiation involves borrowing at a risk-free rate, r , and then utilizing the proceeds to buy the underlying asset at a price of S_0 .

At the expiration date ($t = T$), there exist two replication outcomes:

- If $S_T < X$, exercise the option: sell the underlying at S_T and use the proceeds to repay the risk-free loan.
- If $S_T > X$, no exercise: no settlement is needed.

B is incorrect. It describes the replication strategy in put options. Replication of a put option at the contract initiation involves selling the underlying short at a price of S_0 and lending the proceeds at the risk-free rate, r .

C is incorrect. Adjustments are required over time in both call and put option replication strategies based on the likelihood of exercise.

CFA Level I, Derivatives, Learning Module 8: Pricing and Valuation of Options. LOS (b): Contrast the use of arbitrage and replication concepts in pricing forward commitments and contingent claims.

Q.4183 Consider a one-year call option with an exercise price of \$100 and a risk-free rate of 1.5%. If after six months, the spot price of the underlying is \$105, the exercise value of the option after six months is *closest to*:

- A. \$0
- B. \$0.74
- C. \$5.74

The correct answer is **C**.

The exercise value of a call option is the value of an option contract at any time $t < T$, and it is calculated as spot price (S_t) minus the present value of the exercise price:

$$\begin{aligned}c_t &= \text{Max}(0, S_t - X(1 + r)^{-(T-t)}) \\&= \text{Max}(0, 105 - 100(1.015)^{-0.5}) \\&= \text{Max}(0, 105 - 99.258) = \$5.74\end{aligned}$$

A is incorrect. It assumes that the option in question is the put option so that,

$$\begin{aligned}p_t &= \text{Max}(0, S_t - X(1 + r)^{-(T-t)}) \\&= \text{Max}(0, 100(1.015)^{-0.5} - 105) \\&= \text{Max}(0, -5.74) = \$0\end{aligned}$$

B is incorrect. It uses only the exercise price in the calculation as follows:

$$\begin{aligned}c_t &= \text{Max}(0, S_t - X(1 + r)^{-(T-t)}) \\&= \text{Max}(0, 100 - 100(1.015)^{-0.5}) \\&= \text{Max}(0, 100 - 99.258) = \$0.74\end{aligned}$$

CFA Level I, Derivatives, Learning Module 8: Pricing and Valuation of Options. LOS (a): Explain the exercise value, moneyness, and time value of an option.

Q.4184 A one-year put option has an exercise value of \$99. After six months, the underlying spot price is \$96, and the observable price of the put option is \$4.5. Assuming the risk-free rate is 1%, the time value of the put option six months to maturity is *closest to*:

- A. \$1.99
- B. \$2.51
- C. \$7.01

The correct answer is **A**.

Denote the current price for a put option at any time $T = t$ by p_t . The time value of an option is defined as the difference between the current option price and the option's current payoff (or exercise value):

$$\begin{aligned}\text{Time Value} &= p_t - \text{Max}(0, X(1+r)^{-(T-t)} - S_t) \\ &= 4.5 - \text{Max}(0, 99(1.01)^{-0.5} - 96) \\ &= 4.5 - \text{Max}(0, 2.51) \\ &= 4.50 - 2.51 = \$1.99\end{aligned}$$

B is incorrect. It represents the current payoff of the put option after six months.

$$\begin{aligned}\text{Payoff of the put option after six months} &= \text{Max}(0, X(1+r)^{-(T-t)} - S_t) \\ &= \text{Max}(0, 99(1.01)^{-0.5} - 96) = \$2.51\end{aligned}$$

C is incorrect. It calculates the time value of the put option as the sum of the current option price and the option's current payoff (or exercise value)

$$\begin{aligned}\text{Time Value} &= p_t + \text{Max}(0, X(1+r)^{-(T-t)} - S_t) \\ &= 4.5 + \text{Max}(0, 99(1.01)^{-0.5} - 96) \\ &= 4.5 + \text{Max}(0, 2.51) \\ &= 4.50 + 2.51 = \$7.01\end{aligned}$$

CFA Level I, Derivatives, Learning Module 8: Pricing and Valuation of Options. LOS (a): Explain the exercise value, moneyness, and time value of an option.

Q.4185 A European call option on a non-dividend paying stock has 4 months to maturity. The exercise price of the option is \$100, and the risk-free rate is 1.5%. If the current underlying price is \$105 and the current call option price is \$6.5, the time value of the call option is *closest to*:

- A. \$1.00
- B. \$5.50
- C. \$12.00

The correct answer is **A**.

Denote the current price for a call option at any time $T = t$ by c_t . The time value of an option is defined as the difference between the current option price and the option's current payoff (or exercise value):

$$\begin{aligned}\text{Time Value} &= c_t - \text{Max}(0, S_t - X(1 + r)^{-(T-t)}) \\ &= 6.5 - \text{Max}(0, 105 - 100(1.015)^{-0.3333}) \\ &= 6.5 - \text{Max}(0, 5.50) \\ &= 6.50 - 5.50 = \$1.00\end{aligned}$$

B is incorrect. It represents the current payoff of the put option after four months.

$$\begin{aligned}\text{Max}(0, S_t - X(1 + r)^{-(T-t)}) &= \text{Max}(0, 105 - 100(1.015)^{-0.3333}) \\ &= \$5.50\end{aligned}$$

C is incorrect. It calculates the time value of the call option as:

$$\begin{aligned}\text{Time Value} &= c_t + \text{Max}(0, S_t - X(1 + r)^{-(T-t)}) \\ &= 6.5 + \text{Max}(0, 105 - 100(1.015)^{-0.3333}) \\ &= 6.5 + \text{Max}(0, 5.50) \\ &= 6.50 + 5.50 = \$12.00\end{aligned}$$

CFA Level I, Derivatives, Learning Module 8: Pricing and Valuation of Options. LOS (a): Explain the exercise value, moneyness, and time value of an option.

Q.4186 Which of the following is *most likely* a consequence of a lower no-arbitrage bound at any time before maturity?

- A. A call option is exercisable if the underlying price exceeds the exercise price.
- B. A call option is exercisable if the underlying price is less than the exercise price.
- C. A call option buyer will not pay more than the underlying price for the right to buy the underlying.

The correct answer is **A**.

A call option is exercisable if the underlying price exceeds the exercise price. That is $S_t > X$. As such, the lower bound of a call price is the underlying price minus the present value of the exercise price or zero, whichever is greater. Put into the equation:

$$\text{Lower Bound} = \text{Max}(0, S_t - X(1 + r)^{-(T-t)})$$

B is incorrect. It is associated with the no-arbitrage upper bound.

C is incorrect. It is a consequence of the upper no-arbitrage upper bound of a call option. A call buyer will not pay more than the underlying price for the right to buy the underlying. As such, the upper bound is the current underlying price.

$$\text{Upper bound} = S_t$$

CFA Level I, Derivatives, Learning Module 8: Pricing and Valuation of Options. LOS (c): Identify the factors that determine the value of an option and describe how each factor affects the value of an option.

Q.4187 Consider a one-year put option with an exercise price of USD 100 and a risk-free rate of 1%. If, after six months, the spot price of the underlying is USD 98.50, the no-arbitrage upper and lower bounds are *closest to*:

- A. Lower bound = 0.51; Upper bound = \$100.
- B. Lower bound = 1.00; Upper bound = \$100.
- C. Lower bound = 0.51; Upper bound = \$98.50.

The correct answer is **B**.

A call option buyer exercises a put option only if $S_T < X$. As such, the upper bound on the put value is thus the exercise price.

$$\text{Upper Bound} = X = 100$$

The lower bound is the present value of the exercise price minus the spot price or zero, whichever is greater:

$$\text{Lower bound} = \text{Max}(0, 100(1.01)^{-(0.5)} - 98.5) = \$1.00$$

A is incorrect. It assumes that the no-arbitrage lower bound is the current payoff of the put option.

C is incorrect. It assumes that the no-arbitrage lower bound is the current payoff of the put option, and the upper bound is the current underlying price.

CFA Level I, Derivatives, Learning Module 8: Pricing and Valuation of Options. LOS (a): Explain the exercise value, moneyness, and time value of an option.

Q.4188 Which of the following factors *most likely* have the same effect on both the call and put options?

- A. Increase in the risk-free rate.
- B. Decrease in exercise price.
- C. Increase in the volatility of the underlying price

The correct answer is **C**.

An increase in volatility will increase the value of both call and put options. Higher volatility of the underlying asset increases the chances of a higher positive exercise value without affecting the downside case – the option expires worthless. For instance, as volatility increases, a broader possibility of underlying prices increases the time value of an option and the likelihood of being in the money.

A is incorrect. The value of a call option at any time before maturity ($t < T$) is given by

$$c_t = \text{Max}(0, S_t - X(1 + r)^{-(T-t)})$$

A higher risk-free rate increases the value of the call option. This is because a higher risk-free rate lowers the present value of the exercise price, provided the option is in the money. For a put option, its value at any time before maturity ($t < T$) is given by:

$$p_t = \text{Max}(0, X(1 + r)^{-(T-t)} - S_t)$$

As such, a higher risk-free rate decreases the exercise value of a put option due to the same explanation in the call option.

B is incorrect. The exercise price determines whether an option buyer will exercise the option at the expiration. Remember that the payoff of a call option at maturity is $\text{Max}(0, S_T - X)$. Intuitively, a lower exercise price will increase both the likelihood of exercise and settlement value if it is in the money.

For the put option, the exercise price is the upper bound of the option price. Moreover, the payoff of a put option is $\text{Max}(0, X - S_T)$. As such, a high exercise price increases the value of the put option.

CFA Level I, Derivatives, Learning Module 8: Pricing and Valuation of Options. LOS (c): Identify the factors that determine the value of an option and describe how each factor affects the value of an option.

Learning Module 9: Option Replication Using Put-Call Parity

Q.1149 In which of the following positions can an arbitrageur earn risk-free profits when the market is in contango?

- A. Long forward contract and long underlying asset at the spot price.
- B. Short forward contract and long underlying asset at the spot price.
- C. Short forward contract and short underlying asset at the spot price.

The correct answer is **B**.

Contango is a situation where the futures price (or forward price) of a commodity is higher than the spot price.

When the forward price is higher than the spot price, an arbitrageur can (I) borrow funds at the risk-free rate, (II) buy the underlying asset at the spot price, and (III) short the asset at the higher forward price.

Example:

Assume that the spot price of oil is \$50 a barrel. The market would be said to be in contango if the futures price of oil two months from now is \$55. In these circumstances, a trader could take the following actions:

- I. Borrow \$50 at the risk-free rate.
- II. Buy oil today at \$50 and sit on it for two months.
- III. Sell a futures contract for delivery two months out at \$55.

By locking in that profit at the higher price, and then sitting on the physical oil for a couple of months, a trader makes substantial gains.

A is incorrect. Going long on both the forward contract and the underlying asset at the spot price does not exploit the price difference between the spot and forward prices in a contango market. This strategy would involve buying the asset now and agreeing to buy it again in the future at the forward price, which is higher than the spot price. This does not create an arbitrage opportunity but rather exposes the investor to the risk of paying more for the asset in the future than its current price.

C is incorrect. Shorting both the forward contract and the underlying asset at the spot price does not create an arbitrage opportunity in a contango market. This strategy would involve selling the asset now and agreeing to sell it again in the future at the forward price. Without owning the asset, the arbitrageur would have to purchase it in the future, potentially at a higher price, to fulfill the forward contract, which introduces significant risk and does not guarantee a profit.

CFA Level I, Derivatives, Learning Module 9: Option Replication Using Put-Call Parity.
LOS (b): Explain put-call forward parity for European options.

Q.1155 Calculate the payoff of a fiduciary call option if the spot price is \$45, the strike price is \$37, and the payoff on the riskless bond is \$37.

- A. \$8.
- B. \$10.
- C. \$45.

The correct answer is **C**.

A fiduciary call consists of a European call and a risk-free bond that matures on the option expiration date.

If the option is in the money, then the payoff of the fiduciary call is

$$X + (S - X) \text{ or } 37 + (\$45 - \$37) = \$45$$

A is incorrect. Suggesting a payoff of \$8 overlooks the structure of a fiduciary call. The option alone, if exercised, would indeed result in a gain of $S - X = \$45 - \$37 = \$8$, but this does not account for the total value of the fiduciary call strategy, which also includes the payoff of the riskless bond.

B is incorrect. Suggesting a payoff of \$8 overlooks the structure of a fiduciary call. The option alone, if exercised, would indeed result in a gain of $S - X = \$45 - \$37 = \$8$, but this does not account for the total value of the fiduciary call strategy, which also includes the payoff of the riskless bond. The correct calculation combines the intrinsic value of the call option with the bond's payoff, leading to a total payoff of \$45, not just the option's intrinsic value.

CFA Level I, Derivatives, Learning Module 9: Option Replication Using Put-Call Parity.
LOS (a): Explain put-call parity for European options.

Q.3351 Leslie Hower is a junior trader at a derivatives dealer firm. During her first week at the firm, Hower attempts to synthetically sell a risk-free bond using call and put options. She purchases call and put options with the same exercise price and time to maturity. She simultaneously buys the underlying. With respect to her attempts in creating a synthetic short position in a risk-free bond, Hower is *most accurate* regarding her decision to:

- A. Purchase put options.
- B. Purchase call options.
- C. Buy the underlying short.

The correct answer is **B**.

Based on the rearranged put-call parity (see below), in order to synthetically short sell (issue) a risk-free bond, a call option should be purchased while short selling the underlying and a put option.

$$\frac{-X}{(1+r)^T} = c_0 - p_0 - S_0$$

Given the information in the question, Leslie Hower has purchased call and put options with the same exercise price and time to maturity and simultaneously bought the underlying asset. This creates a synthetic short position in a risk-free bond. According to put-call parity, the value of the call option and the put option should be equal. Therefore, the most accurate decision made by Hower is to purchase the call option, as this is consistent with creating a synthetic short position in a risk-free bond.

A is incorrect. Purchasing put options alone does not create a synthetic short position in a risk-free bond. While put options increase in value when the underlying asset's price decreases, which is a component of a synthetic short position, without the corresponding sale of a call option and the short sale of the underlying asset, the position does not fully replicate the desired payoff structure.

C is incorrect. Buying the underlying short is not a decision that can be made. The phrase likely intended to suggest short selling the underlying asset, which is indeed a part of creating a synthetic short position in a risk-free bond. Short-selling the underlying asset is necessary but not sufficient on its own to create the synthetic short bond position; it must be combined with the purchase of a call option and the sale of a put option.

CFA Level I, Derivatives, Learning Module 9: Option Replication Using Put-Call Parity.
LOS (a): Explain put-call parity for European options.

Q.3362 A synthetic long position in a riskless bond is *most likely* created by combining:

- A. A long position in a put, a long position in the underlying, and a short position in the call.
- B. A long position in a call, a long position in the underlying, and a short position in the put.
- C. A short position in a put, a short position in the underlying, and a long position in the call.

The correct answer is **A**.

A synthetic long position in a riskless bond is created by combining a long position in a put, a long position in the underlying, and a short position in the call.

$$X(1 + r)^{-T} = p_0 + S_0 - c_0$$

Where:

c_0 = Price of the call option

p_0 = Price of the put option

S_0 = Current price of the underlying asset

X = Strike price of the options

r = Risk-free interest rate

T = Time to maturity

B is incorrect. A long position in a call, a long position in the underlying, and a short position in the put does not create a synthetic long position in a riskless bond. Instead, this combination leans more towards creating a leveraged position in the underlying asset, which does not guarantee a risk-free return equivalent to holding a bond. The risk profile of this combination is significantly different from that of a riskless bond, as it involves both the potential for unlimited gains (due to the long call) and losses (due to the short put).

C is incorrect. A short position in a put, a short position in the underlying, and a long position in the call is essentially a speculative strategy that does not replicate the payoff of a riskless bond. This combination could lead to unlimited losses due to the short positions in both the put and the underlying asset. The strategy's payoff is highly dependent on the movements of the underlying asset's price and does not provide the fixed, known return characteristic of a riskless bond.

CFA Level I, Derivatives, Learning Module 9: Option Replication Using Put-Call Parity.
LOS (a): Explain put-call parity for European options.

Q.3376 Which of the following combinations is *most likely* equivalent to going long a bond?

- A. Investing in a put option, purchasing the underlying, and at the same time selling a call.
- B. Investing in a call option, selling the underlying, and at the same time purchasing a put.
- C. Investing in a put option and a call option on the same underlying while going short the underlying.

The correct answer is **A**.

A long bond is equivalent to going long a put, long the underlying, and short a call. We could use the put-call parity to work this problem out.

$$C_o + \frac{X}{(1+r)^t} = P_o + S_o$$

. If we make the bond the subject:

$$\frac{X}{(1+r)^t} = P_o + S_o - C_o$$

An addition sign before a variable implies that that variable has been purchased (trader has taken a long position), whereas a subtraction sign implies that the variable has been sold (trader has taken a short position). A long bond is, therefore, equal to long a put, long the underlying and short a call.

B is incorrect. This option suggests investing in a call option, selling the underlying, and at the same time purchasing a put. This combination does not replicate the payoff of a long bond position. Instead, it represents a protective put strategy combined with a short position in the underlying asset, which does not align with the characteristics of holding a bond.

C is incorrect. The combination of investing in a put option and a call option on the same underlying while going short the underlying is known as a straddle. This strategy does not replicate the payoff of a long bond. A straddle aims to profit from significant movements in the price of the underlying asset in either direction, which is fundamentally different from the relatively stable and predictable returns associated with holding a bond.

CFA Level I, Derivatives, Learning Module 9: Option Replication Using Put-Call Parity.
LOS (a): Explain put-call parity for European options.

Q.3377 A European put option is selling for \$4.00 with an underlying priced at \$52. The exercise price is \$50, and the underlying makes no cash payments during the life of the option. The risk-free rate is 6.0%, and the option expires in 120 days. A call with the same exercise price and expiry sells for \$8.50. This put is *most likely*:

- A. overvalued by \$0.33.
- B. undervalued by \$1.55.
- C. undervalued by \$0.58.

The correct answer is **B**.

$$\begin{aligned}P_0 &= C_0 - S_0 + \frac{X}{(1+r)^T} \\&= 8.50 - 52 + \frac{50}{(1.06)^{\frac{120}{365}}} = \$5.55\end{aligned}$$

Hence, the put is undervalued by \$5.55 - \$4 = \$1.55.

A is incorrect. Suggesting the put is overvalued by \$0.33 does not align with the calculation based on the put-call parity. The calculation clearly shows that the put option is undervalued, not overvalued.

C is incorrect. While this option also suggests that the put is undervalued, the amount of \$0.58 does not match the correct calculation. The accurate undervaluation amount, as derived from the put-call parity, is \$1.55.

CFA Level I, Derivatives, Learning Module 9: Option Replication Using Put-Call Parity.
LOS (a): Explain put-call parity for European options.

Q.3397 A three-month call option with an exercise price of \$55 is being sold for \$8. A three-month Treasury bond is being sold in the marketplace with the same face value as the option's exercise price. The underlying is currently worth \$60, and the risk-free rate is 4.30%. Assuming the put-call parity holds, a put option is being sold for:

- A. \$0.73.
- B. \$2.42.
- C. \$12.34.

The correct answer is **B**.

$$\text{Put-call parity} = c_0 + \frac{X}{(1+r)^T} = S_0 + p_0$$
$$p_0 = \$8 + \left[\frac{\$55}{(1.043)^{0.25}} \right] - \$60 = \$2.42$$

A is incorrect. The calculation of \$0.73 does not align with the put-call parity formula given the provided values.

C is incorrect. The calculation of \$12.34 significantly overestimates the price of the put option.

CFA Level I, Derivatives, Learning Module 9: Option Replication Using Put-Call Parity.
LOS (a): Explain put-call parity for European options.

Q.4176 Assume a two-year put on a stock of Lakeview Inc. has a price of \$9 and an exercise price of \$89. A forward contract expiring in two years has a forward price of \$92. If the risk-free interest rate is 8%, the price of the call option using put-call forward parity is *closest to*:

A. \$10.57

B. \$11.57

C. \$15.00

The correct answer is **B**.

Using the put-call forward parity

$$F_0(T)(1+r)^{-T} + p_0 = c_0 + X(1+r)^{-T}$$

Making c_0 the subject of the formula, we get:

$$c_0 = p_0 - \frac{X - F}{(1+r)^T}$$

As such,

$$c_0 = \$9 - \frac{(89 - 92)}{(1 + 8\%)^2} = \$11.57$$

A is incorrect. It underestimates the value of the call option by not accurately accounting for the present value of the exercise price in the context of the put-call forward parity.

C is incorrect. It significantly overestimates the value of the call option.

CFA Level I, Derivatives, Learning Module 9: Option Replication Using Put-Call Parity.
LOS (b): Explain put-call forward parity for European options.

Q.4177 Which of the following positions *most likely* has the same no-arbitrage value as the long put option?

- A. Long underlying and short call option.
- B. Short put options, short underlying, and long risk-free bonds.
- C. Long risk-free bond, long call option, and short underlying.

The correct answer is **C**.

The put-call parity is given by:

$$S_0 + p_0 = c_0 + X(1 + r)^{-T}$$

Making p_0 the subject we get:

$$p_0 = c_0 + X(1 + r)^{-T} - S_0$$

As such, long put positions can be represented with a long risk-free bond, long call option, and short underlying.

A is incorrect. A long position in the underlying asset combined with a short call option does not replicate the payoff of a long put option. This combination represents a covered call strategy, which has a different risk and return profile compared to a long put option. The covered call strategy involves holding the underlying asset while selling a call option on the same asset, aiming to generate income from the option premium, which does not align with the payoff structure of a long put option.

B is incorrect. Shorting put options, shorting the underlying, and holding long risk-free bonds does not replicate the payoff of a long put option. This combination suggests a strategy that involves taking on obligations to potentially buy the underlying asset if the put options are exercised, while also betting on the decline in the asset's price through the short position. The inclusion of long risk-free bonds adds a fixed income component to the strategy. However, this combination does not provide the same payoff as holding a long put option, which offers the right but not the obligation to sell the underlying asset at a predetermined price, providing downside protection.

CFA Level I, Derivatives, Learning Module 9: Option Replication Using Put-Call Parity.
LOS (a): Explain put-call parity for European options.

Q.4178 Which of the following *most likely* represent the no-arbitrage value of a fiduciary call position?

- A. Long put, Long stock, Short bond.
- B. Long put, Long Stock.
- C. Short put, Short stock, Long bond.

The correct answer is **B**.

A fiduciary call combines a long call position and a long position in the risk-free bond. Essentially, it is the left-hand side of the put-call parity equation written as:

$$\boxed{S_0 + p_0} = c_0 + X(1 + r)^{-T}$$

↓
Fiduciary Call

A is incorrect. It suggests a combination of a long put, long stock, and short bond. This combination does not accurately represent a fiduciary call. A fiduciary call is specifically about creating a position that mimics the payoff of a call option through the combination of a risk-free bond and the underlying stock. The inclusion of a long put and short bond in this option introduces elements that are not part of the fiduciary call structure and thus does not align with the no-arbitrage value representation of a fiduciary call.

C is incorrect. It describes a position that is essentially the opposite of a fiduciary call. A short put, short stock, and long bond position would not replicate the payoff of a call option, which is what a fiduciary call aims to achieve. The fiduciary call strategy is designed to mimic the upside potential of owning a call option while protecting against downside risk through a risk-free bond. The combination suggested in option C would not achieve this objective, as shorting the stock and put would expose the investor to unlimited risk, which is contrary to the protective nature of a fiduciary call.

CFA Level I, Derivatives, Learning Module 9: Option Replication Using Put-Call Parity.
LOS (a): Explain put-call parity for European options.

Q.4180 Consider options and forward the contract expiring in 70 days. The exercise price of options is AUD 87, and the risk-free rate is 4.5%. If the call price is AUD 18.5 and the forward price is AUD 95, the put premium is *closest to*:

- A. AUD 8.95.
- B. AUD 10.57.
- C. AUD 11.34.

The correct answer is **B**.

Using the put-call forward parity

$$F_0(T)(1+r)^{-T} + p_0 = c_0 + X(1+r)^{-T}$$

Making p_0 the subject of the formula, we get:

$$p_0 = c_0 + (X - F_0(T))^{-T}$$

As such,

$$\begin{aligned} p_0 &= 18.5 + \frac{87 - 95}{(1.045)^{\frac{70}{365}}} \\ &= \text{AUD } 10.56725 \approx \text{AUD } 10.57 \end{aligned}$$

is incorrect. The calculation for a put premium of AUD 8.95 does not align with the put-call parity for forward contracts. The put-call parity relationship provides a direct method to calculate the put premium based on the call premium, the exercise price, the risk-free rate, the time to expiration, and the forward price, which leads to a different result.

C is incorrect. A put premium of AUD 11.34 suggests a calculation that does not accurately apply the put-call parity for forward contracts. This value could be the result of overestimating the impact of the risk-free rate or the time to expiration on the put premium. The put-call parity ensures that the relationship between the call price, put price, forward price, and exercise price is maintained, preventing arbitrage opportunities and ensuring market efficiency.

CFA Level I, Derivatives, Learning Module 9: Option Replication Using Put-Call Parity. LOS (b): Explain put-call forward parity for European options.

Q.4181 Tanya Glen is an investor who wants to take a position in a six-month forward contract. The put price value exceeds the call value by \$12, with both having the exercise price of \$90, and the risk-free rate is 6%. Assuming that options expire in six months, the forward price is *most likely*:

- A. less than the exercise price.
- B. more than the exercise price.
- C. not known due to the lack of sufficient information.

The correct answer is **A**.

Recall the put-call forward parity:

$$F_0(T)(1+r)^{-T} + p_0 = c_0 + X(1+r)^{-T}$$

We can rearrange the above equation as follows:

$$p_0 - c_0 = X(1+r)^{-T} - F_0(T)(1+r)^{-T}$$

Intuitively, if the left side of the equation is positive ($p_0 - c_0 \geq 0$), then $F_0(T) < X$. Since, $p_0 - c_0 = \$12$ then, it is true that $F_0(T) < X$.

B is incorrect. It suggests that the forward price is more than the exercise price. This contradicts the put-call parity and the given condition that the put price exceeds the call price. In a scenario where the put price is higher than the call price, it generally indicates a market expectation of a decrease in the asset's price, leading to a forward price that is less than the exercise price.

C is incorrect. It states that the forward price cannot be determined due to the lack of sufficient information. However, using the put-call parity and the given information about the put and call prices, as well as the risk-free rate, we can indeed infer the relationship between the forward price and the exercise price. The information provided is sufficient to conclude that the forward price is less than the exercise price.

CFA Level I, Derivatives, Learning Module 9: Option Replication Using Put-Call Parity.
LOS (b): Explain put-call forward parity for European options.

Learning Module 10: Valuing a Derivative Using a One-Period Binomial Model

Q.3898 Consider a call option on a stock price that is currently at \$50. The exercise price of the option is \$52, and the risk-free rate is 5%. If the stock price can rise by 20% or fall by 25%, the value of the option using the one-period binomial model is *closest to*:

A. 0.67.

B. 2.11.

C. 5.10.

The correct answer is C.

Consider the following one-period binomial model;

$$\begin{array}{ccc} u = 1.2 & S_1^+ = S_0 u = 50 \times 1.2 = 60 & c_1^+ = \max(0, S_1^+ - X) = 60 - 52 = 8 \\ & \nearrow & \\ S_0 = \$50, \quad c_0 = ? & & \\ & \searrow & \\ d = 0.75 & S_1^- = S_0 d = 50 \times 0.75 = 37.5 & c_1^- = \max(0, S_1^- - X) = 0 \end{array}$$

Using the binomial model, the value of the call option is given by:

$$c_0 = \frac{[\pi c_1^+ + (1 - \pi) c_1^-]}{1 + r}$$

$$\text{where } \pi = \frac{1 + r - d}{u - d} = \frac{1.05 - 0.75}{1.2 - 0.75} = 0.67$$

$$c_0 = \frac{0.67 \times 8 + 0.33 \times 0}{1.05} = \$5.10$$

CFA Level I, Derivatives, Learning Module 10: Valuing a Derivative Using a One-Period Binomial Model. LOS (a): Explain how to value a derivative using a one-period binomial model.

Q.4189 An analyst is considering buying a one-year call option on a non-dividend-paying stock with an exercise price of \$100. The current stock price is \$95. The stock price is expected to go up or down by 18% in one year. Assume a risk-free rate of return is 4%. The number of units that the analyst needs to buy to create a risk-free portfolio is *closest to*:

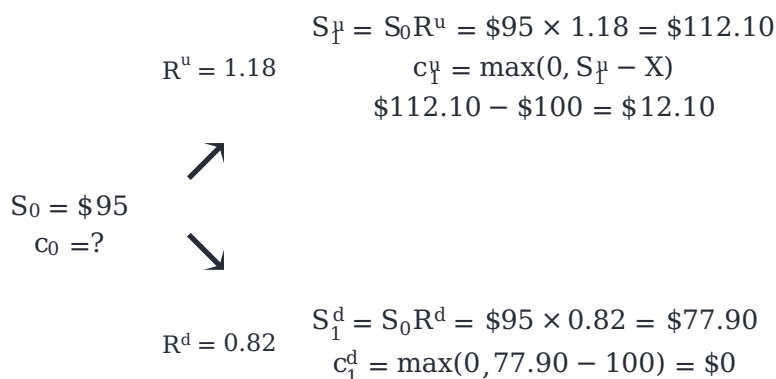
A. 0.35

B. 0.45

C. 2.90

The correct answer is **A**.

This question requires us to calculate the hedge ratio. Denote the initial stock price by S_0 and consider the following diagram:



The hedge ratio is given by:

$$h = \frac{c_1^u - c_1^d}{S_1^u - S_1^d} = \frac{12.10 - 0}{112.10 - 77.90} = 0.353$$

Therefore, to create a risk-free portfolio, the analyst can buy a put option and 0.35 units of the underlying assets (or for each purchased unit of the underlying asset, we buy 2.9 units).

CFA Level I, Derivatives, Learning Module 10: Valuing a Derivative Using a One-Period Binomial Model. LOS (a): Explain how to value a derivative using a one-period binomial model.

Q.4190 Consider a one-year put option on a non-dividend paying stock with an exercise price of \$50. The current stock price is \$47. The stock price is expected to go up or down by 25%. The

value of the hedged portfolio today, if the risk-free rate of return is 4%, is *closest to*:

A. \$5.96

B. \$35.46

C. \$38.66

The correct answer is **B**.

Let the initial price be $S_0 = 47$ and the exercise price by $X = 50$. Therefore, when the stock price goes up, we have:

$$S_1^u = S_0 R^u = \$47 \times 1.25 = \$58.75$$

And when the stock price goes down, we have:

$$S_1^d = S_0 R^d = \$47 \times 0.75 = \$35.25$$

Consequently,

$$p_1^u = \max(0, X - S_1^u) = \max(50 - 58.5) = 0$$

And

$$p_1^d = \max(0, X - S_1^d) = \max(50 - 35.25) = 14.75$$

The hedge ratio of the option is:

$$h = \frac{p_1^u - p_1^d}{S_1^u - S_1^d} = \frac{0 - 14.75}{58.75 - 35.25} = -0.6277$$

At maturity, the value of a perfectly hedged portfolio is either,

$$V_1^u = hS_1^u + p_1^u = 0.6277 \times 58.75 + 0 = \$36.88$$

or

$$V_1^d = hS_1^d + p_1^d = 0.6277 \times 35.25 + 14.75 = \$36.88$$

You can either use the V_1^u or V_1^d to calculate the present value of the hedged position today as:

$$V_0 = V_1(1 + r)^{-1} = 36.88(1.04)^{-1} = \$35.4615$$

A is incorrect. It gives the no-arbitrage put option price:

$$\begin{aligned} p_0 &= V_0 - hS_0 \\ &= \$35.4615 - 0.6277 \times 47 = \$5.96 \end{aligned}$$

C is incorrect. It is the value of the hedged portfolio at maturity.

CFA Level I, Derivatives, Learning Module 10: Valuing a Derivative Using a One-Period Binomial Model. LOS (a): Explain how to value a derivative using a one-period binomial model.

Q.4191 Which of the following is *most likely* true regarding the price of a call option if the up gross return is increased in a one-period binomial model? The price of a call option will:

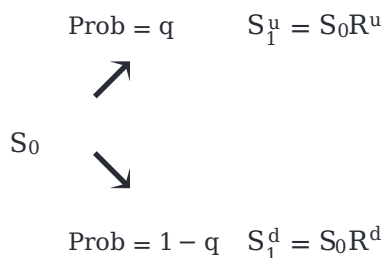
- A. increase
- B. decrease
- C. remain the same

The correct answer is **A**.

In a one-period binomial model, if the up gross return is increased, it is more likely that the stock price will increase in the future, making the call option more valuable.

Recall that in a one-period binomial model is that at maturity, an asset's spot price, S_0 , can either increase to S_1^u , or decrease to S_1^d .

As a result, the call option price is expected to increase. The gross return, when the asset price increases, will be $R^u = \frac{S_1^u}{S_0} > 1$, and when the asset price decreases, the gross return will be $R^d = \frac{S_1^d}{S_0} < 1$.



After one year, the option expires. At this time, the value of the option will either be $c_1^u = \max(0, S_1^u - X) = S_1^u - X$ if the underlying price rises to S_1^u or $c_1^d = \max(0, S_1^d - X) = 0$ if the underlying price falls to S_1^d .

Clearly, the call option price is expected to increase if the upward gross return increases.

CFA Level I, Derivatives, Learning Module 10: Valuing a Derivative Using a One-Period Binomial Model. LOS (a): Explain how to value a derivative using a one-period binomial model.

Q.4192 Consider a one-year call option on a non-dividend stock. The current stock price is \$70. The value of the perfectly hedged portfolio (combination of call option and underlying asset) after one year is \$16.50. If the hedge ratio is 0.65 and the risk-free rate is 1.5%, the no-arbitrage price of the call option is *closest to*:

A. \$16.26

B. \$29.24

C. \$45.50

The correct answer is **B**.

Recall that the no-arbitrage price of a call option is given by:

$$c_0 = hS_0 - V_0$$

Where

c_0 = non-arbitrage call option price.

S_0 = Initial stock price

V_0 = Present value of the hedged position.

As such, we have:

$$\begin{aligned} c_0 &= hS_0 - V_0 \\ &= 0.65 \times 70 - 16.50(1.015)^{-1} = \$29.24 \end{aligned}$$

A is incorrect. It gives the present value of the hedged position at maturity as:

$$V_0 = V_1(1 + r)^{-1} = 16.50(1.015)^{-1} = \$16.26$$

C is incorrect. It gives the value of $hS_0 = 0.65 \times 70 = 45.5$

CFA Level I, Derivatives, Learning Module 10: Valuing a Derivative Using a One-Period Binomial Model. LOS (a): Explain how to value a derivative using a one-period binomial model.

Q.4193 Rose Associates is holding non-dividend stocks of Xerox limited. The stock's current value is USD 100, and in one year, the price can go up by 11% or down by 8%. The current risk-free rate is 3 percent, and the exercise price is USD 99. The risk-neutral probability of an up-move and down-move for a 1-year European call option on the stock is *closest to*:

A. Up-move = 0.58; Down-move = 0.42

B. Up-move = 0.11; Down-move = 0.89

C. Up-move = 0.68; Down-move = 0.32

The correct answer is **A**.

Risk neutral probability of an upward move is given by:

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

Where,

R^d = gross return when the asset price decreases.

R^u = gross return when the asset price increases

r = risk-free rate.

Therefore, the risk-neutral probability of the up-move is

$$\begin{aligned}\pi &= \frac{1 + r - R^d}{R^u - R^d} \\ &= \frac{1.03 - 0.92}{1.11 - 0.92} = 0.58\end{aligned}$$

This implies that the risk-neutral probability of a down-move is:

$$1 - \pi = 1 - 0.58 = 0.42$$

CFA Level I, Derivatives, Learning Module 10: Valuing a Derivative Using a One-Period Binomial Model. LOS (b): Describe the concept of risk neutrality in derivatives pricing.

Q.4194 Which of the following *best* describes the idea behind the risk-neutral pricing formula in the one-period binomial model? The option price is equal to the:

- A. Discounted value of the perfectly hedged position at maturity.
- B. Expected value using the real-world probabilities discounted at a risk-free rate.
- C. Expected value using the risk-neutral probabilities discounted at a risk-free rate.

The correct answer is **C**.

Recall that the value of a call option is the discounted expected value at expiration at the risk-free rate, as summarized in the equation below.

$$c_0 = \frac{(\pi c_1^u + (1 - \pi)c_1^d)}{(1 + r)^T}$$

Similarly, the value of the put option is given by:

$$p_0 = \frac{(\pi p_1^u + (1 - \pi)p_1^d)}{(1 + r)^T}$$

Clearly, the risk-neutral price of an option is the risk-neutral expected payoff discounted at the risk-free rate of interest.

A is incorrect. This is applied in the no-arbitrage pricing of the option before calculating the no-arbitrage the price of an option.

B is incorrect. Real-world probabilities are not required when calculating the value of an underlying asset.

CFA Level I, Derivatives, Learning Module 10: Valuing a Derivative Using a One-Period Binomial Model. LOS (b): Describe the concept of risk neutrality in derivatives pricing.

Q.4195 John Crewe is an analyst at Predict Inc. Some of Crewe's clients have significant non-dividend holdings at Finlay, a tea processing company in Kenya. Crewe anticipates Finlays' stock price will rise next year and advises his clients to buy one-year call options at an exercise price of \$80. Finlay's spot price is \$80, and the risk-free interest is 0.45%. Crewe estimates that there is an equal chance that the stock price will rise or fall by 10%. The risk-neutral price of the option is *closest to*:

- A. \$4.16.
- B. \$4.78
- C. \$8.00.

The correct answer is **A**.

If Finlay's stock price rise by 10%, then:

$$c_1^u = \max(S_0 \times R^u - X) = \max(0, 80 \times 1.10 - 80) = 8.00$$

And

$$c_1^d = \max(S_0 \times R^d - X) = \max(0, 80 \times 0.90 - 80) = 0$$

The risk-neutral probability of upward movement is given by:

$$\pi = \frac{1 + r - R^d}{R^u - R^d} = \frac{1.0045 - 0.90}{1.10 - 0.90} = 0.5225$$

Thus, the risk-neutral pricing is, therefore,

$$c_o = \frac{(\pi c_1^u + (1 - \pi) c_1^d)}{(1 + r)^T} = \frac{(0.5225 \times 8 + (1 - 0.5225)0)}{(1 + 0.0045)^1} = 4.16$$

A is incorrect. Uses the real-world probability to calculate the risk-neutral price of the call option.

$$c_o = \frac{(\pi c_1^u + (1 - \pi) c_1^d)}{(1 + r)^T} = \frac{(0.6 \times 8 + (1 - 0.40)0)}{(1 + 0.0045)^1} = 4.78$$

B is incorrect. State the payoff of the call option at maturity if the stock price rises as the risk-neutral price.

CFA Level I, Derivatives, Learning Module 10: Valuing a Derivative Using a One-Period

Binomial Model. LOS (b): Describe the concept of risk neutrality in derivatives pricing.
