

FRM Part I Exam

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Questions with Answers - Financial Markets and Products

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Reading 25: Banks

Q.1093 Banks face the following main risks:

- I. The risk that counterparties in loan/derivative transactions will default
- II. The possibility that the banks' assets and financial instruments will decline in value due to movement in key market variables
- III. The possibility that internal system failures or external events will lead to significant losses

The types of risks described here are:

- A. Credit risk, operational risk, and market risk, respectively.
- B. Operational risk, market risk, and credit risk, respectively.
- C. Market risk, operational risk, and credit risk, respectively.
- D. Credit risk, market risk, and operational risk, respectively.

The correct answer is **D**.

Credit risk refers to the possibility that the bank's loan recipients and counterparties in derivative contracts such as futures and swaps will fail to meet financial contractual agreements. For example, a borrower may default on a loan halfway through the prepayment period. Alternatively, the counterparty in an interest rate swap arrangement may fail to make the required payments when the interest rate changes.

Market risk has much to do with the possibility that the value of assets and financial instruments might be revised downwards due to movement in key market variables such as interest rates, exchange rates, and inflation. For example, a bank offering securitized instruments face the risk that the primary asset, such as a house, might decline in value if the mortgage rate rises, reducing demand.

Operational risk, widely considered to be the main type of risk facing banks, refers to the possibility of internal failures or external events leading to losses. For example, if a popular rival bank happens to declare bankruptcy, other banks may experience "runs" where depositors rush to withdraw their funds out of fear that they might lose their money as well.

Q.1094 Prime Bank, a recently licensed deposit-taking Sacco, is considering raising capital to fund an ambitious expansion plan aimed at transforming it into a “tier one” bank within the next five years. Which of the following statements **best explains** why the bank’s directors might prefer a rights issue as opposed to subordinated long-term debt?

- A. Subordinated long-term debt is more expensive than equity finance.
- B. Existing shareholders might block attempts to increase debt capital.
- C. Equity finance provides more protection against extreme events, compared to debt finance.
- D. Existing shareholders have pre-emptive rights.

The correct answer is **C**.

Subordinate debt is debt that ranks below some other senior debt and depositors, but above shareholders (equity financiers) in the event of default. For this reason, this type of debt might be cheaper than equity in the long term, since the bank will be obligated to meet both capital and interest payments before shareholders receive a single penny. However, that’s partly why the directors might prefer equity since debt finance will put the bank under considerable pressure, particularly if some extreme events occur. In fact, shareholders would only be entitled to dividends, which would be issued at the bank’s discretion.

Note that generally, equity financing is more secure than debt financing. However, note that debt financing is generally cheaper than equity financing since there are no further obligations to the lender after the loan is paid back in full. Infact, debt is cheaper than equity for firms that are expected to perform well. The more a firm is likely to make profits, the more the cost of sacrificing equity. Owners would rather retain profits and pay interest.

Q.1095 Distinguish between regulatory capital and economic capital.

A. Regulatory capital is the amount of capital a bank is required to hold in accordance with regulatory guidance to sufficiently mitigate the risk of failure, whereas economic capital is the amount of capital a bank needs as prescribed by its own (risk) models.

B. Regulatory capital is the amount of capital a bank needs as prescribed by its own (risk) models, whereas economic capital is the amount of capital a bank is required to hold to sufficiently mitigate the risk of failure.

C. Regulatory capital is the amount of capital a bank needs to hold in accordance with stipulated rules and regulations while economic capital is the amount of capital every bank needs to deposit at the Federal Reserve Bank.

D. Regulatory capital is the amount of capital a bank needs to hold in cash at any given time. In contrast, economic is the total amount of capital held, including cash deposits and tangible/intangible financial assets.

The correct answer is **A**.

In most countries, there's an amount of capital that every deposit-taking bank must hold, in line with regulations and rules established by the regulatory authority in charge. This is called regulatory capital. Economic capital is the amount of capital a bank chooses to hold, as prescribed by its own risk models.

Q.1096 Following several high-profile bank failures, the Central Bank of a certain Asian country is advocating the creation of a deposit insurance corporation to protect depositors in the event that banks fail in the future. How might the establishment of the corporation create a **moral hazard**?

- A. Banks might refuse to make premium payments to the corporation, crippling it financially in the process.
- B. Depositors might channel more of their savings to banks, reducing investments in other sectors of the economy.
- C. Banks may increasingly venture into risky businesses that would not otherwise be feasible.
- D. The corporation may encourage banks to manipulate accounts so as to appear healthier than they actually are, hence be eligible for lower premium payments.

The correct answer is C.

The establishment of deposit insurance is, on one hand, good since depositors are assured of a certain percentage of their deposits in the event that their preferred bank fails. For example, the establishment of the Federal Deposit Insurance Corporation in the U.S. brought about remarkable relief to depositors, guaranteeing a high of \$250,000 per depositor per bank by the year 2008. However, banks might start to take on risky strategies which they would otherwise turn down.

For example, they might use unusually higher interest rates to entice a bigger number of depositors and ultimately channel the money into risky ventures, some of which might lead to heavy losses. Without deposit insurance, banks would not make such a move since depositors might see through the rogue strategy and withdraw their money en masse. The possibility of such behavior on the part of banks is called a moral hazard.

Q.1097 As the chief officer in charge of bank risk monitoring at the Federal Reserve Bank, Peter Musk is asked to advise the regulator on the best strategy to curb moral hazards among banks after the establishment of a deposit insurance agency. Mr. Musk could most likely advise the regulator to:

- A. Crack down on banks caught in paying their senior management excessive sums.
- B. Direct the agency to demand all details of each bank's transactions on a regular basis.
- C. Direct the agency to tailor premiums payable according to each bank's risk level.
- D. Abolish the deposit insurance agency altogether.

The correct answer is C.

By taking into account the risk level of a bank while calculating premiums payable, the agency would discourage the banks from taking part in excessively risky strategies that in turn put depositors' funds at risk. Each bank would pay a premium proportional to the amount of the inherent risk. The moral hazard can also be reduced by enacting regulation that ensures that the capital required by a bank increases proportionally to the risks taken.

Q.1098 Losses resulting from employee fraud form part of:

- A. Market risk.
- B. Liquidity risk.
- C. Credit risk.
- D. Operational risk.

The correct answer is **D**.

Employee fraud results from internal flaws in the system and therefore forms part of operational risk.

Option A is incorrect: Market risk is the risk of losses in a bank's trading book due to exposures to market variables. These market variables are also called risk factors, and they include changes in stock prices, interest rates, foreign exchange rates, commodity prices, and credit spreads.

Option B is incorrect: Liquidity risk describes the risk resulting from the lack of a ready market for an investment, which in turn raises the specter of being unable to meet day-to-day funding needs.

Option C is incorrect: Credit risk is the risk that borrowers will fail to meet their obligations in accordance with the agreed terms.

Q.1101 An investment bank is approached by a manufacturing company that wishes to raise funds to finance an ambitious factory expansion plan. If the bank decides to raise the required funds via a private placement, this means that:

- A. The bank will provide the funds itself without enlisting any third-party investor.
- B. The bank will sell the desired security to a few large investors such as insurance companies.
- C. The manufacturing company will only accept proposals/bids from privately owned limited liability companies.
- D. The bank must sell the securities to one and only one investor.

The correct answer is **B**.

A private placement refers to the selling of securities to a small number of large institutional investors such as pension funds, insurance companies, or mutual funds. The investment bank underwriting the arrangement receives a fee negotiated with the issuer, in this case, the manufacturing company. The bank needs not find just one investor; the issuer may prefer more than one financier.

Q.1103 A public offering on a best efforts basis is a security sale whereby:

- A. The issuer works with multiple investment banks as underwriters.
- B. The underwriter does as well as they can to place securities with investors and get's paid a fee commensurate with the extent of its success.
- C. The underwriter buys the securities and then sells them to investors at a premium.
- D. The issuer does not enlist the services of an underwriter but instead offers securities to investors directly.

The correct answer is **B**.

In a best efforts offering, investment banks (working as agents/underwriters) agree to do their best to place an issue in the hands of investors. It differs from a firm commitment offering in that the bank does not buy the securities so as to resell them to investors. However, they may negotiate an option giving them the right but not an obligation to buy a given amount of the securities, even as they try to maximize sales to other investors.

Q.1104 ABC Company Limited is not publicly traded, but its directors contend the company cannot self-fund further expansion. Directors approach an investment bank intending to create 50 million shares but haven't yet settled on an appropriate price per share. Under these circumstances, the company is most likely to issue a:

- A. Best efforts IPO.
- B. Rights issue.
- C. Firm commitment.
- D. Private placement.

The correct answer is **A**.

A firm that's not publicly traded issues shares in the form of an initial public offering. In most cases, there will be considerable uncertainty regarding the public's willingness to acquire some stake in such a company. As such, most investments prefer to issue the best effort IPO since it carries less risk.

Option B is incorrect: Rights issues are only possible after the first-time allotment of shares to investors. Existing shareholders are invited to buy additional new shares in the company via a rights issue.

Option C is incorrect: In the case of a firm commitment public offering, an investment bank agrees to buy a specified amount of securities from the issuer and then attempts to sell them to the public, promising to own any securities which might not be taken up by the public. In general, underwriters are usually wary of firm commitments because they might be forced to hold a large number of shares in the event that the public's response falls short. For this reason, the company could struggle to get willing underwriters

Option D is incorrect: A private placement refers to the selling of securities to a small group of chosen investors. In other words, the sale is closed to the general public. The disadvantage of a private placement is that the issue could struggle to find a suitable investor (or group of investors).

Q.1105 A company intends to employ the Dutch Auction Approach (DAA) to sell 1 million shares. It receives the following bids:

Bidder	Number of shares	Price per share
A	200,000	\$40.50
B	150,000	\$39.50
C	400,000	\$41.00
D	100,000	39.40
E	300,000	39.00
F	50,000	38.75
G	120,000	37.00

Which of the following is closest to the price all successful buyers will pay per share?

- A. 37
- B. 41
- C. 40.5
- D. 39

The correct answer is **D**.

Under the DAA, potential investors enter their bids quoting the number of shares they intend to purchase and the price they are willing to pay per share. Once the bids have been submitted, the allotment is done starting from the highest bid down, until all the allotted shares have been assigned. However, the final price paid per share is that which has been quoted by the last successful bidder – the buyer whose bid coincides with the end of the intended allotment.

Following the methodology outlined above, here's what would happen in this scenario: First, 400,000 shares would be allocated to C, 200,000 shares to A, 150,000 shares to B, and 100,000 shares to D. At this point, only 150,000 shares remain out of the planned 1 million shares allotment. This means the next highest bid of 300,000 shares at \$39 each can only be half-filled. As such, \$39 is the price that would be paid by all the other successful bidders.

Q.1107 Which of the following is **the most realistic** source of conflict of interest when all the commercial banking, investment banking, and securities services are conducted under the same corporate umbrella?

- A. The three units might not get along, particularly if one or two perform very poorly compared to the other
- B. The investment segment might work with competitors to paint the commercial segment in a bad light and therefore obtain preferential treatment from shareholders
- C. In the process of lending money to a company, the commercial segment may be tempted to share confidential information about the borrowing company with the investment segment which may, in turn, forward the information to a potential takeover bidder
- D. None of the above

The correct answer is C.

Conflicts of interest might emerge whenever investment banking, commercial banking, and securities services all share the same platform. For example, the banking segment may unlawfully pass confidential information about one of its clients to the investment segment to help it provide crucial advice to one of its clients regarding takeover opportunities.

Q.3492 Which of the following statements is/are accurate?

- I. In a "best effort offering," the underwriters buy an issue and use their best effort to sell the issue to investors.
- II. In an "underwritten offering," the underwriters buy an issue and then attempt to sell the issue to investors.
- III. A "best effort offering" is the most common type of offering.

- A. I & III only
- B. II & III only
- C. II only
- D. All of the above

The correct answer is **C**.

Statement II is correct. In an "underwritten offering," the underwriter buys an issue and then attempts to sell the issue to investors.

Statement I is incorrect. In a "best effort offering," the underwriters do not buy the issue, they only act as a broker.

Statement III is incorrect. Underwritten offerings are the most common type of offering because they ensure the success of the proposed issue of shares by providing some insurance against under-subscription. Any shares not taken up by investors are held by the underwriter, thereby ensuring that the issuer gets to generate the amount of cash targeted. In addition, the underwriter offers expert advice and is in charge of marketing the offer. This ensures that the issuer's human resources are not stretched and paves the way for a smooth transition.

Q.4883 Which of the following best defines a broker's discretionary account?

- A. An account where the broker can trade the investor's funds without the investor's explicit consent.
- B. An account where a trader can buy and sell privately traded securities only
- C. An account that holds securities traded solely for the benefit of the broker, not investors.
- D. An account that doesn't have to comply with the rules set by the Securities and Exchange Commission.

The correct answer is **A**.

A broker's discretionary account is an investment account that allows an approved broker to buy and sell securities without obtaining the client's permission for each transaction. But to be able to do so, the client must sign a discretionary disclosure with the broker.

A discretionary account is also called a managed account.

Option B is incorrect. There are no limitations as to which securities can be traded in a discretionary account.

Option C is incorrect. All the proceeds of a discretionary account flow to the investor, less the agreed-upon broker fee.

Option D is incorrect. All trading accounts must comply with the rules and regulations set by the Securities and Exchange Commission, including discretionary accounts.

Q.4884 What is the difference between a banking book and a trading book as used in banks?

- A. The banking book consists of assets on the bank's balance sheet expected to be held until maturity while the trading book consists of assets that are available for sale.
- B. The banking book consists of assets held on the bank's balance sheet while the trading book consists of assets held off the balance sheet.
- C. The banking book reports assets whose value is fixed (e.g. fixed income bonds) while the trading book reports assets whose value fluctuates in response to market variables.
- D. The banking book only shows primary financial instruments such as cash while the trading book shows secondary financial derivative instruments such as interest rate futures and options.

The correct answer is **A**.

The **banking book** consists of assets on the bank's balance sheet that are expected to be held until maturity. Banks are not required to mark these to market. They are usually held at historical cost.

The **trading book** consists of assets that are available for sale, meaning that they are eligible for day-to-day trading. Under Basel II and III, the trading book has to be marked to market on a daily basis. In addition, the VaR for all assets making up the trading book has to be measured at 99% confidence on a 10-day time horizon.

Q.4885 Which of the following is an example of a poison pill?

- A. Providing attractive stock options to key workers that can be exercised in the case of a takeover.
- B. Issuing preferred shares that immediately convert to common shares in the case of a takeover.
- C. Adding a clause to the company's charter prohibiting a new owner from firing existing directors for a period of time.
- D. All of the above.

The correct answer is **D**.

A poison pill is a defense tactic utilized by a target company to prevent or discourage hostile takeover/acquisition attempts. The poison pill makes the company less attractive to hostile buyers.

Example of such actions include:

- Providing attractive stock options to key workers that can be exercised in the event of a takeover.
 - Issuing preferred shares that immediately convert to common shares in the event of a takeover.
 - Adding a clause to the company's charter prohibiting a new owner from firing existing directors for a period of time.
 - In the event of a takeover, existing shareholders could be given preemptive rights to buy shares at a reduced price.
 - Modifying the voting system so that management has enough votes to prevent a takeover.
 - Including a clause that requires the remaining shareholders to sell their shares to the new owner at a 50% premium if a takeover is successful.
-

Q.4886 Which of the following are offers that can be made by the acquiring company in a takeover?

- A. Cash offer.
- B. Share-for-share offer.
- C. Combination of a cash offer and a share-for-share exchange.
- D. All of the above.

The correct answer is **D**.

The following are the types of offer that could be made in the event of a turnover:

- **Cash offer:** where the existing shares of Company B are purchased for cash,
- **Share-for-share exchange:** where newly issued shares of Company A are exchanged for those of Company B so that Company B's shareholders become shareholders of Company A.
- **Combination** of a cash offer and a share-for-share exchange.

In a cash offer, the acquiring company bears the risk of the acquisition in the exchange. In a share-for-share exchange, the risks are shared between the two companies. The initial offer is not necessarily the final offer, so the investment bank must rely on its previous experience to formulate a fair strategy for price negotiations.

Q.4887 The following table shows information about the bid and bidders in a Dutch Auction to sell 10,000 shares.

Bidder	Number of Shares	Price (USD)
A	1, 500	40
B	1, 000	36
C	2, 500	45
D	3, 000	43
E	4, 500	35
F	2, 000	42
G	4, 000	44

At what price are the shares sold?

- A. 44
- B. 42
- C. 36
- D. 40

The correct answer is **B**.

In a Dutch auction, the auctioneer starts with the highest asking price and lowers it until it reaches a price level where the bids received will cover the entire offer quantity.

First, we sort the bids from the highest to the lowest (according to bid price)

Bidder	Number of Shares Requested	Cumulative Number of Shares Requested	Price (USD)
C	2,500	2,500	45
G	4,000	6,500	44
D	3,000	9,500	43
F	2,000	11,500	42
A	1,500	13,000	40
B	1,000	14,000	36
E	2,000	16,000	35

From the table above, it can be noted that a cumulative total of

9,500 shares can be sold for 43 or more. 11,500 shares can be sold for 42 or more. This is the price that coincides with a cumulative total of 10,000 shares as targeted by the auctioneer. Shares therefore sell for 42 each.

Reading 26: Insurance Companies and Pension Plans

Q.1108 Which one of the following statements regarding traditional whole life insurance is **incorrect**?

- A. The beneficiary receives the sum assured only on the death of the insured.
- B. The payout time is known with certainty.
- C. The insured pays premium throughout their life.
- D. Premiums payable usually remain fixed throughout.

The correct answer is **B**.

It's not possible to predict exactly when the sum insured will be paid out since that only happens once the insured has died – and the time of death, as we all know, is unpredictable.

Under a whole life contract, the sum assured is payable when the policyholder dies, regardless of when that happens. It provides protection for the life of the policyholder. Premiums are paid **throughout** the life of the policyholder. Unlike in a term life contract (where there's no certainty that the sum assured will be paid) the sum assured **is certain to be paid at some point in the future**, provided the policyholder continues to make the required premium payments up to the point of their death.

Q.1109 Under term life insurance, the sum assured is payable only if:

- A. The insured dies within the specified time period.
- B. The beneficiary is alive at the end of the specified term.
- C. The insured lives beyond the specified term period.
- D. The beneficiary dies within the specified term period.

The correct answer is **A**.

Term life insurance lasts a predetermined number of years. The sum assured is payable if the insured dies within the term of the policy, in which event the beneficiary receives the money. If the beneficiary themselves happen to die soon after the insured has died, there are guidelines that specify other eligible beneficiaries, usually close family members.

Options B and D are incorrect: the policy is not affected by the death of the beneficiary. The beneficiary comes in only when the insured dies within the specified time, and thus the benefits are paid to the beneficiary.

Option C is incorrect: No benefits are paid if the policy expires before the death of the insured.

Q.1111 A noncontributory group life insurance contract is a policy where:

- A. Premium payments are made only in the first year, without further payments in later years.
- B. Premium payments are shared by the employer and the employee.
- C. The employer pays the premium in full, without financial input from employees.
- D. The insured company and its employees are offered free life insurance, in exchange for free goods and services.

The correct answer is **C**.

A group life policy is an insurance contract written by a company on behalf of its employees, where the insurer agrees to compensate the company, or employees whenever some kind of tragedy strikes, for instance, death, injury, or permanent disability. Both the employer and employees might agree to make payments towards the policy, in which case it's called a contributory contract. If premiums are paid by employers only, then the contract is said to be noncontributory.

Q.1112 The following data gives the mortality experience among males in Europe in 1931.

Age in years	Probability of death within one year	Survival probability	Life expectancy
30	0.001419	0.97372	47.52
31	0.001445	0.97234	46.59
32	0.001478	0.97093	45.65
33	0.001519	0.97093	44.73

Calculate the probability of a new-born male dying between his 30th and 31st birthday.

- A. 0.97372
- B. 0.99862
- C. 0.001418
- D. 0.00138

The correct answer is **D**.

From the table, the probability of a man surviving to age 30 is 0.97372.

The probability that a new-born male dies between age 30 and 31 equals the probability that the newborn lives until age 30 (0.97372) and dies in the 30th year (0.001419)

Thus, the probability of a new-born male dying between his 30th and 31st birthday is:
 $0.97372 \times 0.001419 = 0.00138$

Q.1113 The following data gives the mortality experience among males in Europe in 1931.

Age in years	Probability of death within one year	Survival probability	Life expectancy
30	0.001419	0.97372	47.52
31	0.001445	0.97234	46.59
32	0.001478	0.97093	45.65
33	0.001519	0.97093	44.73

Calculate the probability of a man aged 30 dying in the **second** year?

- A. 0.001407
- B. 0.001443
- C. 0.998557
- D. 0.001445

The correct answer is **B**.

The probability of a man who is aged 30 dying between ages 31 and 32 means the man survives for one year but dies in the second year. This is equal to the probability that the man survives in the first year (between ages 30 and 31) multiplied by the probability that he dies in the second year (between ages 31 and 32). This is:

$$(1 - 0.001419) * 0.001445 \approx 0.001443$$

Q.1114 The following data gives the mortality experience among males in Europe in 1931.

Age in years	Probability of death within one year	Survival probability	Life expectancy
30	0.001419	0.97372	47.52
31	0.001445	0.97234	46.59
32	0.001478	0.97093	45.65
33	0.001519	0.97093	44.73

Assuming that: I. Interest rate = 4% II. Premiums are paid annually in advance (at the beginning of the year) III. Compounding is semi-annual. A 30-year-old man takes up a term insurance policy that expires in two years. Calculate the expected payout given that the policy has a sum assured of \$100,000. (Assume that deaths occur mid-way through the year).

- A. 144.62

- B. 275.09
- C. 283.42
- D. 125

The correct answer is **B**.

First, let's calculate the present value of the expected payout:

If the man dies during the first year, the expected payout is the probability of a 30-year-old dying within one year multiplied by the sum assured.

$$= 0.001419 * 100,000 = \$141,90$$

And because we assume that the payout is made approximately half-way through the year, we should discount the expected payout for 6 months.

$$= 141.90 * 1.02^{-1} = \$139.12$$

Similarly, if the man dies during the second year, the expected payout is the probability of a 30-year-old surviving for the first year and then dying in the second year multiplied by the sum assured.

$$[(1 - 0.001419) * 0.001445 * 100,000] * 1.02^{-3} = \$135.97$$

Hence, total expected payout = $139.12 + 135.97 = \$275.09$

Q.1115 The following data gives the mortality experience among males in Europe in 1931.

Age in years	Probability of death within one year	Survival probability	Life expectancy
30	0.001419	0.97372	47.52
31	0.001445	0.97234	46.59
32	0.001478	0.97093	45.65
33	0.001519	0.97093	44.73

Assuming that:

I. Interest rate = 4%

II. Premiums are paid annually in advance (at the beginning of the year)

III. Compounding is semi-annual

If the policy has a sum assured of \$100,000, and a 30-year-old man takes up a term insurance policy that expires in two years, then which of the following is closest to the break-even premium payable by the policyholder?

A. 140.37

B. 123.62

C. 150

D. 80

The correct answer is **A**.

First, let's calculate the present value of the expected payout:

If the man dies during the first year, the expected payout is the probability of a 30-year-old dying within one year multiplied by the sum assured.

$$= 0.001419 * 100,000 = \$141.90$$

And because we assume that the payout is made approximately half-way through the year, we should discount the expected payout for 6 months.

$$= 141.90 * 1.02^{-1} = \$139.12$$

Similarly, if the man dies during the second year, the expected payout is the probability of a 30-year-old surviving for the first year and then dying in the second year multiplied by the sum assured.

$$[(1 - 0.001419) * 0.001445 * 100,000] * 1.02^{-3} = \$135.97$$

Hence, total expected payout = $139.12 + 135.97 = \$275.09$

If we let P be the annual premium payable, then the first premium is received at time zero with a probability of 1. The second premium is received at the beginning of the second year. This particular premium is subject to the probability that the man does not die in the first year. It also has to be

discounted for 12 months.

$$\text{Thus, present value of premiums} = p + \frac{(1-0.001419)p}{1.02^2} = 1.9598p$$

To calculate the value of p , we then equate the present value of the expected payout to the present value of premiums:

$$\begin{aligned} 275.09 &= 1.9598p \\ p &= \$140.37 \end{aligned}$$

This is the break-even premium.

Q.1116 How does an increase in longevity risk affect the profitability of lifelong annuity contracts?

- A. It increases profits made by the insurer.
- B. It decreases the profits made by the insurer.
- C. It reduces the return on investment to the policyholder.
- D. It has no effect on profitability.

The correct answer is **B**.

Longevity risk refers to the risk that advancement in technology and improved lifestyles will lead to people living longer. Bearing in mind that a lifelong annuity contract features a series of regular payments made to the policyholder from a specified age until they die, it's clear that the insurer's profitability will decrease if the policyholder lives longer than estimated.

Option A is incorrect because it contradicts option B.

Options C and D are incorrect: The policyholders are most likely to live longer and hence benefit from the longevity risk.

Q.1117 How does increased mortality risk affect the profitability of life insurance contracts?

- A. It increases profits made by the insurer.
- B. It decreases the profits made by the insurer.
- C. It reduces the return on investment to the policyholder.
- D. It has no effect on profitability.

The correct answer is **B**.

Mortality risk is the risk that epidemics such as HIV & AIDS, pandemics such as Bird Flu, and wars will lead to people living not as long as expected. Bearing in mind that the policyholder's death prompts payment of the sum assured, it's clear that an increase in mortality risk reduces the profitability of the life insurance business.

Q.1118 Which of the following strategies presents the best way to deal with longevity and mortality risks in the insurance business?

- A. Adding a substantial risk premium to the final break-even premium payable.
- B. Avoiding high-risk business.
- C. Reinsurance.
- D. Using a high interest rate.

The correct answer is **C**.

Reinsurance is an arrangement where an insurer tries to transfer some of the pooled risks to other parties so as to reduce the likelihood of having to pay very large payouts when the mortality experience turns out to be worse than expected. If longevity and mortality risks increase, the management should consider transferring some of the risks to an insurer, who, for instance, might agree to pay claims exceeding a certain amount.

Longevity risk can also be hedged using **longevity derivatives**. A typical derivative here is the **longevity bond**. Under this bond, a population is defined. The coupon payable as of a particular date is a function of the number of people still alive at that point

Q.1119 Richard Brad, FRM, owns a high-rise mixed-use building located in the heart of London. Although he has complied with all quality and safety standards, he fears that a major accident, such as a fire, might result in injuries to residents and third parties and he might be forced to pay for such damages. To protect his building and avoid losses resulting from large-scale compensations, Mr. Brad could most likely:

- A. Make life insurance and disability insurance mandatory requirements for every tenant as well as visitors.
- B. Reinsure the building against large-scale loss.
- C. Seek property insurance.
- D. Seek property-casualty insurance.

The correct answer is **D**.

Property insurance would provide protection against damage to the building resulting from fire, theft, water damage, etc. Casualty insurance, on the other hand, would provide protection against legal liability exposures, such as injuries to visitors in case of an inferno.

Q.1120 Which of the following is a good example of moral hazards under property insurance?

- A. Faking of death.
- B. Legal suits filed by third parties for losses incurred the moment they realize that the party at fault is insured.
- C. A tendency to leave a car unlocked after successfully insuring it against theft.
- D. A bank taking fewer risks after benefiting from government-sponsored deposit insurance.

The correct answer is **C**.

In insurance, moral hazard is the idea that a party protected in some way from risk will act differently than if they didn't have that protection. The change in behavior might increase the likelihood of perilous events happening or even increase the expected payouts. A tendency to leave a personal car unlocked just because it's insured might significantly increase the likelihood of theft.

Q.1121 If an insurance company offers the same premium to both smokers and non-smokers, it is likely to attract high-risk policyholders and might contend with more payouts than initially expected. This problem is called:

- A. Moral hazard.
- B. Poor selection.
- C. Adverse selection.
- D. Adverse risk modeling.

The correct answer is **C**.

Adverse selection is the challenge of distinguishing good risks from bad ones with respect to policy applications. If an insurer fails to collect as much information about the applicant as possible, they risk leaving out so-called “grey areas” that may make the policy too risky to execute. For example, if the insurer fails to dig for details about one’s smoking status, they would end up charging the same premium for smokers and non-smokers. Besides having to contend with higher-than-expected claims and payouts, a large number of smokers – including those turned away by other insurers – will seek to buy policies. Some insurers are known to have incurred heavy losses this way.

Option A is incorrect: In insurance, moral hazard is the idea that a party protected in some way from risk will act differently than if they didn't have that protection. The change in behavior might increase the likelihood of perilous events happening or even increase the expected payouts.

Options B and D are not used in insurance.

Q.1122 The main difference between a defined benefit scheme and a defined contribution scheme is that:

- A. While defined benefit schemes are employer-sponsored, defined contribution schemes are run by employees who contribute funds for investment with no input from employers.
- B. Defined contribution schemes last for a maximum of 40 work-years while there's no time limit for defined benefit schemes.
- C. Defined benefit schemes are tax-deductible but defined contribution schemes are not.
- D. A defined benefit scheme promises a specific income whereas, with a defined contribution scheme, the income depends on factors such as the size of monthly contributions and investment performance.

The correct answer is **D**.

Under a defined benefit scheme, all contributions are pooled and specified payments are made to retirees out of the pool. Under a defined contribution plan, both the employee and the employer make contributions. Each employee has an account to which they regularly contribute. They are free to determine the size of their contributions. The funds may be invested in stocks, bonds or money market instruments.

Q.4888 Which of the following factors poses the **greatest** risk of loss to whole life insurance business?

- A. Low rates of interest.
- B. Mortality risk.
- C. Longevity risk.
- D. Currency risk.

The correct answer is **B**.

The greatest risk faced by life insurance companies is mortality risk. This is the risk of policyholders dying earlier than expected, possibly due to illness, disease, or fatal accidents. From the perspective of the insurance company, the risk of losses increases because the company is forced to make earlier-than-expected life insurance payouts.

A and D are incorrect. Although insurers are faced with market risks with respect to their investments, such investments are heavily regulated by insurance authorities and are also well diversified.

C is incorrect. Longevity risk refers to the risk of policyholders living longer than expected, possibly due to better healthcare and healthier lifestyle choices. This type of risk is actually good for life insurance business because it leads to delayed payouts, helping the company to receive more premium payments and higher investment returns. In fact, there may be no payout at all if the policyholder has term insurance and dies after the policy expires.

Q.4889 Which of the following types of property insurance poses the greatest risk of loss for an insurer?

- A. Fire insurance.
- B. Theft insurance.
- C. Insurance against automobile accidents.
- D. Insurance against natural disasters.

The correct answer is **D**.

The risks to a property and casualty insurance company can be divided into two categories:

- Category A risks where the average payout can be predicted reasonably well from historical data because the yearly payout arises from many independent (or almost independent) claims by policyholders, and
- Category B Risks where a single event can lead to many claims at the same time. These risks can be particularly difficult to model due to scarcity of data and the unpredictable nature of catastrophic events. As such, they pose the greatest risk of loss for insurers. They are also known as all-or-nothing risks. For example, either a hurricane happens (and most policyholders file a claim) or it doesn't (and no policyholders do so).

A, B, and C are incorrect. Risks posed by these types of insurance belong in category A and are generally easy to model. In the case of automobile insurance, for example, claims by different drivers are independent (or almost independent) of each other. Independence implies that if Driver X has an accident, this does not increase the probability of Driver Y having an accident.

Q.4890 In contrast whole life insurance premiums, health insurance premiums:

- A. Always increase from year to year.
- B. May increase or decrease from year to year.
- C. May increase from year to year or remain constant.
- D. Always remain constant throughout the holder's life.

The correct answer is C.

One difference between health insurance and whole life insurance concerns the circumstances when premiums increase. In whole life insurance, premiums typically **remain constant**. Once the contract comes into force, premiums cannot increase even if it becomes known that a policy holder has a short life expectancy because of a terminal disease. In health insurance, premiums may increase because the overall costs of health care have increased, or they may remain constant. However, the insurer cannot increase premiums because of unexpected health problems that were unknown at the time the policy was initiated.

Q.4891 The following data gives the mortality experience among males in Europe in 1931.

Age in years	Probability of death within one year	Survival probability	Life expectancy
30	0.001419	0.97372	47.52
31	0.001445	0.97234	46.59
32	0.001478	0.97093	45.65
33	0.001519	0.97093	44.73

What is the probability that a man aged 30 will live to age 33?

- A. 0.9454
- B. 0.9971
- C. 0.0255
- D. 0.0029

The correct answer is **B**.

$$\begin{aligned} P(\text{Man aged 30 live to age 33}) &= \frac{P(\text{Survival from birth to 33})}{P(\text{Survival from birth to 30})} \\ &= \frac{0.97093}{0.97372} \\ &= 0.99713 \end{aligned}$$

Note: To be able to interpret this in terms of probabilities, it may be helpful to consider this as the probability of a man living to age 33 given that they have already survived/lived to age 30.

Q.4892 Which of the following is the best definition of variable life insurance?

- A. Whole life assurance with an investment component.
- B. The policyholder makes a lump sum payment to the insurer in exchange for a stream of regular payments for a specified period of time.
- C. Term life insurance that is renewable on expiry.
- D. whole life assurance with an investment component and which gives the policyholder a lot **more flexibility** in terms of the premium payable.

The correct answer is **A**.

Variable life assurance policy is a type of whole life assurance with an investment component. A portion of the premium payable is invested in a number of sub-accounts available in the policy. For example, let's say John buys a variable life assurance policy where he pays an annual premium amounting to \$10,000. The contract could be designed in such a way that \$5,000 goes toward the sum assured (death benefit), say, \$1 million, and the other \$5,000 is invested in various instruments. Thus, the total benefit received on the death of the policyholder will be the sum assured plus a variable amount generated from the investment account.

Option B is incorrect: It refers to a typical annuity contract.

Option C is incorrect: A term life insurance lasts a predetermined number of years. The sum assured is payable if the insured dies within the term of the policy, in which event the beneficiary receives the money.

Option D is incorrect: It refers to a **universal life contract** which is a type of whole life assurance with an investment component. However, a universal contract gives the policyholder a lot **more flexibility** in terms of the premium payable. The premium can even be reduced to a pre-specified minimum without the policy lapsing. Lapsing occurs when a policyholder quits paying premiums resulting in the withdrawal of the policy. Reducing premiums will, however, reduce the expected benefits

Reading 27: Fund Management

Q.1123 Robert Jobs, FRM, has historically invested in multiple stocks. After incurring significant losses on his investments, he decides to liquidate most of his holdings in favor of a mutual fund. Which of the following best explains why a mutual fund might be better than multiple investments spread across several industries?

- A. Mutual funds are considered immune from the effects of financial crises.
- B. Mutual funds are more profitable than individual investments in the long-run.
- C. Mutual funds allow investors to diversify risks in a way multiple stock investments cannot.
- D. Mutual funds are easier to manage compared to multiple stock investments.

The correct answer is **C**.

Mutual funds are very attractive to small investors because of the diversification opportunities that they offer. It may be difficult to hold enough stocks to shake off all specific risks. And even though a small investor might be able to create a well-diversified portfolio, transaction costs can be somewhat overwhelming. A mutual fund provides an avenue where small investors can pool their resources and realize the fruits of diversification at a low cost.

Q.1124 An investor joins a mutual fund and buys shares at \$200 each. In the trading course, the fund leads to a capital gain of \$15 per share in the first year and a capital loss of \$20 per share in the second year. If the investor decided to sell the shares during the second year, what would be the purchase price to calculate the capital gain/loss on the transaction during the second year?

- A. \$200
- B. \$215
- C. \$195
- D. \$205

The correct answer is **B**.

The investor has to declare a capital gain of \$15 in the first year and a capital loss of \$20 in the second year. To avoid double counting, the purchase price must be adjusted to take into account the capital gains or losses that have already accrued to the investor. By selling the shares in the second year, only the \$15 capital gain has accrued, and thus the purchase price would be $(200 + 15) = \$215$. Note: If the investor were to sell during the third year, both the capital gain of \$15 and the capital loss of \$20 would have accrued, giving an adjusted purchase price of $(200 + 15 - 20) = \$195$.

Q.1125 Funds that are designed to track a particular equity index such as the S&P 500 are known as:

- A. Open-end funds.
- B. Closed-end funds.
- C. Equity index funds.
- D. Hedge funds.

The correct answer is C.

Equity index funds are used to track the performance of particular equity indexes, such as the S& P 500 or the FTSE 100. To achieve this, all the shares in the chosen index are bought in amounts reflective of their weight. That means if XYZ stock has a 2% weight in a particular index, 2% of the tracking portfolio for the index would be invested in XYZ stock.

Option A is incorrect: In an open mutual fund, shares are traded at their net asset value, (NAV)

Where,

$$\text{NAV} = \frac{\text{Market value of assets at the close of the day} - \text{Liabilities}}{\text{Number of outstanding shares}}$$

Option C is incorrect: In a closed-end mutual fund, shares are traded at a discount/premium to their net asset value (NAV).

Option D is incorrect: Hedge funds have fewer regulations than mutual funds, follow a diverse approach of trading strategies, and are not required to disclose their holdings daily. They, however, have additional restrictions on how to solicit funds from investors.

Q.1126 Michael Bauer wishes to buy shares in a front-end loaded mutual fund. He is likely to:

- A. Pay a front-end purchase fee at the time of purchase.
- B. Pay a back-end purchase fee at the time of purchase.
- C. Pay a front-end fee whenever he decides to sell his shares.
- D. Pay a back-end purchase fee when he decides to sell the shares.

The correct answer is **A**.

To meet management expenses, sales commissions, administrative costs, and other costs, mutual funds charge a fee for every share sold. Those that charge a fee at the onset are called front-end loaded mutual funds. Those that charge a fee when an investor decides to sell his holdings are called back-end loaded mutual funds.

Q.1127 Describe the meaning of hurdle rate in regard to hedge funds.

- A. The minimum rate of return necessary for fund managers to be paid.
- B. The minimum rate of return necessary for the incentive fee to be applicable.
- C. The highest peak in value that an investment fund or account has reached.
- D. The lowest value that an investment fund or account has reached.

The correct answer is **B**.

The hurdle rate is the minimum rate of return that a hedge fund should earn before incentive fees can be deducted from the net profit after deducting management fees.

Option A is incorrect: The hurdle rate refers to the minimum level of return that a fund manager must attain in order to receive a performance bonus and not a payment.

Option C refers to a high-water mark. A high watermark can also be defined as the highest value reached by an investment portfolio.

Option D is incorrect because it also refers to a high watermark.

Q.1128 The following statements regarding open-end mutual funds are correct, EXCEPT:

- A. The funds offer investors professional management.
- B. The funds offer investors a guaranteed rate of return.
- C. Shares are redeemed at net asset value.
- D. Investors are free to sell their holdings at will.

The correct answer is **B**.

Mutual funds do not offer a guaranteed rate of return. Rather, the return is in large part hinged on investment performance.

In an open-end mutual fund, shares are traded at their net asset value (NAV). The net asset value is the market value of all assets the fund owns at the end of each trading day minus liabilities divided by the number of shares outstanding.

The net asset value (NAV) changes on a daily basis, usually at 4 p.m every day, to reflect changes in the underlying investments, which are usually stocks and bonds. All shares are also purchased or redeemed at the NAV. In an open-end fund, one deals with the fund itself when buying shares.

The open-end mutual fund consists of equity funds, bond funds, and money market funds. They can be further divided into the following types of funds.

Note that mutual fund liabilities may include debt owed to the lending banks, pending payments, charges and fees owed to various stakeholders. Other liabilities may include foreign liabilities arising from shares issued to non-residents, income or dividends that are awaiting payment to non-residents, and sales proceeds that have yet to be repatriated. Other operational and management expenses also form part of liabilities of a mutual fund too.

Q.1129 Consider the following statements regarding closed-end mutual funds:

- I. Funds are redeemed at their NAVs.
- II. Shares at times trade at a premium to the NAV.
- III. Shares at times trade at a discount from the NAV.
- IV. The funds offer investors professional management.

Which of the statements above is/are correct?

- A. Only I is correct.
- B. Only I and II are correct.
- C. II, III, and IV only.
- D. All of the statements are correct.

The correct answer is **C**.

Shares of closed-end mutual funds are redeemed at their prevailing market values, not at their NAVs.

Shares of closed-end mutual funds are redeemed at their prevailing market values, not at their NAVs.

All other statements are correct. At times, shares at a discount or a premium from the NAV, and these funds offer investors professional management.

Q.1130 Proud Mutual Fund had year-end assets worth \$335 million and liabilities of \$68 million. Given that there were a total of 100,000 shares outstanding, compute the NAV.

- A. 120
- B. 2,600
- C. 1,500
- D. 2,670

The correct answer is **D**.

$$\text{NAV} = \frac{(335,000,000 - 68,000,000)}{100,000} = \$2,670$$

Q.1131 Brighter Market Portfolio had end-year liabilities amounting to \$43 million and assets worth \$279 million. Given that the fund's NAV was \$20, how many shares must have been held in the fund?

- A. 5000 shares.
- B. 11,000,000 shares.
- C. 11,800,000 shares.
- D. 10,000,000 shares.

The correct answer is **C**.

$$\frac{(279,000,000 - 43,000,000)}{20} = 11,800,000 \text{ shares}$$

Q.1132 When most actively managed mutual funds are compared to index funds such as the S&P 500, they:

- A. Beat the market return in most years.
- B. Underperform the market.
- C. Generally do not outperform the market.
- D. Exceed the return earned on index funds.

The correct answer is **C**.

A large majority of mutual funds may do very well when compared to index funds, but generally do not outperform the market. A good explanation usually has much to do with higher transaction costs in mutual funds.

Q.1133 Transaction costs and management expenses of money market mutual funds may include:

- A. Back-end loads.
- B. Front-end loads.
- C. 12b-1 charges.
- D. All the above.

The correct answer is **D**.

Ownership of a money market mutual fund can include all of the listed expenses.

Note: A 12b-1 fee is an annual marketing or distribution fee on a mutual fund. The 12b-1 fee is considered to be an operational expense and, as such, is included in a fund's expense ratio. It is generally between 0.25% and 0.75% (the maximum allowed) of a fund's net assets.

Q.1134 Which of the following statements is correct regarding hedge funds?

- A. Hedge funds are subject to the Investment Company Act of 1940 and the Securities Act of 1933.
- B. Hedge funds outline their investment agenda in their prospectus.
- C. Hedge funds must be set up as partnerships and have to provide detailed investment strategies to investors.
- D. A majority of hedge funds commit to the use of leverage and short-selling and have a wide investment latitude, including land, derivatives, stocks, currencies, real estate, etc.

The correct answer is **D**.

Unlike mutual funds, hedge funds are not subject to regulation by the Securities and Exchange Commission. They attempt to earn a return from the use of short-selling and leverage and do not have to produce prospectuses. In fact, the vast majority of hedge funds are very secretive about their investment strategies

Option A is incorrect: Hedge funds have fewer regulations as compared to mutual funds, can follow a diverse approach of trading strategies, and are not required to disclose their holdings on a daily basis. They, however, have additional restrictions on how to solicit funds from investors.

Option B is incorrect: while mutual funds are offered via a prospectus, hedge funds are offered via a private placement Memorandum.

Option C is incorrect: Unlike mutual funds, hedge funds do not have to provide details about their investment compositions.

Q.1135 Which of the following financial institutions **must** provide to all investors the information regarding portfolio composition?

- A. Mutual funds.
- B. Hedge funds.
- C. Both mutual funds and hedge funds.
- D. None of the above.

The correct answer is **A**.

Although hedge funds do not have to provide details about their investment compositions, mutual funds are under stricter regulation and must keep investors abreast of strategies and portfolio composition.

Q.1136 Which of the following best describes the long/short equity hedge fund strategy?

- A. Taking a long position in undervalued stocks and a short position in overvalued stocks.
- B. Taking a long position in overvalued stocks and a long position in undervalued stocks.
- C. Taking a long position in both overvalued and undervalued stocks.
- D. Taking a long position in overvalued stocks.

The correct answer is **A**.

The long/short equity strategy entails taking a long position in stocks that are undervalued and another short position in overvalued stocks. If stocks in both classes are picked well, the strategy gives good returns in both bull and bear markets.

Q.1137 Washington Mutual Fund had year-end assets worth \$240 million and liabilities of \$12 million. Given that there were a total of 1,000,000 shares outstanding, which of the following is closest to the net asset value (NAV) of the fund?

- A. 240
- B. 220
- C. 20
- D. 228

The correct answer is **D**.

$$\text{NAV} = \frac{(240,000,000 - 12,000,000)}{1,000,000} = 228$$

Q.3493 An analyst gathered the following information regarding a mutual fund:

- Total shares outstanding: 500,000 shares.
- Assets: \$1,000,000.
- Liabilities: \$300,000.

What is the fund's net asset value (NAV)?

- A. 2
- B. 1.4
- C. 0.6
- D. 0.7

The correct answer is **B**.

$$\begin{aligned}\text{NAV} &= \frac{\text{Market value of assets} - \text{Liabilities}}{\text{No. of shares outstanding}} \\ &= \frac{1,000,000 - 300,000}{500,000} \\ &= 1.4\end{aligned}$$

Q.3494 Which of the following is/are the correct statements regarding similarities and differences between exchange-traded funds and closed-end funds?

- I. Both types of funds are passively managed to match a particular index.
- II. In both types of funds, the market price of shares and the net asset value (NAV) can differ significantly.
- III. Both types of funds can be sold and purchased on the open market.

- A. III only.
- B. I & III only.
- C. I & II only.
- D. All of the above.

The correct answer is **A**.

ETFs and closed-end funds are sold and purchased on the open market rather than from the fund itself.

Options I & II are incorrect. ETFs are passively managed to match the index while closed-end funds are actively managed. In closed-end funds, the market price of shares and the NAV differ significantly, whereas ETFs are designed to keep their share price close to the NAVs.

Q.3496 Which of the following is a correct characteristic of hedge funds?

- A. Hedge funds are usually listed on exchanges.
- B. Management fees are a fixed percentage of the funds under management, but managers also collect fees based on performance.
- C. Hedge funds are readily available to all investors.
- D. Hedge funds are free to advertise to the public.

The correct answer is **B**.

Management fees are a fixed percentage of the funds under management, but managers also collect fees based on performance.

However, hedge funds cannot be listed on exchanges, are not available to all investors, and cannot advertise to the public.

Q.3497 Restrictions on redemptions of funds invested in hedge fund until the specific time during which withdrawals are not allowed is called:

- A. Redemption restriction.
- B. Lock-up period.
- C. Non-withdrawal period.
- D. High-water mark.

The correct answer is **B**.

A lock-up period is a time during which withdrawals are not allowed for the investors.

A hedge fund's high-water mark (HWM) ensures that the performance fee is only charged on new profits.

Option D is incorrect: A high watermark can be defined as the highest value reached by an investment portfolio.

Q.3498 Anna Smith is a hedge fund manager who tries to exploit price discrepancies between convertible bonds and common stocks of companies. The strategy that Smith uses is known as:

- A. Long/short equity.
- B. Corporate arbitrage fixed income.
- C. Equity market neutral strategy.
- D. Convertible arbitrage fixed income.

The correct answer is **D**.

Convertible arbitrage fixed income is a strategy of exploiting pricing discrepancies between convertible bonds and common stocks of companies.

Option A is incorrect: The long/short equity strategy involves maintaining long and short positions in equity and equity derivative securities. The fund manager buys the stocks they feel are undervalued while simultaneously selling those they feel are overvalued.

Options B and C are not among the hedge fund strategies.

Q.3499 A hedge fund has a beginning year value of \$200 million, 2% management fee, and 20% incentive fee with a hurdle rate of 10%. The management fee is applied to the end-of-year assets under management, and the incentive fee is calculated net of the management fee. If the fund's ending value is \$300 million, then what is the total fee of the hedge fund?

- A. \$18.8 million.
- B. \$20.8 million.
- C. \$14.8 million.
- D. \$6 million.

The correct answer is **B**.

Management fee = \$300 million * 2% = \$6 million

Incentive fee = (\$300 million - \$6 million - \$200 million - (\$200 million * 10%)) * 20% = \$14.8 million

Total fees = Management fee + Incentive fee = \$6 million + \$14.8 million = \$20.8 million

Q.3500 A hedge fund has a beginning year value of \$370 million and a 2 plus 20 fee structure with no hurdle rate or watermark. The hedge fund structure is set up such that the management fee is calculated on the assets at the beginning of the year and that the incentive fee is calculated net of the management fee. If the fund's ending value is \$400 million, then what are the total fees paid to the hedge fund for the period?

- A. \$12.4 million.
- B. \$11.92 million.
- C. \$16 million.
- D. \$4.4 million.

The correct answer is **B**.

Management fee = \$370 million * 2% = \$7.4 million

Incentive fee = (\$400 million - \$7.4 million - \$370 million) * 20% = \$4.52 million

Total fees = Management fee + Incentive fee = \$7.4 million + \$4.52 million = \$11.92 million

Q.3502 Mega Star Investment is a hedge fund with \$550 million initial capital and a '2 and 20' fee structure. The 2% management fee is based on year-end assets under management and the 20% incentive fee is not independent of the management fee. The value of the fund at the end of year one is \$652 million. What is the investor's net return?

A. 0.1247

B. 0.1294

C. 0.1531

D. 0.1779

The correct answer is **B**.

Year end fund value = \$652 million

Management fee = $2\% \times 652 = \$13.04$ million

Incentive fee = $(652 - 550 - 13.04) \times 20\% = \17.79 million

Investor's net return = $(652 - 550 - 13.04 - 17.79)/550 = 71.17/550 = 12.94\%$

Q.3503 Rosy Garcia is considering investing in a hedge fund or a fund of funds.

Garcia invests \$50 million in the hedge fund and receives a yearly gross return of 10%. The fund has a '2 and 20' fee structure with no hurdle rate, and management fees are calculated on an annual basis on assets under management at the beginning of the year. Incentive fees are calculated independently of management fees.

Garcia also invests \$60 million in a fund of funds (FOF) and earns a 5% yearly gross return. Assuming that the fund of funds fee structure is '1 and 10' and that all other fee structures in the FOF are similar to that of the hedge fund, the return to the investor of investing directly in the hedge fund will be:

- A. 2.5% greater than the return generated by investing in the FOF.
- B. 2.3% greater than the return generated by investing in the FOF.
- C. 3.1% greater than the return generated by investing in the FOF.
- D. Lower than the return generated by investing in the FOF.

The correct answer is **A**.

For investing directly \$50 million in the hedge fund: \$50 million (10%) = \$5 million profit

Management fee: \$50 million (2%) = \$1 million gross profit

Incentive fee: \$5 million (0.20) = \$1 million

Total fees = \$1 million + \$1 million = \$2 million

Return: (\$5 million - \$2 million)/\$50 million = 6%

For investing \$60 million in the FOF: \$60 million (5%) = \$3 million gross profit

The FOF charges a fee of 1%: 60 million (1%) = \$0.6 million and an incentive fee of \$3 million (0.10) = \$0.3 million

Return: (\$3 million - \$0.6 million - \$0.3 million)/\$60 million = 3.5%

So 6% - 3.5% = 2.5%

Note that in this chapter, it is usually assumed that the management fee is calculated on the assets at the beginning of the year and that the incentive fee is calculated **after** subtracting management fees.

So, in a special case where the incentive fee is calculated independent of the management fee, then this simply means that we will now calculate the incentive fee "independently". In other words, the incentive fee is calculated **before** subtracting management fees.

Q.3504 Right-Lance Capital is a hedge fund with \$250 million as initial investment capital. A 2% management fee based on assets under management is charged at the beginning of the year, and a 20% incentive fee is charged on the performance net of management fees. In the first year of operations, the fund earned a return of 16%.

What is the investor's effective return given this fee structure?

- A. 0.1094
- B. 0.112
- C. 0.125
- D. 0.0943

The correct answer is **B**.

Management fee = \$250 million * 2% = \$5 million

Incentive fee = (\$290 million - \$250 million - \$5 million) * 20% = \$ 7. million

Total fees to Right-Lance Capital = \$5. million + \$7 million = \$12 million

Investor's return = (\$290 million - \$250 million - \$12 million)/\$250 million = 11.20%

Q.3505 Clock Limited is a hedge fund with a total asset base of \$10 million. The fund charges a 2% management fee based on assets under management at year-end and a 20% incentive fee in excess of a 0.5% hurdle rate. During the first year, the fund appreciates by 15%. If incentive fees are calculated independently and management fees are calculated at year-end, what is the investor's return net of performance fees?

- A. 0.068
- B. 0.081
- C. 0.098
- D. 0.0852

The correct answer is **C**.

Fund value at year-end = \$10 million * 1.15 = \$11.5 million

Management fees = \$11.5 million * 0.02 = \$0.23 million

Hurdle amount = \$10 million * 0.005 = \$0.05 million

Incentive fees = (\$11.5 million - \$10 million - \$0.05 million) * 0.20 = \$0.29 million

Total fees paid to Clock Limited = \$0.23 million + \$0.29 million = \$0.52 million

Investor's net return = (\$11.5 million - \$10 million - \$0.52 million)/\$10 million = 9.8%

Q.3506 Which of the following statements correctly describes a fixed income arbitrage hedge fund strategy?

- A. This strategy seeks beta-positive investment strategies.
- B. This strategy seeks to employ a pricing discrepancy between related securities.
- C. This strategy involves buying a convertible bond of one issuer while selling another issuer's common stock.
- D. This strategy seeks to make investment decisions guided by the economic/political outlook of a country.

The correct answer is **B**.

A fixed-income arbitrage strategy is classified as a relative value strategy. Relative value funds seek to profit from a pricing discrepancy between related securities, i.e., mispricing between a convertible bond and its component parts (the underlying bond and the embedded stock option).

Option A is incorrect. A fixed income convertible arbitrage strategy is a market-neutral (zero beta portfolio) strategy.

Option C is incorrect. The fixed income convertible arbitrage strategy involves buying a convertible bond of one issue and simultaneously selling the issuer's common stock.

Option D is incorrect. Global macro is a general investment strategy that involves making investment decisions guided by the economic/political outlook of a country.

Q.3507 Which of the following is *NOT* a characteristic of open-ended mutual funds?

- A. Open-end funds accept new investment money and issue additional shares to existing or new investors. Therefore, the number of outstanding shares changes after every new investment.
- B. In open-end funds, new shares are created and sold at a premium or a discount to net assets values depending on the demand for the shares.
- C. An open-end structure makes it easy to grow in size but creates pressure on the portfolio manager to manage the cash inflows and outflows.
- D. None of the above

The correct answer is **B**.

In open-end funds, new shares are issued at the fund's net asset value at the time of investment. An open-end fund is a collective investment scheme that can issue and redeem shares at any time. An investor will generally purchase shares in the fund directly from the fund itself rather than from the existing shareholders.

It contrasts with a closed-end fund, which typically issues all the shares it will issue at the outset, with such shares usually being tradable between investors thereafter.

Q.3508 In an open-end fund:

- A. Shares are issued and are traded in secondary markets.
- B. Investors can redeem their shares at any point in time at net asset value.
- C. Investors cannot redeem shares for a certain number of years that are specified at the initiation of the contract.
- D. None of the above.

The correct answer is **B**.

In an open-end fund, investors can redeem their shares at any point in time at net asset value.

Note:

Redemption 'at any point in time' means "any day," but there could be strict rules regarding the exact time of day when redemption can occur. In most jurisdictions, redemption occurs at the close of business (4 P.M). That's because the underlying assets (shares and bonds) have values that keep changing throughout the day. Any purchase or sell order placed on a given day will then be settled at the Net Asset Value determined using values at the close of business.

Option A is incorrect: This is a characteristic of closed-end funds.

Option C is also incorrect since this is a characteristic of a closed-end fund.

Q.3509 MZJ Income Fund is a mutual fund that does not issue new shares, and its shares can only be bought or sold like equity on exchange markets. Identify this type of fund.

- A. Closed-end fund.
- B. Open-end fund.
- C. Exchange-traded fund.
- D. Hedge fund.

The correct answer is **A**.

Closed-end funds are pooled investments that do not take new investments once the fund is established or funded.

Option B is incorrect: Open-end funds allow issues of new shares.

Option C is incorrect: Exchange-traded funds also allow issues of new shares

Option D is incorrect: Hedge funds are typically open-ended, however, since they are not as regulated as mutual funds, they are only available to sophisticated investors.

Q.3510 The Belta fund trades on the Chicago Stocks Exchange. Its most recent price is \$1850, but its NAV is \$1,600. We know then that:

- A. the fund is closed-end, selling at a premium.
- B. the fund is closed-end, selling at a discount.
- C. the fund is open-end, selling at a premium.
- D. the fund is open-end, selling at a discount.

The correct answer is **A**.

The open-end fund's share price is based on the portfolio's net asset value (NAV). However, the stock price of a closed-end fund fluctuates according to market forces. These forces include supply and demand and the changing values of the securities in the fund's holdings. As such, a share of a closed-end fund could trade either at a premium or a discount to the NAV. In this case, the price is higher than the NAV, implying that it is trading at a premium.

Q.4932 Hedge funds managers are compensated by:

- A. deducting management fees from fund assets and receiving incentive bonuses for beating a specified benchmark.
- B. deducting a percentage of any gains in asset value.
- C. Buying shares in the fund at a discount.
- D. charging portfolio turnover fees.

The correct answer is **A**.

Hedge funds deploy a complex compensation structure centered around a flat management fee plus incentive fees engineered to give hedge fund managers significant payouts based on their performance. The most common is a 2 plus 20% fee structure, which means that they charge a flat 2% of all assets under management plus an additional 20% of all profits above a specified benchmark.

Q.4933 On January 1, 2020, a hedge fund began with \$100 million in assets from investors. The 10-year Treasury, yielding 1.25% at the time, was chosen as the hurdle rate for the next five years. In addition, the fund operates on a 2 plus 20% fee structure and is bound by a high-water mark clause. In the first year of operation, a combination of a challenging macroeconomic environment and some bad decisions culminated in end-of-the-year assets under management dropping to \$90 million. In 2021, the fund bounced back, with its total assets coming at \$110 million by the end of the year. Calculate the total fees earned by the management in 2021. (Assume that the management fee is calculated on the assets at the beginning of the year and that the incentive fee is calculated after subtracting management fees)

- A. \$5.8m
- B. \$1.8m
- C. \$3.5m
- D. \$2.94m

The correct answer is **D**.

A high-water mark clause states that previous losses must first be recouped and hurdle rates surpassed before incentive fees once again apply.

In the first year, the fund managers earned a management fee of \$2m ($= 100 * 0.02$). However, it earned \$0 in incentive fees since it made a loss. Incentive fees would only have applied to any profits earned above a 1.25% return, meaning that only an ending balance higher than \$101.25 million would have triggered the 20% incentive fee.

The management pocketed \$1.8m in management fees in the second year ($= 90 * 0.02$). As per the fund's high-water mark clause, investors expected its total worth to be above \$102.5 at the end of year 2 before any incentive fees can be earned (i.e., $100 + 1.25 + 1.25$). In other words, the high-water mark for year 1 is \$101.25m and \$102.5m for year 2. At \$110m, at the end of the second year, therefore, the fund has outperformed by a margin of \$7.5m (i.e., $110 - 102.5$). As such, 20% of this less the management fee [i.e., $0.2 * (7.5 - 1.8) = \$1.14m$] is earned as incentive fees.

Total fees earned in year 2 = \$1.8m + \$1.14m = \$2.94m

Reading 28: Introduction to Derivatives

Q.27 Allan enters into a derivative contract with one of his clients. The client is expected to sell the underlying asset to Allan at the expiration date at price P. Allan wishes to fully hedge his position using derivatives. Which of the following can help him achieve his goal?

- A. Sell a p-strike call.
- B. Purchase a p-strike call and sell a p-strike put.
- C. Sell a p-strike call and buy a p-strike put.
- D. Subscribe to a long forward contract with a forward price P.

The correct answer is C.

The client is obligated to sell the underlying asset implies that he is in the short position of the contract. Therefore, Allan is in a long-forward position. To hedge this position, he needs a short futures contract. Selling a call option and purchasing a put option effectively replicates a short forward position.

Example:

Suppose an investor has entered into a long futures contract to buy crude oil in June 30 2022 at \$60 a barrel. He will need to create a synthetic short futures contract on oil (for June 30, 2021). Here's how:

- the investor buys a put with a \$60 strike price with expiry on June 30, 2022.
- the investor sells (writes) a call with a \$60 strike price with expiry on June 30, 2022.

If the asset price is above the strike price on the expiration date, say at \$70:

- The investor will be obligated to buy at \$60 under futures contract.
- They will then sell at \$60 to the short position in the call.
- The put option expires worthless.

In the end, there's zero loss.

If the asset price at expiration is below the strike price, say at \$50:

- the investor will be obligated to buy at \$60 under the futures contract.
- the investor will want to exercise the put option and sell at \$60.
- the call expires worthless.

Again, there will be no loss.

As you can see, the long futures position combined with the synthetic short forward will hedge the contract and result in no loss for the investor – regardless of the direction the price of the asset takes. Of course, we’ve ignored the put/call premiums, but even if we were to consider them, the futures contract would still be hedged, albeit not perfectly. The net loss/gain would be minimal.

Q.28 Matthew enters into a derivative position with one of his real estate customers. Under the terms of the contract, the customer is obligated to sell the underlying asset to Matthew if the spot price at the expiration is more than P. Matthew, on the other hand, has the right to sell the underlying asset to the customer if the spot price at expiration is less than P. Which of the following describes Matthew's position?

- A. Matthew enters into a short forward contract.
- B. Matthew enters into a long forward contract.
- C. Matthew purchases a P-strike call and a P-strike put.
- D. Matthew purchases a P-strike call and sells a P-strike put.

The correct answer is C.

The customer is obligated to sell the underlying asset to Matthew if ..." means that the customer is the writer of the option. "If the spot price at the expiration is more than P" implies this is a call option. "Matthew, on the other hand, has the right to sell the underlying asset to the customer if..." implies Matthew is purchasing an option. "If the spot price at expiration is less than P" implies that Matthew actually purchases a put option. Therefore, Matthew purchases a P-strike call and a P-strike put.

Q.587 Mehmet Emre, an FRM part 1 candidate, is preparing for his upcoming exam. From his understanding of futures exchanges, he has concluded the following:

- I. In futures exchanges, traders do not have to worry about the creditworthiness of the counterparty
- II. In futures exchanges, the trades are more standardized than they would be for similar forwards contracts
- III. In futures exchanges, participants have to deposit an initial margin with the clearinghouse of the exchange

Which of these features of futures exchanges are accurate?

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

The correct answer is **D**.

All the defined features of futures exchange are correct.

In futures exchanges:

- I. Traders do not have to worry about the creditworthiness of the counterparty.
 - II. The trades are handled by the exchange's clearinghouse.
 - III. The participants have to deposit an initial margin with the clearinghouse of the exchange.
 - IV. The credit risk is lower as compared to OTC markets
 - V. Trades are more standardized.
-

Q.588 Before the credit crisis of 2007, over-the-counter (OTC) markets were not as regulated as exchanges. However, after the credit crisis, many new important changes were brought into the US and around the world to align the operations of OTC markets with exchange-traded markets. Which of the following is not a change/regulation introduced after the 2007 credit crisis?

- A. Standardized OTC derivatives must be traded on swap execution facilities (SEFs) introduced in the US.
- B. Central counterparty (CCP) is required in standardized derivatives transactions.
- C. All the OTC trades must be reported to a central registry.
- D. Participants of OTC derivatives must publicly disclose their initial and maintenance margin positions.

The correct answer is **D**.

Participants of OTC derivatives trades do not have to disclose to the public their initial and maintenance margin requirements

Following are the three most important changes introduced in the US and other global markets to bring OTC markets in line with exchange-traded markets:

1. In the US, it is required that standardized OTC derivatives must be traded on swap execution facilities (SEFs). SEFs are portal where one participant can post the bid or offer and trade with counter-participants
 2. In global markets, it became a requirement to use the Central counterparty (CCP) in standardized derivatives transactions
 3. All the OTC trades must be reported to a central registry
-

Q.589 David Dillion, head of the treasury department of Dutch Monks Corp., entered into a derivative contract to purchase ₺350 million (Turkish lira) 3-month forwards from a Lirika Bank 3-month forward exchange rate of ₺3.9 per euro. Which of the following correctly describes Lirika Bank's position on the euro?

- A. Short forward contract.
- B. Long forward contract.
- C. Short futures contract.
- D. Long futures contract.

The correct answer is **B**.

The bank has a long forward contract (position) on the Euro and a short forward position on the Turkish lira, whereas Dutch Monks Corp. has a long forward position on the Turkish lira and a short forward contract on the Euro.

Options C and D are incorrect because the contract is a forward contract as both parties entered into a derivative contract with each other without the presence of any exchange or clearinghouse. In futures contracts, both parties enter into a contract on an exchange without knowing which party is on the other side of the trade.

Q.590 A trader at Prime Investments entered into a derivatives contract to purchase one lot (or 100 troy ounces) of gold at the price of \$1,200/ounce and take delivery 3 months from now. Determine the appropriate position of the trader in the derivatives contract.

- A. A long gold futures contract.
- B. A long dollar futures contract.
- C. A long gold forward contract.
- D. A short dollar forward contract.

The correct answer is **A**.

The trader has a long future contract/position in gold. The derivatives contract is a futures contract for two reasons:

1. Since the trader does not know the counterparty of the derivatives contract, it is a futures contract, unlike forward contracts where both the parties know who the other side is.
 2. The size of the trade is small and standardized in futures contracts, whereas in forward contracts, the size of the trade is comparatively large and customizable.
-

Q.591 Which of the following equations accurately demonstrates the payoff of the short position holder in a forwards contract?

A. $K - S_T$

B. $S_T - K$

C. $\max(0, X - S_T)$

D. $\max(0, S_T - X)$

The correct answer is **A**.

The appropriate payoff of the short position in a forwards contract is $K - S_T$.

Where K stands for the delivery price and S_T stands for the spot price.

Since there are no costs to enter into the contract, the payoff from the contract is also the trader's gain/loss from the contract.

Option B is incorrect because $(S_T - K)$ is the payoff for the long position holder in the forward contract.

Option C is incorrect because $\max(0, X - S_T)$ is the payoff a put option.

Option D is incorrect because $\max(0, S_T - X)$ is the payoff of a call option.

Q.592 A number of derivatives are used to hedge the risk or earn a profit with speculation and arbitrage strategies. Forwards, futures and options are different from each other in terms of their properties. Which of the following statement correctly differentiates forward, futures, and options?

- A. Forward contracts and options are different from futures, as it takes a certain cost to enter into a forward contract.
- B. Options and futures are different from forwards contracts as they give an option or futures contract holder the right, but not the obligation, to exercise the contract.
- C. Forwards and futures are different from options because the holder of the forwards and futures are obligated to buy or sell the underlying.
- D. Forward contracts and options are different from futures because forwards and options trade on OTC markets.

The correct answer is C.

The holders of call or put options have the right, but not the obligation, to exercise the option (or buy/sell the underlying asset). The holder of forwards and futures contracts are obligated to buy or sell the underlying assets.

Option A is incorrect because it costs nothing to enter into a forward contract, unlike futures contracts that require an initial margin to enter into the contract.

Option B is incorrect: The holder of a futures contract has both the right and the obligation to exercise the contract as agreed.

Option D is incorrect because futures and options trade on exchange-traded markets, whereas,

Q.593 Kapil Kumar is an individual investor who invests a portion of his salary in stocks and derivatives at the beginning of every month. Kumar is interested in the stocks of Geneva Computers Inc., which are currently trading at the price of \$14. However, he believes the stock will trade above \$17 at the beginning of next month. If Kapil is interested in entering into an options contract that gives him the right to take exposure in the stock at \$17, then suggest the most appropriate option position for Kumar.

- A. A long call option with a strike price of \$14.
- B. A short call option with a strike price of \$17.
- C. A long put option with a strike price of \$17.
- D. A Short put option with a strike price of \$14.

The correct answer is **A**.

Since Kumar believes the stock will be trading higher, the most appropriate position for him is a long call option on Geneva's stock with the strike or exercise price of \$14. A long position in a call option gives the buyer of the option the right, but not the obligation, to buy the stock at the strike price. The payoff, in this case, would be equal to $(\$17 - \$14)$, and the profit would be $(\$17 - \$14 - \text{premium paid})$, assuming the stock hits \$17 at expiration.

Q.594 Consider a European call option for 100 shares of Tesla, Inc., whose strike price is \$870 per share and which matures 12 months from now. What does this option entitle you to do?

- A. Between now and 12 months from now, you are entitled to make a phone call to the European headquarters of Tesla, Inc., to inquire about the value of 100 shares.
- B. Between now and 12 months from now, you have the right, but not the obligation to purchase 100 shares of Tesla, Inc., for \$870 per share.
- C. At the maturity date, that is 12 months from now, you have the right, but not the obligation to sell 100 shares of Tesla, Inc., for \$870 per share
- D. At the maturity date, that is 12 months from now, you have the right, but not the obligation to purchase 100 shares of Tesla, Inc., for \$870 per share.

The correct answer is **D**.

A European call option is a type of options contract where the buyer has the right but not the obligation to buy the number of shares stipulated in the contract at the specified strike price, but this can only on the expiration date.

Option A is incorrect. A call option is a legally binding contract, not a right to make an inquiry about the share price.

Option B is incorrect. A European call option can only be exercised at the maturity date.

Option C is incorrect. A call option gives the right but not the obligation to **buy** the underlying stock.

Q.595 Which of the following options requires a party to purchase the underlying asset at a specific date?

- A. European short call option.
- B. American short call option.
- C. American short put option.
- D. European short put option.

The correct answer is **D**.

Shorting (writing) a put option means you give the holder the right to sell you the stock at the strike price. In other words, you have an obligation to buy the stock at the strike price if the put option buyer exercises the option.

Option A is incorrect. Selling a call obligates the investor to sell the stock at the strike price if the option is assigned.

Options B and C are incorrect. An American option can be exercised any time before the expiration date, while European options can only be exercised at a specific (expiration) date.

Q.596 Nisha Jatoi, a lecturer at the Karachi School of Business, is delivering a lecture on the subject of Introduction to Derivatives. While discussing the details of derivatives, specifically options contracts, she presented the following properties of options in her slideshow:

- I. The price of a call option increases as the exercise price decreases.
- II. The price of a put option increases as the exercise price increases.
- III. The values of both American call and put options increase as time to maturity increases.

Which of these properties are correct?

- A. Properties I and II.
- B. Properties II and III.
- C. Properties I and III.
- D. Properties I, II, and III.

The correct answer is **D**.

All of the mentioned option properties are correct.

- I. The price of a call option increases as the exercise price decreases.
- II. The price of a put option increases as the exercise price increases.
- III. The values of both American call and put options increase as time to maturity increases.

Also, note that the price of a call option decreases as the exercise price increases while the price of a put option decreases as the exercise price decreases.

Q.597 A trader sold five July put options, each at \$7.60, pledging to buy 500 shares of Galaxy Carpets Co. at a price of \$13.50 per share. If at maturity of the contract, Galaxy Carpet's stock is trading at \$9.30 per share, then which of the following statements accurately describes the net cash flow of the transaction?

- A. The trader profited \$3,800 from the transaction.
- B. The trader lost \$2,100 from the transaction.
- C. The trader profited \$2,100 from the transaction.
- D. The trader profited \$1,700 from the transaction.

The correct answer is **D**.

At initiation, the trader gets $5 \times 7.6 \times 100 = \$3,800$ from the sale of the put options. This is because for stock options, the premium is quoted as a dollar amount per share, and most contracts represent the commitment of 100 shares.

At maturity, the trader made a loss of $(\$9.3 - \$13.5) \times 500 = \$2,100$

Therefore, the net cash flow for the trader is $+\$1,700$ ($3,800 - 2,100$).

Note: On the derivatives market, options are quoted in per-share prices but only sold in 100 share lots. In other words, each put has 100 shares. In this case, for example, the put option is quoted at \$7.6, but the buyer pays $\$7.6 \times 100 = \760 per put option. For 5 puts, that's $\$760 \times 5 = \$3,800$

Q.598 Steve Hellmuth, a former derivatives trader, runs an online derivatives investment and trading tutorial portal. Every weekend he educates hundreds of subscribers through weekly webinars. In his last webinar, he presented the following properties of each trader type:

- I. Hedgers use derivatives to guard against the risks related to future movements in market prices of underlying variables.
- II. Arbitrageurs use derivatives to bet on the direction of the market of underlying variables.
- III. Speculators use derivatives to take offsetting positions in two or more instruments and markets to earn a profit.

Which type of derivatives trader did Hellmuth define inappropriately?

- A. Speculators only.
- B. Hedgers and speculators.
- C. Arbitrageurs and speculator.
- D. Hedgers and arbitrageurs.

The correct answer is C.

Steve Hellmuth inappropriately defined the properties of Arbitrageurs and Speculators.

- I. Hedgers use derivatives to safeguard against the risks related to future movements in market prices of underlying variables.
 - II. Speculators, not arbitrageurs, use derivatives to bet on the direction of the market of underlying variables.
 - III. Arbitrageurs, not speculators, use derivatives to take offsetting positions in two or more instruments and markets to earn a profit.
-

Q.599 Donald Brown, an investment manager at a pension fund, manages a portfolio of twenty stocks. Brown is long the stocks of Blue Blue Moon Inc., and he believes that the value of the stock of Blue Motors Inc., which forms part of the portfolio, can decrease due to an increase in oil prices. After analyzing the fundamentals of the stock, Brown decides to take a long position in put options on Blue Motors Inc. stocks. The given transaction appropriately categorizes Donald Brown as a:

- A. Speculator.
- B. Hedger.
- C. Market maker.
- D. Arbitrageur.

The correct answer is **B**.

Donald Brown is clearly interested in hedging against the risk of movements in stock prices of Blue Motors. Put options would give him the right but NOT an obligation to sell the stocks at a predetermined price, thus cautioning him from a price decline.

Option A is incorrect because Brown is not merely betting on the direction of the market without a reasonable basis. He appears to engage in objective market analysis before taking the long positions.

Option C is not correct either: market makers are traders that make the market by maintaining bid and offer prices of a specific asset in anticipation of buying and selling the asset in bulk.

Option D is incorrect because there appears to be no attempt to take advantage of price discrepancies in the stock price of Blue Motors Inc. so as to make a risk-free profit.

Q.600 Hedgers use a number of derivatives to neutralize their risk by taking long or short positions in derivatives. These derivatives differ in costs and features. Which of the following type of derivatives provides a type of insurance to the hedger to protect against unfavorable movement and benefit from favorable movement in the underlying variable?

- A. Forward contracts.
- B. Futures contracts.
- C. Options.
- D. None of the above.

The correct answer is C.

Hedgers use both forward & futures contracts and options to hedge against the risk faced by their exposures. Forward and futures contracts work in a way that they neutralize the risk by fixing a buy or sell price for the hedger to trade on the maturity date. However, options provide insurance to the hedger to protect against unfavorable movement while at the same time allowing the hedger to benefit from favorable movement in the prices of the underlying variable.

Q.601 Samuel Simpson is a commodities trader at one of the largest asset management firm in Abu Dhabi. He believes that due to a resolution passed by all members of the OPEC committee to cut the supply of oil, the prices of oil are expected to increase. In order to capitalize on his vision, Simpson purchased 2,000 lots of crude oil futures for the price of \$45.6 per barrel. Which type of derivatives trader is Samuel Simpson?

- A. Speculator.
- B. Hedger.
- C. Option trader.
- D. Arbitrageur.

The correct answer is **A**.

Samuel Simpson is a speculator because he uses derivatives to bet on the upward direction of market prices of crude oil (the underlying asset).

Option B is incorrect because hedgers use derivatives to safeguard against the risks related to future movements in market prices of underlying variables.

Option D is also incorrect because arbitrageurs use derivatives to take offsetting positions in two or more instruments to earn a profit.

Q.602 In which of the following is the holder of the derivative instrument exposed to limited downside risk or limited losses?

- A. Long futures contract.
- B. Long put option
- C. Short call option.
- D. All of the above

The correct answer is **B**.

A long position in a put option (or the buyer of the put option) has a limited risk of losing the premium paid for the purchase of the put option in case the put option is not exercised.

Options A is incorrect because long positions in forwards and futures contracts are exposed to unlimited risk/losses in case of unfavorable movement in a market variable.

Option C is incorrect because the seller of a call option is exposed to unlimited losses as the price of stocks can increase to infinity. In contrast, the profit of the seller of a call option is limited to the call premium received at the initiation of the option.

Q.603 Assume stock K trades on the New York Stock Exchange (NYSE) and the London Stock Exchange (LSE). The stock currently trades on the NYSE for \$50 and on the LSE for £39. Given the current exchange rate is 1.2658 \$/£, determine the amount of arbitrage profit that could possibly be earned.

- A. \$0.82
- B. \$1.25
- C. \$0.63
- D. Zero: there's no opportunity for arbitrage

The correct answer is **C**.

Value in dollars of K on LSE = £39 x 1.2658 \$/£ = \$49.37

Arbitrageur could purchase K on LSE for \$49.37 and sell on NYSE for \$50.

Profit per share = \$50 - \$49.37 = \$0.63

Q.3511 Which of these is *NOT* a characteristic of over-the-counter options?

- A. Large traders trade over large sums of money.
- B. They are often used to hedge interest rate risks and currency fluctuation risks.
- C. Participants have the freedom to negotiate deals.
- D. They are highly regulated.

The correct answer is **D**.

Before the 2007-2009 financial crisis, Over-the-counter options were largely UNREGULATED.

Since the crisis, OTC markets are increasingly being regulated. However, they are not yet highly regulated. It is often the place where large players, i.e., banks, hedge themselves against interest rate risks and currency fluctuation risks.

Q.3512 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.
- D. Flexible and easily customizable.

The correct answer is **B**.

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

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

Option 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 in a desire to earn profits.

Option D is incorrect. OTC products are customizable and much more flexible.

Q.3515 If Michael Emery takes a long position in copper futures, which of the following parties will take the opposite position to the futures contract?

- A. Another investor/trader.
- B. The clearinghouse.
- C. A large commercial bank.
- D. None of the above.

The correct answer is **B**.

The clearinghouse act as the opposite party to each transaction in futures markets. Example:

Assume that Member A agrees to buy 5,000 bushels of corn (defined by the Chicago Mercantile Exchange as one contract) from Member B for delivery in September at 400 cents per bushel (USD 20,000 in total). The exchange (through its CCP) then becomes the counterparty to both members. This means that the CCP agrees to buy 5,000 bushels of corn from Member B at 400 cents per bushel while Member A agrees to buy 5,000 bushels of corn from the CCP at 400 cents per bushel. Thus, when Member A and Member B agree on a certain transaction, the exchange stands between them as the intermediary.

The key point is that Member A no longer needs to worry about the creditworthiness of Member B (and vice versa). Indeed, the two members might agree on a trade (either on the floor of the exchange or electronically) without even knowing each other. The CCP becomes the counterparty to both and is a clearinghouse for all transactions.

Q.3516 The everyday process of adjusting the margin for the gains and losses on the value of futures contracts is known as:

- A. Marking to market.
- B. Value adjusting.
- C. Clearing.
- D. Initial margining.

The correct answer is **A**.

The process of adjusting the margin balance for 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.

Q.3517 Which of the following best describes a forward commitment?

- A. A forward commitment is a legally binding promise to perform some action in the future.
- B. A forward commitment is a claim (to a payoff) that depends on a particular event.
- C. A forward commitment is a contingent claim that depends on a stock price at some future date.
- D. A forward commitment is a derivative contract through which two parties exchange the cash flows or liabilities from two different financial instruments.

The correct answer is **A**.

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 forward commitment can also be defined as a contract entered into between two parties that require both parties to transact in the future at a pre-specified price known as the forward price. 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. The parties have to transact; they are obligated to do so. In the event of non-performance, because of the obligation of the forward contract, a legal remedy is possible to enforce the obligation.

The payoff profiles of forward commitments are linear in nature and move upwards or downwards in direct relation to the price of the underlying asset. Forward commitments include futures contracts and forwards contracts.

Options B and C are incorrect: A forward commitment and a contingent claim are two different things. A **forward commitment** creates an obligation between the transacting parties whereas a contingent **claim** creates the right but not the obligation to transact at a future date.

Option D is the definition of a swap.

Q.3519 Chris Dunkins bought a put option with a strike of \$59. If at expiration the stock is now worth \$42, then what is the payoff of the option at expiration?

- A. \$0 payoff.
- B. \$17 positive payoff.
- C. \$17 negative payoff.
- D. None of the above.

The correct answer is **B**.

The payoff of a put option at expiration is:

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

Q.3520 Which of the following statements is correct regarding the value of a forward contract to a short party at expiration?

The value of the forward contract is:

- A. Valueless.
- 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.
- D. Equal to 1 divided by the value of the long party.

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.

Option 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.

Option 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. This party with a short position has agreed to deliver the obligation for a price that is higher than what would have been received if it were sold today in the market.

Option D is incorrect. 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.

Q.3521 Which of the following is *NOT* an exchange-traded derivative instrument?

- A. Futures.
- B. Forwards.
- C. Options.
- D. None of the above.

The correct answer is **B**.

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

Q.3522 Which of the following factors differentiates futures contracts from forward contracts?

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

The correct answer is **D**.

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.

Option A is incorrect: Both futures contracts and forward contracts can be settled using cash.

Option B is incorrect: Both futures and forwards are derivatives that derive their value from the underlying assets.

Option C is incorrect: Both cash or physical assets can be used for the settlement of futures

Q.3523 In order to protect from the downside risk of stock prices, investors should:

- A. Buy put options.
- B. Sell put options.
- C. Buy call options.
- D. Sell 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 asset's price is lower than the strike price. This protects investors from downside risk because the option gains value when the underlying asset's price drops.

Reading 29: Exchanges and OTC Markets

Q.824 John Galloway has recently joined Ace Investments as an investment manager. He previously worked as an equity trader at a small brokerage firm. His new boss told him that he would only be trading derivatives on exchanges, and the firm does not approve the use of over-the-counter derivatives.

Which of the following derivative instruments is he NOT allowed to trade?

- I. Forwards
- II. Options
- III. Swaps

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

The correct answer is **D**.

If the investment company does not approve the trading of over-the-counter derivatives, then the trading of forwards and swaps is not allowed. Generally, forwards and swaps trade on over-the-counter markets while futures contracts and options trade on exchanges.

Q.825 Diya Singh is a junior trader at Mumbai Balance Fund. She invests in derivatives with the purpose of speculating on derivatives prices and the price trends of the underlying assets. Unlike hedgers who trade long-dated customized derivatives, Singh intends to invest in more liquid and more standardized derivative instruments. She has the option to invest in either exchanges or over-the-counter markets. Considering her purpose, which of the following markets is more suitable for Singh?

- A. Over-the-counter markets.
- B. Centralized exchanges.
- C. Both over-the-counter markets and centralized exchanges.
- D. None of the markets are suitable.

The correct answer is **B**.

Exchange markets or centralized exchanges are more suitable for Singh. Since the trader wants to trade more standardized and more liquid derivatives instruments, the best option available for the trader is to trade on exchanges. Over-the-counter markets are more suitable for the investors that want to invest in long-dated, illiquid, customizable and more complex derivatives instruments.

Q.826 Muhammad Amir recently completed his Ph.D. in finance and economics. After his graduation, he started his career as a college professor. In his first lecture, he said: "Exchanges are more efficient and more liquid than OTC markets as they minimize the risk and promote customization." Which of the following options is correct?

- A. Muhammad Amir is incorrect regarding the liquidity feature of exchanges.
- B. Muhammad Amir is incorrect regarding the enhanced efficiency of exchanges.
- C. Muhammad Amir is incorrect regarding the promoted customization of exchanges.
- D. Muhammad Amir is incorrect regarding the risk reduction of exchanges.

The correct answer is **C**.

Exchanges promote standardization, not customization. Due to the central clearing feature of exchanges, exchanges are more efficient and more liquid. Exchange act as the buyer to every seller, and seller to every buyer, which results in reduced counterparty or default risk.

Q.827 Exchanges perform a number of functions to enhance efficiency and promote the integrity of financial markets. Which of the following functions is least likely performed by the exchanges?

- A. Exchange constructs contracts that are standardized in terms of maturity dates, minimum price quotation increments, deliverable grade of the underlying assets, delivery location of the contract, etc.
- B. Exchange provides a central venue for trading and hedging. This centralized trading venue enhances efficiency and promotes an opportunity for price discovery.
- C. Exchange provides a platform for hedgers and arbitrageurs to construct products and transactions that fulfill their purposes.
- D. Exchange provides reporting services related to transaction prices and volumes to trading participants, data vendors, and subscribers, which improves price transparency.

The correct answer is C.

Exchanges least likely provide a platform for hedgers and arbitrageurs to construct products and transactions according to their needs. Hedgers can hedge their risk through standardized, not customized products. Additionally, the pricing strategy of exchange-traded products is based on the no-arbitrage opportunity principle.

The main function of an exchange is to ensure fair and orderly trading as well as efficient distribution of information regarding the price of all the securities traded on the exchange.

Other functions of an exchange include: Constructing contracts that are standardized in terms of maturity dates, minimum price quotation increments, deliverable grade of the underlying assets, delivery location of the contract, etc.

Providing a central venue for trading and hedging. This centralized trading venue enhances efficiency and promotes an opportunity for price discovery.

Providing reporting services related to transaction prices and volumes to trading participants, data vendors, and subscribers improves price transparency.

Q.828 Frau Schulz is the head of risk management at Frankfurt Money Bank. Her job is to understand the risk structure of a transaction and the risk of the market in which the transaction is carried out. She suggests that it is better to trade in exchanges than it is to trade in over-the-counter markets for the following reasons:

- I. One reason for trading in exchange is the central clearing feature of exchange that allows the netting of all the outstanding trades of a specific party
- II. Another reason for trading in exchanges is because it reduces counterparty risk and systemic risk

Which of the above-mentioned reasons for trading in exchanges rather than in OTC markets is/are incorrect?

- A. Only I is incorrect
- B. Only II is incorrect
- C. Both reasons are incorrect
- D. Both reasons are correct

The correct answer is **D**.

Both reasons mentioned are correct.

Reason I is correct as one of the main advantage of trading in exchanges is that it allows the netting of all the trades of a party through its central clearing feature, which means that if a party has two opposite outstanding positions with two different parties, then both positions of the party will be offset or netted.

The second reason for trading in exchanges is that it reduces counterparty risk and systemic risk. In bilateral clearing, the risk of a default by a market participant is borne entirely by its counterparties. If trades are cleared through a CCP, however, the risks are shared by all members of the CCP (some of which may never have traded with the defaulting counterparty). This sharing of credit risk is referred to as loss mutualization and is attractive to regulators because it has the effect of reducing systemic risk. It does this by dispersing the impact of a default by a market participant throughout the market.

Q.829 The majority of the derivative transactions are a zero-sum game. Therefore, the party with the loss is less likely to pay for its losses or fulfill its obligations. To mitigate such situations, exchanges have developed netting and margining methods. Identify if the given definitions of margining and netting are correct.

I. Netting is referred to as the offsetting of contracts that reduce the exposure or risk of counterparties related to the open positions to which they are exposed. It also reduces the costs of maintaining open positions as the parties will be required to only post margins against net positions.

II. Margining is divided into two types - the variation margin, and the initial margin. In the variation margin account, members receive and pay cash or other assets against gains or losses in their positions.

III. In the initial margin account, members provide coverage against losses in case they default on their contracts.

- A. Only statement I is correct.
- B. Only statement II is correct.
- C. Only statements II and III are correct.
- D. All of the statements are correct.

The correct answer is **D**.

All the definitions are correct. Netting involves the offsetting of the contracts, which reduces the exposure of the counterparties in the open positions and reduces the costs of maintaining open positions as the parties will be required only to post margins against net positions. The variation margin account only requires members to pay or receive the cash or other assets against gains and losses in their positions, while the initial margin provides coverage against losses in case of default in case a trader is unable to pay the variation margin.

Q.832 Mathew Perry, an investment analyst, is reading a research paper based on the evolution of exchanges. He finds out that, before the introduction of clearinghouses, many other clearing and netting alternatives existed in exchanges to net the positions of members in order to reduce the risks. Which of the following clearing or netting type is most common nowadays in exchanges?

- A. Bilateral clearing
- B. Central clearing
- C. All of the above
- D. None of the above

The correct answer is **B**.

Centrally cleared markets with CCPs or clearing houses have complete clearing features. In these types of markets, central counterparties (or clearinghouses) exist and act as the buyer to every seller and the seller to every buyer. Since all the contracts are standardized in terms of maturities, underlying assets, delivery terms, etc., the CCP can easily offset all transactions.

Option A is incorrect: Bilateral clearing involves two parties in a transaction agreeing on how they will be cleared, what netting arrangements they would prefer, and what will be used as collateral in case of any.

Q.833 Which of the following statements are consistent with the differences between OTC markets and exchange markets?

I. The members of OTC markets are in better positions to negotiate the terms of a contract such as maturity, grade of the underlying assets, delivery terms, etc., than the members of exchange markets
II. It is riskier to trade in exchanges as all the trades are cleared through only one counterparty and the default of this party can have an effect on all the parties

- A. Statement I is consistent with the differences between OTC markets and exchange markets.
- B. Statement II is consistent with the differences between OTC markets and exchange markets.
- C. Both statements are consistent with the differences between OTC markets and exchange markets.
- D. None of the statements are consistent with the differences between OTC markets and exchange markets.

The correct answer is **A**.

Only statement I is correct because the members of OTC markets are in a better position to negotiate the terms of the contract because OTC contracts are customizable and can be negotiated in terms of maturity, grade of underlying assets, delivery terms, etc., while the members of exchange markets can not negotiate the terms of the contracts as contracts are standardized. Statement II is incorrect because it is less risky to trade in exchange markets because the central counterparty of the exchange guarantees the clearance and fulfillment of the obligations. On the other hand, the credit risk in a bilateral transaction in OTC markets is high.

Q.834 Ellen Fraser, FRM, has recently joined Galactic Investment Bank as an investment manager. Fraser's first assignment at her new job is to hedge a client's portfolio against the movements in interest rates. Her supervisor instructed her to hedge the portfolio with exposure in the derivatives market while taking basis risk into considerations. Fraser has the option to invest in either over-the-counter derivatives or exchange-traded derivatives. Which derivatives are LEAST likely exposed to basis risk?

- A. Over-the-counter derivatives are least likely exposed to basis risk.
- B. Exchange-traded derivatives are least likely exposed to basis risk.
- C. Both over-the-counter and exchange-traded derivatives are exposed to basis risk.
- D. Neither over-the-counter nor exchange-traded derivatives are exposed to basis risk.

The correct answer is **A**.

Over-the-counter derivatives are least likely to contain basis risk. Basis risk can arise due to differences in the maturities of the contracts that are used for hedging the exposure. Since OTC derivatives are customizable, OTC derivatives are negotiated to match the maturities that reduce basis risk. In contrast, exchange-traded derivatives are standardized and are more likely to contain basis risk as it is difficult to match the maturities of exchange-traded derivatives with the product that has to be hedged.

Q.835 Which of the following is not true regarding over-the-counter derivatives?

- A. OTC derivatives are more flexible as they enable market participants to negotiate the terms of the agreement.
- B. In order to unwind an OTC derivatives transaction, a member must interact with the original counterparty.
- C. OTC derivatives are more efficient as they help reduce the credit risk or the systemic risk of the transaction.
- D. OTC derivatives reduce basis risk, as there are no standardized contracts in OTC derivatives markets.

The correct answer is **C**.

Exchanges, (not OTC derivatives) are more efficient as they help reduce the credit risk or the systemic risk of the transaction.

Option A is true: OTC derivatives are more flexible as they enable market participants to negotiate the terms of the agreement.

Option B is true: One of the disadvantages of over-the-counter derivatives is that, in order to unwind an OTC derivatives transaction, a member must interact with the original counterparty who can misuse its privileged position to quote unfavorable prices.

Option D is true: Since OTC derivatives are customizable, OTC derivatives are negotiated to match the maturities that reduce basis risk.

Q.836 Guanting Chen is participating in an aptitude test to enter into the summer analyst program of the Great Britain Investment Bank (GBIB). The aptitude test was divided into three portions, including business ethics, asset valuation, and derivatives. One of the questions in the derivatives portion asked to note down four categories of over-the-counter derivatives.

Which of the derivative categories mentioned by Chen is NOT a type of OTC derivative?

- A. Interest rate derivatives
- B. Exchange rate derivatives
- C. Credit derivatives
- D. Arbitrage derivatives

The correct answer is **D**.

Arbitrage derivatives are not a category of derivatives. All types of derivatives can be used to earn arbitrage earnings. The five main categories of over-the-counter derivatives are:

- I. Interest rate derivatives
 - II. Foreign exchange derivatives
 - III. Equity derivatives
 - IV. Commodity derivatives
 - V. Credit derivatives
-

Q.837 Which of the following is the accurate difference between the clearing process and the settlement process of over-the-counter derivatives?

- A. The settlement of OTC derivatives is the process by which payment obligations between two or more parties are computed and netted, and clearing is the process by which the contract obligations are fulfilled.
- B. The clearing process of OTC derivatives is the process by which payment obligations between two or more parties are computed and netted, and the settlement is the process by which the contract obligations are fulfilled.
- C. The clearing process of OTC derivatives is the process by which members are required to post cash and assets against their open positions, and the settlement is the process by which the contract obligations are fulfilled.
- D. The clearing process of OTC derivatives is the process by which payment obligations between two or more parties are computed and netted, and the settlement is the process by which the contract cleared through the central clearinghouse.

The correct answer is **B**.

Clearing and settling are two different processes. The clearing process of OTC derivatives is related to computing the cash flow or payoff of a certain party after netting, and the settlement is the process by which the contract obligations are fulfilled.

Option A is incorrect because it contradicts **option B**.

Option C is incorrect: The definition for clearing is incorrect-Clearing only involves computation of the payment obligations.

Option D is incorrect: The definition of settlement is wrongly stated.

Q.838 Margining is a method of creating a layer of security or resources to cover the losses incurred during the period of a contract. In other words, margining is a process that requires members to receive and pay cash or other assets against gains and losses in their positions, which provides coverage against losses in case of default. In which of the following markets is margining used?

- A. Over-the-counter markets.
- B. Exchanges.
- C. Both over-the-counter and exchange markets.
- D. None of the above.

The correct answer is C.

In OTC markets, both parties bilaterally require margin as security against losses, whereas in exchanges, the margining process is performed by the central counterparty.

A margin account can be used between a trader and a broker. If the broker is not a member of a CCP, it will have to use an entity that is a member giving rise to a margin account between the broker and the member. Unlike margin accounts between CCPs and their members, a margin account between a broker and a retail trader comprises of both an initial and a maintenance margin. The balance in the margin account should not fall below the maintenance margin.

Q.840 Clearing houses are

- A. never used in futures markets but are sometimes used in OTC markets.
- B. always used in futures markets and sometimes used in OTC markets.
- C. always used in both futures markets and OTC markets.
- D. always used in OTC markets but never used in futures markets.

The correct answer is **B**.

A clearing house is an intermediary between buyers and sellers of financial instruments. It has always been used in regulated (exchange) markets to settle trading accounts, clear trades, collect and maintain margin monies, regulate delivery, and report trading data. Futures contracts are exclusively traded in organized exchanges. Although OTC markets (decentralized market in which market participants trade stocks, commodities, currencies, or other instruments directly) traditionally do not involve a clearing house, they are increasingly embracing the idea of central clearing through central counterparties (CCPs) which are a type of clearing house.

Q.841 Derivative Product Companies or DPCs are typically triple-A rated independently capitalized entities created by one or more banks as a bankruptcy-remote subsidiary of a major dealer. The purpose of DPCs is to provide external counterparties with a degree of protection against counterparty risk by protecting against the default of the parent bank or parent company. Which of the following is least likely a determinant of DPCs' triple-A ratings?

- A. The ability to mutualise the default loss amongst other counterparties and another market participant.
- B. The support from the parent company and the transferability of the risk to the well-capitalized firm in case the parent company defaults.
- C. The capability of credit risk management, and providing operation guidelines to external counterparties to control credit quality.
- D. The ability of the DPC to minimize market risk.

The correct answer is **A**.

The credit rating of a derivatives product company or DPC does not depend on its ability to mutualize the loss amongst counterparties and market participants; it is the role of the central counterparty in exchanges. The ratings of the DPC depend on three functions:

1. The support from the parent company and the transferability of the risk to the well-capitalized firm in case the parent company defaults
 2. The capability of credit risk management, and providing operation guidelines to external counterparties to control credit quality
 3. The ability of the DPC to minimize market risk
-

Q.842 Which of the following correctly defines monolines?

- A. Monolines are legal entities created to isolate the default risk of the counterparty in a derivatives transaction, so the firm can receive the full settlement of its other transactions.
- B. Monolines are triple-A rated independently capitalized entities created by one or more banks as a bankruptcy-remote subsidiary.
- C. Monolines are dependent central parties in the derivatives market that act as the counterparty in every derivative transaction.
- D. Monolines are types of insurance companies with strong credit ratings that provide credit wraps and credit default swaps to achieve diversification and better returns.

The correct answer is **D**.

Monolines/Credit Derivatives Product Companies (CPDCs) are similar to insurance companies (or financial guarantee companies) with strong credit ratings that provide credit wraps (financial guarantees) and credit default swaps (CDC) to achieve diversification and better returns. They are structured as an extension of a DPC that focused only on credit default swaps.

Option A is incorrect: It refers to special purpose vehicles.

Option B is incorrect: This is the definition of derivative product companies.

Option C is incorrect: It refers to CCP.

Q.843 Which of the following is a method of risk mitigation in over-the-counter markets where a firm creates a legal entity to transfer its assets and to isolate the firm's financial risk?

- A. Central counterparty
- B. Initial Margins
- C. Derivative Product Company
- D. Special purpose vehicles

The correct answer is **D**.

A Special Purpose Vehicle (SPV) or Special Purpose Entity (SPE) is a separate legal entity created to isolate a firm from financial risk. The company forming an SPV transfers its asset to the SPV. If a specific counterparty in a derivatives transaction defaults, the firm can still receive full settlement on its other transaction without netting the losses on the defaulted transactions.

Option A is incorrect: Central counterparty refers to a dependent central party in the derivatives market that act as the counterparty in every derivative transaction

Option B Is Incorrect: Initial margins save CCPs from losses in case a trader is unable to pay the variation margin. The initial margin amount is set by the CCP and is dependent on the changes in the future market prices. The CCP is therefore allowed to alter the initial margin at any point depending on market change

Option C is incorrect: A derivative product company is a triple-A rated independently capitalized entity created by one or more banks as a bankruptcy-remote subsidiary.

Q.3571 Financial intermediaries securitize assets by creating Special Purpose Vehicles (SPVs) because:

- A. It increases the overall return
- B. It protects the SPV in case the financial intermediary goes bankrupt
- C. All of the above
- D. None of the above

The correct answer is **B**.

Special Purpose Vehicles are created to protect the investors in case of bankruptcy of a financial intermediary (usually a bank). As the pooled assets are separate from the financial intermediary, in the event of bankruptcy, the lenders of the financial intermediary cannot lay claim on the SPV's assets.

Q.3572 What is the definition of a Special Purpose Vehicle (SPV)?

- A. A subsidiary company with an asset/liability structure and legal status that makes its obligations secure even if the parent company goes bankrupt
- B. A type of asset-backed security that is secured by a mortgage or collection of mortgages
- C. A structured financial product that pools together cash flow-generating assets and repackages this asset pool into discrete tranches that can be sold to investors
- D. An institution providing a wide variety of deposit, lending and investment products to individuals, businesses or both.

The correct answer is **A**.

A Special Purpose Vehicle (SPV) is a subsidiary of a company which is bankrupt remote from the main organization. The actions of an SPV are usually very tightly controlled, and they are only allowed to finance, buy and sell assets.

Notes: Option B is the definition of mortgage-backed securities, option C is the definition of CDOs, and option D is the definition of a financial institution.

Q.4874 Which of the following is a way in which CCPs handle credit risk?

- A. Variation Margin and Daily Settlement

- B. Netting
- C. Default Fund Contributions
- D. All of the above

The correct answer is **D**.

CCPs use various ways to mitigate credit risk. These include the following:

Netting

Netting involves long and short positions offsetting each other.

Variation Margin and Settlements

Future contracts are traded on a daily basis up-to-the maturity period. A member who is trading with the CCP will have to pay the CCP in case the price of the traded commodity decreases. The payment made should correspond to the price decline of the commodity. Similarly, if the price of the commodity increases, the CCP will have to pay the member an amount that corresponds to the price increase.

Daily settlements have simplified the closing out of future contracts by making the maturity date of the contract less useful. There are no interests associated with variation margin payments as they are settled on a daily basis and not on the maturity date.

Initial Margin

In addition to the variation margin, a trader is required to deposit an initial margin with the CCP. Initial margins save CCPs from losses in case a trader is unable to pay the variation margin. The initial margin amount is set by the CCP and is dependent on the changes in the future market prices. The CCP is therefore allowed to alter the initial margin at any point depending on market changes.

Default Fund Contributions

Default fund contributions take care of the remaining amount not covered by the initial margin. The equity of a CCP is at risk only after exhausting the default fund contributions of all members.

Q.4875 In a lecture, when an FRM candidate is asked to give the advantages of OTC markets over exchanges, he says the following:

- I. The participants have the freedom to negotiate deals
- II. There's better information flow between a market maker and the customer
- III. There are fewer restrictions and regulations on trades

Which of the above statement(s) is/are the correct advantages of OTC markets?

- A. III only
- B. I & II only
- C. All of the above
- D. None of the above

The correct answer is C.

All of the above statements are the advantages of OTC markets over exchanges.

Advantages of OTC markets over exchanges include the following:

There's better information flow between a market maker and the customer

There are fewer restrictions and regulations on trades

It's cost-effective for corporates as service costs lower

The participants have the freedom to negotiate deals

Q.4876 Which of the following factors are likely to affect the initial margin for a futures contract set by a CCP?

- A. Volatility of the futures prices.
- B. The time taken by the exchange to close out a member in case of a default.
- C. All of the above.
- D. None of the above.

The correct answer is **C**.

The initial margin will be determined by the volatility of the futures price and the time it takes the exchange to close out a defaulting member.

Q.4877 The following are funds available to a CCP to help cover for losses that may arise if a member default:

- I. Default fund contribution made by the member
- II. Initial margin paid by the member
- III. Equity capital provided by the exchange
- IV. Default fund contributions made by other members

Which of the following is the correct order in which the funds are used?

- A. I, II, III, and IV
- B. II, I, IV, and III
- C. I, II, IV, and III
- D. IV, III, I, and II

The correct answer is **B**.

The funds available to a CCP to help cover for losses that may arise if a member default, are used in the following order:

1. Initial margin paid by the member,
 2. Default fund contribution made by the member,
 3. Default fund contributions made by other members, and
 4. Equity capital provided by the exchange.
-

Q.4878 Assume that, before the existence of CCPs, Trader X agreed to buy 10,000 bushels of wheat for 400 cents per bushel from Trader Y for delivery in June. Three weeks later, Trader X sold 5,000 bushels of wheat to Trader Z for 420 cents per bushel for delivery in June and another 5,000 bushels to Trader Q for 440 cents per bushel of wheat for delivery in June. What is the expected profit or loss for Trader X?

- A. A profit of USD 4,000
- B. A loss of USD 3,000
- C. A profit of USD 3,000
- D. A loss of USD 2,000

The correct answer is **C**.

The cost of delivery of 10,000 bushels is:

$$10,000 \times 400 \text{ cents} = \text{USD } 40,000$$

Therefore,

Trader X sold:

- i. 5,000 bushels of wheat to Trader Z for 420 cents per bushel for delivery in June
- ii. 5,000 bushels to Trader Q for 440 cents per bushels of wheat for delivery in June.

Thus, gross earnings will be:

$$5000 \times 420 \text{ cents} + 5000 \times 440 \text{ cents} = \text{USD } 43,000$$

Hence, Trader A makes a net profit of:

$$\text{USD } 43,000 - \text{USD } 40,000 = \text{USD } 3,000$$

Q.4879 A trader agrees with a broker to enter into a futures contract to sell 4,000 bushels of wheat for 500 cents per bushel. The initial margin is USD 20,000, and the maintenance margin is USD 10,000. Which circumstances will lead to withdrawal of USD 400 from the margin account?

- A. If price rise by 10 cents.
- B. If price drops by 10 cents.
- C. If price drops by 13 cents.
- D. If price rises by 13 cents.

The correct answer is **B**.

$$\begin{aligned} 4000F &= (\$20,000 + \$400) \\ F &= \frac{20,400}{4,000} = 510 \text{ cents} \end{aligned}$$

So, USD 400 can be withdrawn from the margin account if the price of wheat falls by 10 cents (500 - 10) or more.

Alternative (More Direct) Approach

The trader has a short position. Thus, they will gain if the price of wheat falls. But how much do they gain for each one cent decline? That would be $0.01 * 4,000 = \$40$. Therefore, how far would the price need to fall in order for the trader to gain \$400? That would be $400/40 = 10$ cents.

Q.4880 All of the following parties are required to post margin by the Chicago Board Options Exchange EXCEPT:

- A. A trader with a net long position in a call option.
- B. A trader with a net short position in a put option.
- C. A trader with a net short position in a call option.
- D. A trader shorting a stock.

The correct answer is **A**.

In the event that a trader holds a net long position in an exchange-traded stock option, he or she has no potential future liability. These positions are often purchased upfront, and the option may or may not be exercised. Consequently, there is no reason for the exchange to require margin from a trader who holds a long position in a call option or a long position in a put option.

Options B and C are incorrect. Potential future liability exists for a trader with a net short position in an option contract (e.g., a trader selling call or put options). The trader must sell or buy the underlying stock at an unfavorable price if the options are exercised. As a result, traders with short positions must post margin with the CCP.

D is incorrect. Shorting a stock in the US typically requires that the retail trader posts margin equal to 150% of the stock's price when the short position is initiated. In most cases, the sale proceeds account for two-thirds of the margin (100%/150%). This leaves the trader with an additional 50% contribution to the margin.

Q.4882 1,000 shares are sold by a trader at a price of \$45 per share. The initial margin and maintenance margin are 140% and 115%. What is the initial margin required?

- A. \$63,000
- B. \$51,750
- C. \$45,000
- D. \$18,000

The correct answer is **A**.

The initial margin required is 140%,

$$\text{Initial margin} = 1.4 \times 1000 \times 45 = 63,000$$

That is, initially, in addition to the \$45,000 obtained from the selling of the shares, the trader is required to contribute another \$18,000 ($=\$63,000 - \$45,000$)

Q.5039 You sell one December Brent Crude Oil futures contract when the futures price is \$108 per gallon. Each contract is on 1,000 gallons, and the initial margin per contract that you provide is \$6,000. The maintenance margin per contract is \$3,000. During the next day, the futures price rises to \$109.5 per gallon. What is the balance of your margin account at the end of the day?

- A. \$1,500
- B. \$7,500
- C. \$4,500
- D. \$9,000

The correct answer is **C**.

The price has increased by \$1.5. Because you have a short position, you lose $1.5 \times 1,000$ or \$1,500.

The balance in the margin account, therefore, goes down from \$6,000 to \$4,500.

However, there is no margin call since the margin account is still above the maintenance margin level.

Q.5040 A company (systemically important non-financial institution) entered into derivatives agreements with Banks X, Y, and Z that are worth +\$50 million, -\$60 million, and -\$25 million to the company, respectively. All transactions are cleared centrally through the same CCP, and the CCP requires a total initial margin of \$50 million. How much margin does the company have to provide?

- A. \$85 million
- B. \$50 million
- C. \$0
- D. \$35 million

The correct answer is **A**.

Since the transactions of the company are cleared centrally, they are netted against each other and the company's total variation margin (in millions of dollars) is $-50 + 60 + 25$ or \$35 million in total. The total margin required (including the initial margin) is therefore \$85 million.

B is incorrect. It assumes the variation margin is zero and therefore only the initial margin counts.

C is incorrect. It assumes the company isn't obliged to provide neither the initial margin nor the variation margin.

C is incorrect. The total margin requirement is erroneously calculated as \$85 million - \$50 million.

Things to Remember

Under the new CCP clearing rules in OTC markets that were phased in between 2016 and 2020, initial margin and variation margin must be posted.

We have changed the signs against the exposures when computing the margin required because in margin calculations, positive exposures (gains) reduce the variation margin while negative exposures (losses) increase the margin.

Reading 30: Central Clearing

Q.844 Frank Oliver is the head of the derivatives trading unit of an investment company. Apart from looking after derivative investments, his job description also includes the supervision of a dozen derivatives traders. In a post-market review session, Oliver made the following points regarding the cycle of a derivatives trade:

- I. The first stage is the execution, in which parties agree to the legal obligation of buying or selling the underlying against a cash flow determined by a variable
- II. The second stage is the clearing stage, where the underlying securities and cash is exchanged
- III. The third stage is the settlement, where the margins are maintained trade is settled, and the obligation of the contract is fulfilled

Determine if Oliver's comments are accurate.

- A. He is only correct regarding the first stage of the derivatives trade cycle.
- B. He is only correct regarding the second stage of the derivatives trade cycle.
- C. He is only correct regarding the third stage of the derivatives trade cycle.
- D. He is correct regarding all stages of the derivatives trade cycle.

The correct answer is **A**.

The following are the stages of the derivatives trade cycle:

1. Bilateral documentation and internal approvals

Here, the overall parameters of trading activities are established through a bilateral master agreement. This is a document that sets out standard terms that apply to all the transactions entered into between parties. At this stage, the derivatives desk also conducts credit reviews to establish credit lines and trading limits.

2. Clearing Clearing is the management of a transaction during its life. It includes margining and netting.

3. Settlement Settlement of a trade occurs when the trade is completed and all payments have been made and legal obligations satisfied. Cash or other assets are exchanged per the terms of the contract. settlement takes the form of cash or physical delivery.

II is incorrect. The underlying securities are exchanged at the settlement stage.

III is incorrect. Margining occurs at the clearing stage.

Q.845 Unlike traditional investments where the transaction takes place in two stages, derivatives transactions are carried out in multiple stages. In which of the following stages of a derivatives trade is the central counterparty most likely involved?

- A. Execution stage
- B. Clearing stage
- C. Settlement stage
- D. None of the above

The correct answer is **B**.

In the clearing stage of a derivatives transaction, the third party or central counterparty is involved in clearing the trade. Clearing involves margining and netting.

Option A is incorrect: Under the execution stage, the parties agree (before involving the CCPs) to the legal obligation of buying or selling the underlying against a cash flow determined by a variable

Option C is incorrect: The underlying securities are exchanged at the settlement stage without involving CCPs.

Q.846 Isabell Engler is a finance journalist who is currently working on a research paper focused on the difference between the goals of central counterparties in over-the-counter markets and in exchanges. She made the following statements in this regard:

I. One main goal of the central counterparty (CCP) is to standardize and enhance the operational process

II. On the other hand, another goal of the central counterparty (CCP) in over-the-counter markets is to mitigate counterparty risk and maintain liquidity

Which of her statements is/are correct?

- A. Only statement I is correct.
- B. Only statement II is correct.
- C. Both statements are correct.
- D. None of the statements is correct.

The correct answer is **C**.

Both statements are correct. Since the exchanges are standardized in terms of maturity, grade of the underlying, etc., the focus of the CCP is to standardize and enhance the operational process. On the other hand, since over-the-counter markets are long-dated, customized, and illiquid, the goal of CCPs in OTC markets is to mitigate counterparty risk and maintain liquidity.

Q.847 The introduction of central counterparties (CCP) changed the way the market participants are interrelated in the financial system by making itself the center point in the transactions. Determine the two accurate benefits of CCPs in relation to the topology of financial markets.

- A. Increased interconnectedness and decrease risk.
- B. Increased interconnectedness and increased transparency.
- C. Decreased interconnectedness and increased transparency.
- D. None of the above.

The correct answer is C.

The two benefits of central counterparties (CCP) in changing the topology of the financial markets is that it decreased the interconnectedness of market participants, which in turn, reduced systemic risk.

Another benefit of CCPs is that they increased transparency, as they maintain transaction records, including notional amounts and counterparty identities.

Q.848 Which of the following is the appropriate definition of the novation function of the CCP?

- A. Novation is the act of replacing one party in a contract with another, or of replacing one debt or obligation with another. It extinguishes (cancels) the original contract and replaces it with another, and requires the consent of all parties involved.
- B. Novation is the act of replacing one party in a contract with another, or of replacing one debt or obligation with another. It extinguishes (cancels) the original contract and replaces it with another, and does not require the consent of all parties involved.
- C. Novation enforces that no party is allowed to replace a contract with another, or of replacing one debt or obligation with another.
- D. None of the above.

The correct answer is **A**.

Novation is the legal process in which the CCP positions itself between buyers and sellers when one party replaces a contract with one or more other contracts. Novation transfers counterparty risk to the CCP. Once the novation process is complete, the new contract is not legally obligated on previous parties

Options B and C are incorrect: They contradict option A.

Q.849 Margins are usually of two types – initial margins and variation margins. Both required margins are calculated based on different variables. Which of the following is the determinant of the initial margin?

- A. Ratings of the borrower.
- B. Risk of the transaction.
- C. The creditworthiness of the borrower.
- D. Discretion of the parties involved

The correct answer is **B**.

The margin requirements are solely dependent on the risk of the transaction. The CCP evaluates the transaction and, based on the risk of the transaction, requires a certain margin from the parties involved.

In other words, the initial margin depends on the volatility of the futures price and how long it takes the exchange to close out the member in case of default.

Options A and C are incorrect: Ratings and creditworthiness of the borrowers are not factors considered in margining.

Option D is incorrect: The margin payments are determined by the CCPs and not the parties involved.

Q.850 Identify if the given definitions of margins are correct.

I. The variation margin is referred to as the offsetting of contracts that reduce the exposure or risk of counterparties related to the open positions to which they are exposed.

II. The initial margin is the initial amount required from members at the inception of the trade; it provides coverage against the losses in case one member defaults.

A. Only definition I is correct.

B. Only definition II is correct.

C. Both definitions are correct.

D. None of the definitions are correct.

The correct answer is **B**.

The definition of the initial margin is correct. The definition of the variation margin is incorrect because it is netting, not the variation margin, that involves offsetting the contracts to reduce the exposure to counterparties. The variation margin requires members to pay or receive the cash or other assets against gains and losses in their positions during the contract.

Q.851 Infrastructure Bank of Congo has a long exposure of \$350 million in a derivatives contract on the Frankfurt futures exchange. Since elections recently took place in Congo and the newly elected government canceled the projects of its predecessor, the nation's bank is likely to default on its obligations. Which of the following is the first alternative a central counterparty (CCP) will apply after default?

- A. Increasing the variation margin.
- B. Auctioning the contract of the defaulting party.
- C. Requiring additional initial margin.
- D. Loss mutualizing.

The correct answer is **B**.

As the Central Counterparty (CCP) guarantees the obligation of the contract, the CCP will honor the contract to the party if the other party defaults. This is not done by the CCP directly paying the losses on behalf of the defaulter, but the CCP replaces the defaulting counterparty of the contract with a new counterparty by auction.

Options A and C are wrong because the additional margin requirements are made before the default.

Option D is wrong because loss mutualization is the last resort.

Q.852 The central counterparty (CCP) is the center point in the exchanges. It is the counterparty of all the parties or members having exposure in the exchange. Suppose that one of the members is unable to fulfill its obligation and defaults. The CCP will terminate all financial contracts and relations with the defaulting party. The CCP has to manage ways to go about such defaults. Which of the following has the least adverse consequences on the other members if a member defaults?

- A. Let the defaulting member absorb the losses.
- B. Let the CCP pay for the losses.
- C. Let the CCP replace the defaulting member through auction.
- D. Let the CCP distribute loss through loss mutualisation.

The correct answer is **C**.

The auction has the least adverse consequences in case of default. In case a CCP member defaults, the CCP quickly halts all financial relations with that particular counterparty without suffering any losses. Other clearing members take up the positions of the defaulted member. This is usually actualized by auctioning the positions of the defaulting counterparty to other members by sub-portfolio, such as interest swaps. In most cases, members are more than willing to participate in the auctioning, given that they can realize a favorable workout of default with no negative consequences. The members should participate in the auction, or otherwise, the loss of the defaulting contract will be distributed among all members through loss mutualization.

Q.854 Mitigating the counterparty risk is essential to maintain liquidity and reduce systematic risk in the financial system. As an insurance against the counterparty default, all the central counterparty (CCP) members contribute specific resources to a pool that is used if the resources of the defaulting counterparty are insufficient to pay off the losses. In which of the following processes do members contribute to this type of insurance to absorb the adverse consequences of a defaulting counterparty?

- A. Novation
- B. Auction
- C. Loss mutualization
- D. Multilateral netting

The correct answer is C.

The process of insurance and absorbing the losses of a defaulting counterparty through a specific pool is called loss mutualization. In other words, loss mutualization is the process in which all the central counterparty (CCP) members contribute a specific amount of resources to a pool which is used to absorb the losses if the resources included in the initial margin, variation margin, and default fund contribution of the defaulting counterparty are insufficient to pay off the losses.

Option A is incorrect: Novation is the term used to describe the transfer of a contract from one party to another party. A central counterparty interjects itself between a buyer and a seller through a process called 'Novation' and becomes a seller to the buyer and a buyer to the seller. By novating the trade, the CCP guarantees settlement of the trade even if one party defaults on their obligation, thereby eliminating counterparty risk.

Option B is incorrect: In case a CCP member defaults, the CCP quickly halts all financial relations with that particular counterparty without suffering any losses. The positions of the defaulted member are taken up by other clearing members in what is known as an auction.

Option D is incorrect: Multilateral netting refers to more than two parties netting their positions. If we have only two parties involved in the netting, then it is referred to as bilateral netting.

Q.855 Which of the following is NOT a criterion for a contract/product that can be cleared in exchanges through CCPs?

- A. More standardized
- B. Less complex
- C. More liquid
- D. More creditworthy

The correct answer is **D**.

Increased creditworthiness is a good thing, but in terms of clearing, it does not matter as the central counterparty (CCP) works to mitigate the counterparty risk.

Options A, B, and C are accurate criteria for contracts/products that are cleared through CCPs in exchanges.

Q.856 Angela Oliver has recently joined a fast-growing brokerage house based in New York, which is also a member of a central counterparty (CCP). Which of the following is not a criterion for becoming a CCP member?

- A. Should meet admission criteria like ratings.
- B. Financial commitment through contribution to the default fund.
- C. Should be able to conduct the novation process.
- D. Should be able to fulfill operation requirements like posting margins.

The correct answer is **C**.

The member of a CCP has a lot of responsibilities as it acts as the liaison between the CCP and the end-users. Novation is a legal process that is conducted by the CCP and is the act of replacing one party in a contract with another, or of replacing one debt or obligation with another. It extinguishes (cancels) the original contract and replaces it with another, requiring the consent of all parties involved.

Q.857 Adam Eger, an equity analyst, is one of the members of a panel of guests invited to discuss the subject of the efficiency of exchange markets. While the panel supports the argument that there should be a single global central counterparty that can increase standardization globally and reduce counterparty risk, Eger is opposed to it. He believes that there should be more than one central counterparty due to the following factors:

I. Geographical markets intend to have their own 'local' CCPs to clear the transactions of regional financial institutions denominated in their local currency.

II. Regional CCPs specialize in certain products like credit default swaps, FRAs, etc. One single CCP is not sufficient to specialize in every clearable product.

Which of the above mentioned is/are likely to support the argument of multiple CCPs?

- A. Only factor I supports the argument of multiple CCPs.
- B. Only factor II supports the argument of multiple CCPs.
- C. Both factors support the argument of multiple CCPs.
- D. None of the factors support the argument of multiple CCPs.

The correct answer is **C**.

Both factors support the argument that there must be more than one CCP. Regional CCPs are more cost-efficient and risk diverse than a single global CCP. It is easy for a regional CCP to clear transactions with locally denominated contracts. However, it is difficult for one global CCP to specialize in every product being traded in each global exchange.

Q.858 Lindy Sago is a project manager at Toronto Fast Brokers Inc. The firm acts as a non-clearing member in the derivatives exchange market it trades in, but the firm's management recently decided to become a clearing member of the exchange. The firm has assigned Sago the task to evaluate the revenue model of the central counterparty (CCP). Which of the following is the appropriate combination of a CCP's revenue?

- A. Trading spreads and initial margins.
- B. Trading spreads and interest on the margins.
- C. Fees on clearing trades and interest on the margins.
- D. Fees on clearing trades and initial margins.

The correct answer is **C**.

It is necessary for CCPs to have sufficient human and capital resources to clear the million dollars worth of transactions and reduce counterparty risk. To finance these resources, CCPs need revenues. The two most common revenue streams of the CCPs are the fees that they charge per trade on the members for the clearing services and the interest that they earn on the margins posted by the members.

Use of initial margins is used to protect the CCPs from credit loss, in case a member defaults.

Q.859 Susanne Lange is an investment manager at London Wharf Bank. The firm acts as a non-clearing member in the derivatives exchange market it trades in, but recently the firm has decided to become a clearing member of the exchange. To brief the team about the new direction of the firm, Lange has prepared the following general points related to CCPs:

- I. The central counterparty does not make counterparty risk disappear, rather it centralize risk and converts counterparty risk into different forms of financial risk
- II. Unlike other financial institutions, the central counterparty cannot fail
- III. The margining activity of the central counterparty decreases risk, but in some cases, it can also increase risk

Which of the above-mentioned statements is/are correct?

- A. Points I and II are correct.
- B. Points II and III are correct.
- C. Points I and III are correct.
- D. Points I, II, and III are correct.

The correct answer is **C**.

Points I and III are correct.

Point I is correct because it is true that the central party doesn't vanish counterparty risk completely but, in fact, it centralizes the risk by acting as the counterparty to every party.

Point III is also correct.: The increase of margin requirements can absorb the liquidity of the party which can result in increased counterparty risk or default risk.

Point II is incorrect because, like any other financial institution, CCPs can also fail.

Q.860 A number of differences exist between CCPs and OTC CCPs. Because of these differences, CCP markets are considered less risky than OTC CCP markets. Which of the following is **not** an appropriate similarity between OTC CCP markets and CCP markets?

- A. In both, contracts last for the same period of time.
- B. In both, there is posting of initial and variation margins.
- C. In both markets, transactions are standardized.
- D. Default fund contribution applies in both markets.

The correct answer is **A**.

Option A is not a similarity since, while exchange-traded futures contracts trade continuously, OTC contracts on the other hand trade intermittently.

Options B, C and D are similarities because just like CCPs, posting of initial and variation margins, and contribution to the default fund are required in OTC CCPs. Just like CCPs, standardization applies in OTC CCPs, however, OTC CCP transactions are less standardized than CCP transactions

Q.861 Mohan Singh is an investment manager at Platonic Investments that has been investing in OTC derivatives for the past 10 years. This year, the manager has proposed to buy contracts into central counterparty (CCP) cleared markets as they tend to be more efficient. If Singh included the following advantages of central counterparty (CCP) cleared markets in his proposal, identify which of the following advantages he incorrectly presented in his proposal.

- A. The centralized position of the CCP enables it to understand the positions and exposures of its market participants, which increases the transparency in the market.
- B. The CCP's functions like margining, netting, and settlement potentially increases operational efficiency and reduces costs.
- C. The central auction feature of CCP may transform the large default of a clearing member into smaller price disruptions through coordinated replacement of positions during a crisis.
- D. The function of frequently requiring greater margin requirements under a CCP may increase the procyclicality in the economy.

The correct answer is **D**.

Requiring greater margin requirements in central counterparty (CCP) cleared markets is not an advantage but a disadvantage. The procyclicality is referred to as the dependence on the state of the economy. The greater margin requirements under the crisis period can increase the dependency of market participants on the economy, which increases procyclicality.

Options A, B, and C are appropriate advantages of the CCPs.

Q.862 Which of the following is NOT a disadvantage of central counterparty (CCP) cleared markets?

- A. Moral hazard has a serious effect on the counterparty risk management practices of the market participant as they believe that, in the presence of the CCP, they do not have to take risk into consideration.
- B. The function of frequently requiring greater margin requirements under a CCP may increase the procyclicality in the economy.
- C. When the losses of the defaulting counterparties exceed the financial commitments from the defaulter, then these losses are distributed throughout the CCP members.
- D. The central counterparty is vulnerable to adverse selection, which means that since the members trading OTC derivatives know more about the risks than the CCP itself, the members may intentionally pass the toxic contracts or assets to the CCP.

The correct answer is C.

The distribution of the loss or loss mutualization is an advantage, not a disadvantage of CCP markets. Loss mutualization is referred to as the situation when the losses of the defaulting counterparties exceed the financial commitments from the defaulter. These losses are then distributed throughout the CCP members.

Options A, B and C are appropriate disadvantages of the CCP.

Q.863 Ben Owen is a final-year student in a post-graduate program in the field of investing and hedging at the University of Zurich. Owen is writing a thesis on the subject of the risk-mitigating abilities of central counterparties. After reading a great amount of literature on the subject, he has concluded that the properties of CCPs are as follows:

I. The counterparty risk does not disappear from the system but is transferred from one party to the CCPs

II. CCPs are also vulnerable to failure

III. When CCPs increase the initial margin requirements in adverse economic times, the liquidity of financial institutions with liquidity shortages is likely to worsen.

Which of the properties of CCPs analyzed by Owen is correct?

- A. Properties I and II are correct.
- B. Properties II and III are correct.
- C. Properties I and III are correct.
- D. Properties I, II, and III are correct.

The correct answer is **D**.

All three properties of CCPs are correct. The counterparty risk does not disappear from the market, but it is transferred from one party to the central counterparty (CCP).

Just like other financial institutions, CCPs can also fail. In fact, we have seen in the past that when CCPs have failed, governments have come to bail them out.

Many financial institutions are likely to have liquidity shortages in adverse economic times or during a financial crisis. In such times, CCPs are likely to increase initial margin requirements and default fund contributions in order to meet their liquidity requirements. By doing so, the liquidity of financial institutions with liquidity shortages is likely to worsen even further.

Q.864 Tara Denis is the spokesperson for a central counterparty in one of the largest operating futures markets in Japan. During a Q&A session, one of the members of the public commented that the presence of CCPs in exchanges and OTC markets is creating a moral hazard. Which of the following is the most appropriate reference of the moral hazard pointed out by the member of the public?

A. It is the moral hazard related to the standardization of products by the CCP. As the CCP standardizes all the products, the market participants use more and more alternative products that do not capture the true motive of the hedge.

B. It is the moral hazard related to the effect of disincentivizing counterparty risk management practices by CCP members. Since the CCP acts as the counterparty to the transaction, the party or institution invests little resources in monitoring others parties' credit quality.

C. It is the moral hazard related to the reduction in counterparty risk. Since the CCP assumes all the counterparty risk, it becomes cheaper for parties to enter into the contracts, which is unnecessary for them.

D. It is a moral hazard related to the creation of liquidity. As the CCP creates and maintains liquidity in financial markets through margining, more and more participants enter the market with the intention of speculating.

The correct answer is **B**.

The moral hazard which the journalist is referring to is the moral hazard related to the effect of disincentivizing counterparty risk management practices by CCP members. Since the CCP assumes most of the counterparty risk of the transaction, the party or institution in the transaction invests little time or resources in monitoring other parties' credit quality.

Option A is incorrect because standardization does not increase the room for alternative products; it does the opposite. By standardizing products, participants have to trade in a highly regulated set of instruments that have some common characteristics.

Option C is incorrect: a CCP does not make counterparty risk disappear. What it does is centralize it and convert it into different forms of financial risk such as operational and liquidity.

Option D is incorrect: There's no empirical evidence suggesting that increased liquidity increases speculative tendencies.

Q.865 For a CCP to clear a product, some conditions MUST be satisfied. Which of the following is not one of those conditions?

- A. The legal and economic terms of the product must be standard within the market.
- B. There should be extensive historical data on the product price should be available
- C. There needs to be generally accepted models for valuing the products.
- D. The product needs to be passively traded.

The correct answer is **D**.

The product must trade actively. Otherwise, it may be difficult to unwind a member's position if the member fails to produce margin when required. Moreover, it may also be difficult to obtain up-to-date valuations for non-actively traded products. Furthermore, CCPs will not consider it worthwhile to develop the systems to support the clearing of a product if their members do not trade it frequently.

B is incorrect: Extensive historical data on the price of the product should be made available to enable initial margin requirements to be determined.

C is incorrect: Availability of generally accepted models for valuing the product will enable CCP to determine the variation margin at least once a day.

Q.866 The main goal of the central counterparty (CCP) is to reduce the counterparty risk or default risk by acting as a central counterparty to every buyer and seller. However, apart from the risk related to the default of the clearing member, this centralization creates other risks. Which of the following risks is NOT likely a risk that the CCP faces?

- A. Distress of other clearing members.
- B. Failed auction.
- C. Resignation of employees.
- D. Reputational risk.

The correct answer is C.

The resignation of the clearing members, not the resignation of the employees, is the risk which the CCP faces. Distress or default of the other clearing members once a member has defaulted is a major risk faced by the CCP. Another risk is that if the CCP doesn't receive reasonable bids in an auction, then the CCP has to allocate the losses to other clearing members, which can catalyze the financial markets. Another risk faced by the CCP is the reputation risk, which arises after a CCP allocates losses to other clearing members after the default of a member.

Q.868 Edward Trott is a renowned anchor at a local business news channel. During a panel discussion in an evening news bulletin, he mentioned that central counterparties (CCPs) themselves are vulnerable to risks. One of the major risks faced by CCPs arises if the CCP does not receive reasonable economic bids for the contracts defaulted by clearing members. It then has to impose the significant losses of that member on another clearing member via loss allocation methods, which may result in financial distress and potential further defaults. Which of the following risks is the anchor referring to?

- A. Distress of other clearing members.
- B. Failed auction.
- C. Resignation of clearing members.
- D. Reputational risk.

The correct answer is **B**.

The anchor is referring to the risk faced by a central counterparty (CCP) due to failed auction. The risk of failed auction arises when the CCP does not receive reasonable economic bids for the defaulted contracts through an auction. In this case, the CCP has to impose significant losses of that member on another clearing member via loss allocation methods, which may result in financial distress and potential further defaults.

Option A is incorrect: The distress or default of the other clearing members once a member has defaulted is a major risk faced by the CCP.

Option C is incorrect: The resignation of the clearing members is a risk that arises when one member defaults and the loss is allocated to another clearing member. This results in the resignation of the members.

Option D is incorrect: Reputation risk or reputational risk is the risk related to gaining a bad reputation due to the loss mutualization or loss location methods of a CCP. Though all members agree to this method, some members believe it's unfair to allocate a loss to clearing members just because they have sufficient funds and positive positions.

Q.869 A case study in a financial investments analysis exam stated that central counterparties (CCP) are faced with many risks. These risks can be default-related or non-default-related. From the following, identify the least likely default-related risk faced by CCPs.

- A. Failed auction.
- B. Investment losses.
- C. Resignation of clearing members.
- D. Reputational risk.

The correct answer is **B**.

The loss on the investments made by central counterparties is a non-default-related risk. The funds held on margin are used by CCPs to earn profits and interests. These margin funds are sometimes made up of cash and securities; these securities can decline in value, which may also result in investment losses.

Failed auction, the resignation of clearing members, reputation risk, and distress of other members are typical default-related risks faced by central counterparties.

Q.870 A postgraduate finance student of Dornbusch University has based his thesis on the subject of the risks faced by central counterparties. The student has categorized the risks faced by central counterparties in two categories i.e., default risks and non-default risks. This categorization is consistent with the risk classifications provided in the FRM books. Which of the following types of risk is a type of non-default risk?

- A. Failed auctions.
- B. Resignation of clearing members.
- C. Frauds.
- D. Reputational risk.

The correct answer is **C**.

Fraudulent activities of the internal and external members of the central counterparty are types of non-default risks. Since the default-related risks and non-default-related risks are considered correlated, the possibility of fraudulent activities is high in financial distress and defaults.

Options A, B and D are all types of default risks.

Q.871 Unlike in exchanges, the central counterparties of over-the-counter markets have to deal with complex transactions and projects. These CCPs are exposed to the risk of inconsistency in their margining functions. This is because the margin requirements of OTC products cannot be derived from market sources directly, but they require complex models to carry out the mark-to-market activities. This risk is most likely associated with:

- A. Distress risk
- B. Operational risk
- C. Legal risk
- D. Model risk

The correct answer is **D**.

Model risk is the risk associated with creating a robust and standard model that can derive the margin requirements in a timely and standardized manner. Unlike exchange-traded products, the initial margin and variation margin requirements of OTC products cannot be derived from market sources directly, but they require complex models to carry out the mark-to-market activities.

Option A is incorrect: Distress risk refers to the risk that other clearing members will default.

Option B is incorrect: Centralization of various functions fosters efficiency, but on the downside, it creates a fertile ground for operational bottlenecks. For example, the CCP may have to contend with frequent system failures due to heavy traffic.

Option C is incorrect: Legal risk refers to risks that CCPs may face that pertain to legal issues such as non-compliance with the laws and regulations.

Q.873 Which of the following model risks or model problems arise in the model-based initial margin estimation?

- A. In the model-based initial margin estimation, the defaulting party is unidentified until he defaults on its obligations in the contract.
- B. In the model-based initial margin estimation, the loss incurred due to the default of a member is allocated to the other clearing members.
- C. In the model-based initial margin estimation, the initial margins are estimated at a fixed dollar amount margin requirement set by the central counterparty (CCP).
- D. In the model-based initial margin estimation, the initial margins increase in proportion to the size of the position without considering that the risk of a large and concentrated position is adequately covered.

The correct answer is **D**.

The central counterparty is most exposed to model risk in the modeling of the initial margin requirement. In the model-based initial margin estimation, the initial margins increase in proportion to the size of the position without considering that the risk of a large and concentrated position is adequately covered.

Q.874 The central counterparties are not only exposed to default risks and operational risks but they are also exposed to liquidity risks. Which of the following functions of CCPs can possibly increase the liquidity risk of the CCPs?

- A. Large amount of cash that flows through the central counterparties (CCPs) due to variation margin payments.
- B. Large amount of cash that flows through the central counterparties (CCPs) due to initial margin requirements.
- C. Large amount of default losses that are mutualized after a clearing member of CCPs has defaulted.
- D. Large amount of cash that disappears from central counterparties (CCPs) when one clearing member has a negative balance position.

The correct answer is **B**.

Large amount of cash that flows through the central counterparties (CCPs) due to initial margin requirements.

Option A is incorrect because variation margins do not flow very frequently because we already have initial margins.

Option C is incorrect because, in loss mutualization, the losses are allocated to clearing members. This activity does not have a direct impact on the liquidity of CCPs.

Option D is incorrect because the loss of one party is the gain of another party within the CCP market.

Q.875 When trading standard transactions with an end user, a dealer is more likely to insist that the transactions are cleared through a CCP even when the credit quality of the end user is low. This is termed as:

- A. Moral hazard
- B. Adverse selection
- C. A tear up
- D. A pro-cyclical

The correct answer is **B**.

Adverse selection is a term used to describe a situation when trading standard transactions with an end-user, a dealer is more likely to insist that the transactions are cleared through a CCP even when the credit quality of the end-user is low.

Option A is incorrect: Moral hazard is where a dealer may fail to monitor the credit quality of the counterparty carefully.

Option C is incorrect: Tear ups involve closing out transactions of members that were originally entered into with the defaulting party at prices that leave the members with some loss.

Option D is incorrect: Pro-cyclical actions are those that reinforce the severity of economic cycles.

Q.876 The centralization feature of the central counterparty (CCP) increases the efficiency but at the same time also increases the operational risks for its members due to the concentration of the whole risk on the CCP. Which of the following situations can give rise to operational risk?

- A. Default by a clearing member.
- B. Increase in margin requirements.
- C. Failed auction.
- D. Infrastructure breakdown.

The correct answer is **D**.

The breakdown/failure of the infrastructure of the central counterparty (CCP) and fraud can increase the operational risk of the CCP and give rise to additional risk for its members. This is due to the centralization feature of the CCP.

Option A is incorrect: Default by a clearing member gives rise to distress risk.

Option B is incorrect: An increase in margin requirements is an issue that relates to model risk.

Option C is incorrect: Failed auctions is an event that leads to default risk.

Q.877 Which of the following is the most accurate explanation of the sovereign risk faced by the central counterparty (CCP)?

- A. The sovereign risk faced by the CCP is referred to as the intervention of sovereign governments in operation and activities of the CCP.
- B. The sovereign risk faced by the CCP is due to the failure of members who have held sovereign bonds as margin, which may have declined in value due to sovereign failure.
- C. The sovereign risk faced by the CCP is referred to as the pressure and the undue influence that can arise when one of the members of the CCP is the agency of a sovereign fund/government.
- D. None of the above.

The correct answer is **B**.

The sovereign risk faced by the CCP is due to the failure of members who have held sovereign bonds as margin, which may have declined in value due to sovereign failure. Members and CCPs frequently use repo rates. During the Eurozone crises, we noted that sovereign risk is strongly correlated with repo rates.

Q.878 The central counterparty (CCP) acquires banks services for the receipt and transfer of funds to and from its clearing members due to changes in variation margins and initial margins. These banks or large financial institutions can face technical failures or human failures that could stop them from processing the CCP's instructions to make cash payments and receive or deliver securities to its members. This could create liquidity problems on the end of the CCP and the clearing members that still have to fulfill obligations. This risk is most likely associated with:

- A. Sovereign risk
- B. Custodian risk
- C. Model risk
- D. Investment risk

The correct answer is **B**.

The custodian risk or custody risk is associated with the inability of a custodian to perform its operation. Banks and large financial institutions act as the custodians of the CCPs. There are extensive regulatory controls that govern the custodian services of these banks. However, these banks can face technical failures or human failures that could stop a bank from processing the CCP's instructions to make cash payments and receive or deliver securities to its members. This could create not only liquidity problems on the end of the CCP and members but can also increase the systematic risk in the market.

Q.1138 The default of a clearing member could create further problems, including:

- A. Loss resulting from litigation.
- B. Fraud.
- C. Operational losses.
- D. Default or distress among other CCP members.

The correct answer is **D**.

If a clearing member defaults, other CCP members might experience distress due to default correlation. Default events are unlikely to be isolated events.

Option A is incorrect because litigation losses relate to legal risk and not the default of clearing members

Option B is incorrect because fraud is an example of operational risk, which is not linked to defaulting of members.

Option C is incorrect because operational losses are related to the internal and external operations of the CCP and not the default of clearing members.

Q.1139 Since CCPs handle large amounts of cash and securities, they could potentially suffer losses from non-default loss events. The following are good examples of such events except:

- A. Business or operational failure.
- B. Failure or insolvency of a custodian.
- C. Investment losses.
- D. Resignations.

The correct answer is **D**.

Resignations are not non-default events but are actually triggered by default events. By resignation, we are referring to the possibility of clearing members leaving a CCP in the aftermath of a default.

Examples of non-default events include the following:

- Internal/external fraud.
 - Operational losses.
 - Investment losses.
 - Losses due to litigation.
-

Q.1140 One of the lessons learned from previous CCP failures is that:

- A. Initial margin methodologies need not be updated when there's a major shift in market regime.
- B. Initial margin methodologies need to be updated when there's a major shift in market regime.
- C. Initial margin updates should be excessive.
- D. CCP failures cannot be avoided.

The correct answer is **B**.

Significant market moves should call for an update of initial margins to avoid liquidating positions.

Q.1141 Which of the following is the main source of liquidity risk in CCPs?

- A. High transaction costs.
- B. Varying margin payments.
- C. Overinvestment in long-term assets.
- D. High operating costs.

The correct answer is **B**.

The main reason why CCPs face liquidity risk has much to do with varying margin payments. These contractual payments keep on changing as positions change. If the CCP does not set aside enough funds to meet margin payments, it risks failing to fulfill its obligations to surviving members in a timely manner.

Q.1142 A potential mismatch between margin payments and cash flows in various currencies describes:

- A. FX risk
- B. Concentration risk
- C. Sovereign risk
- D. Custody risk

The correct answer is **A**.

FX risk refers to a scenario where a CCP may not have enough currency, say, U.S. dollars, to meet dollar-denominated margin payments.

Reading 31: Futures Markets

Q.605 Jack Lee, a commodities investor at Singapore Investment Bank, instructs his team of traders to sell a September copper futures contract of 25,000 pounds in the COMEX (Commodities exchange, a sub-division of the NYMEX). Given these instructions, a bank's team of floor traders at the COMEX physically met the seller of the September Copper futures contract and determined the price of \$0.05 (5 cents) per pound. Looking at the nature of the transaction, one can say that the contract is being traded on:

- A. An over-the-counter market.
- B. An open outcry exchange.
- C. An electronic exchange.
- D. None of the above.

The correct answer is **B**.

Since the team of floor traders physically met the seller of the September copper futures contract to determine the price of the contract, the contract is trading on a futures exchange with an open outcry system. Option A is incorrect because Futures do not trade on over-the-counter (OTC) markets; they only trade on exchanges. Option C is incorrect because, in electronic exchanges, traders enter into futures contracts by entering their desired trades in a computer system that later matches the buyers and the sellers.

Q.606 Matias, FRM, has recently joined the London office of Venture Financials as a junior derivatives trader. Currently, Matias has an open position of gold futures contracts on the London Exchange. According to the contract, Matias is obligated to sell 5,000 troy ounces of gold with delivery in April. Determine the appropriate position of Matias's trade.

- A. Hedged futures position.
- B. Short put option position.
- C. Short futures position.
- D. Short forwards position.

The correct answer is C.

A short position in futures contracts requires the investor to sell the underlying asset at a predetermined price. Since the investor is a trader, not the producer or user of the commodity, the positions cannot be ascertained as a hedge. Usually, the producer and the user of the commodity use futures contract to hedge against price changes. Therefore, option A is inappropriate. Option B is also inappropriate because a short position in put options requires the short position holder to purchase, not sell, the underlying asset. Option D is incorrect because forward contracts trade on over-the-counter markets whereas Matias's gold contracts are being traded on the London exchange.

Q.607 Jack Manchester is a summer intern at one of the well-known investment banks in Canary Wharf. During lunch with his supervisor, Manchester was given a document pertaining to the futures contract's specifications. The excerpt from the document reads "... the tin must be a minimum of 99.85% purity conforming to BS EN 610:1996. All the tin deliverable against the London Metal Exchange (LME) contracts must be LME approved." This futures contract's specification is most likely related to:

- A. Position limits.
- B. Delivery arrangements.
- C. Contract size.
- D. Quality of the underlying.

The correct answer is **D**.

The excerpt presented depicts the quality of the underlying asset (e.g. tin). Since the futures contract is traded on an exchange, the contracts have standardized specifications like the quality of the underlying assets, delivery time and place, contract size, price, and quotation, etc.

Option A is incorrect because position limits entail the maximum number of positions in futures contracts that a speculator can hold in order to prevent speculators from manipulating markets.

Option B is correct because contract specifications related to delivery arrangements contain the information related to the place of delivery of the underlying asset.

Q.608 Nora Schneider is an experienced derivatives trader at a German commodities investing firm. Recently, she was given additional responsibilities to look after the trader's training department. While training the newly employed derivatives traders, she instructed the trader to clearly read the terms and specifications of a futures contract. Which of the following feature is NOT specified in the contract specification details of a futures contract?

- A. Position limit.
- B. Delivery month.
- C. Price limits.
- D. Counterparty.

The correct answer is **D**.

Since futures are standardized contracts that trade on exchanges and the trades are handled by clearinghouses, investors of futures contracts do not usually know the counterparty to the transaction. Following are the specifications mentioned in futures contracts agreements:

1. Quality of underlying asset
 2. Contract size
 3. Price and quotation
 4. Delivery month
 5. Delivery place
 6. Positions limit
 7. Price limits
-

Q.609 The Karachi Mercantile Exchange (KME) has set the daily price limit of rice futures contracts to Rs.4. The closing price of the rice futures contract on Monday was Rs.140 per 100 KG. If the evening newspaper on Wednesday reads that "Rice futures contracts closed limit down at Rs.138 per 100 KG," then which of the following is the most likely closing price of the rice futures contract on the preceding day?

- A. Rs. 136 per 100/KG
- B. Rs. 140 per 100/KG
- C. Rs. 142 per 100/KG
- D. None of the above

The correct answer is C.

Price limits are the maximum price movement/limit set by exchanges. Suppose the intraday increase in the price of the futures contract is equal to the predefined price limit. In that case, the contract is said to be limit up, whereas if the intraday decrease in the price of the futures contract is equal to the predefined price limit, the contract is said to be limit down. Since the newspaper reads that the price of the contract closed limit down (price decreased by Rs. 4) at Rs. 138, the preceding day (i.e., Tuesday) price is:

Limit down close to the current day = Closing price of the preceding day - Price limit

The closing price of the preceding day = Rs. 138 + Rs. 4 = Rs. 142

Q.610 Elif Makarov, a derivatives trader at one of the largest commodities trading firms in Moscow, is looking at a possible arbitrage trade in the copper futures contract. If the copper futures contract price is \$47.6 and the spot price of copper is \$48.9, then determine the appropriate strategy Makarov may take to earn the arbitrage profit.

- A. Take a short position in the copper futures contract and buy copper at the spot price.
- B. Take a long position in the copper futures contract and sell copper at the spot price.
- C. Wait for copper futures contracts to converge to the spot price and then take a short position in futures contracts.
- D. Wait for copper futures contracts to converge to the spot price and then take a long position in futures contracts.

The correct answer is **B**.

The most appropriate strategy to earn arbitrage profit or risk-free profit in the given scenario is to purchase (or take a long position) in the copper futures contract as the futures price of copper is below the spot price, and sell copper at the spot price since the spot price is higher than the futures price.

Q.611 Adam Anderson is a junior officer in the settlement department of a derivatives investment firm. He also takes a keen interest in tweeting and blogging about derivatives education and strategies. In one of his latest blog articles, he made the following comments regarding operations on a margin account:

- I. The initial margin refers to the amount that must be deposited to take a position in futures contracts
- II. The variation margin refers to the minimum margin balance required to retain a position in the futures contract
- III. Marking to market is the process of purchasing a particular asset or commodity and selling the futures contracts on that asset or commodity

Which of the comment is/are incorrect?

- A. Comment I only
- B. Comment III only
- C. Comments I & II
- D. Comments II & III

The correct answer is **D**.

Comments II and III are incorrect. Comment II is incorrect because the maintenance margin, not the variation margin, is the minimum margin balance required to retain a position in the futures contract. Comment III is incorrect because marking to market is a daily process of adjusting the margin account to reflect the investor's gain or loss.

Q.615 Which of the following statements regarding futures transactions is/are incorrect?

- I. Speculators are subject to lower margin requirements in futures contract trades as compared to hedgers.
- II. In a spread transaction, the trader simultaneously takes a long position in futures on a specific asset for a specific delivery time and takes a short position in futures on the same asset for a different maturity or delivery time.
- III. Futures contracts are settled on a daily basis, whereas forward contracts are settled at the maturity date.

- A. Statement I only
- B. Statement II only
- C. Statements I & II
- D. Statements II & III

The correct answer is **A**.

Statement I is incorrect. Hedgers, not speculators, are subject to lower margin requirements in futures contracts trades as compared to speculators because hedgers (just like producers or users of the specific commodity) are deemed to be less risky than speculators. Statement II is correct. In spread transactions, the investor takes opposite positions in futures contracts on the same assets but with different maturities. Statement III is correct because futures contracts are settled on a daily basis, whereas forward contracts are settled at the maturity date.

Q.616 During the inauguration ceremony of a newly introduced electronic clearing system at the Istanbul Commodities Exchange, the general manager of the operations department emphasized the importance of clearinghouses in the exchange. He said the following:

“It is because of clearinghouses that the traders of futures markets are required to honor their contracts. The clearinghouses act as a counterparty to every buyer and seller, allowing traders to decrease the default risk of the counterparty. Because of clearinghouses, traders can reverse or close their positions without having to contact the counterparty.”

The speech of the general manager at the inauguration ceremony is:

- A. Incorrect because the traders of futures markets have the right, but not the obligation, to honor the contract.
- B. Incorrect because the default risk pertaining to the counterparty exists in futures markets.
- C. Incorrect because traders cannot reverse their positions at any given time until the maturity of the contract.
- D. Appropriate.

The correct answer is **D**.

In the general manager’s speech, all of the features of the clearinghouse are defined appropriately. The clearinghouse guarantees that the traders of futures markets honor their obligations. Clearinghouses act as a buyer to every seller and seller to every buyer. The clearinghouses act as a counterparty to every buyer and seller, allowing traders to decrease the default risk of the counterparty. Because of the clearinghouses, investors can close or reverse their positions in futures contracts any time they want without having to contact the counterparty.

Q.619 Alisha Gomez, head of the trading department, is interviewing with one of the potential candidates for a position as a junior trader in the derivatives units. Gomez asked the candidate to identify which of the following prices is used for calculating daily gains, losses, and margin requirements for the parties involved in the trading of futures contracts. Which of the following is the appropriate answer to Alisha Gomez's question?

- A. Opening price.
- B. High price.
- C. Closing price.
- D. Settlement price.

The correct answer is **D**.

The settlement price is used for calculating daily gains, losses, and margin requirements for the parties involved in futures contract trading. The settlement price is not the closing price of the contract, but it is the average price at which the contract is traded on the last period or before the end of a day's trading period. The exchange itself sets it to prevent traders from manipulating futures prices. Option A is wrong because opening prices are the first price at which futures open for the trading session. Option B is wrong because the high price is the highest price of a contract traded throughout the day.

Q.620 Which of the following is NOT a method/process for terminating a position in a futures contract?

- A. By delivering the underlying assets/goods of a futures contract.
- B. By cash-settling in which futures are marked to market - based on the settlement price of the last trading day.
- C. The investor can take a position that is opposite of his current position.
- D. The investor can take the exact same position in the underlying asset as in the futures contract.

The correct answer is **D**.

Having a long position in the futures contract and simultaneously having a long position in the underlying asset will double the risk and exposure in that particular asset. Methods provided in options A, B, and C (delivery, cash-settlement, an offsetting position in the futures market) are appropriate methods of terminating a futures contract.

A note about closeouts

A trader who has a long position takes an equivalent short position in the same contract in a closeout, and both the positions offset against each other. Similarly, a trader with a short position takes a long position in the same contract to close out the position.

For example, assume it's 1st March, and you are long 1 contract of May 2019 Nikkei, but on 25th March, you decide to terminate this position. You can do so by going short 1 contract of May Nikkei, effectively canceling the contract. What happens?

When you place a closeout order to your broker, the broker will enter the market and offer to go short 1 contract of May Nikkei. Another (third) participant will take up the long position. That means you have effectively canceled your position by transferring the obligation to the other participant. It's this participant that will now be holding the long position.

Q.621 Vikram Pandit, a derivatives investor from Mumbai, instructs his broker to terminate his short position in 10 futures contracts of live cattle at Chicago's futures exchange. The broker proposed to him four alternatives for terminating the contract. Which of the following is the most appropriate method?

- A. Purchase cattle from Mumbai and physically deliver the cattle to the long party.
- B. Take a new short position of the same size in a live cattle futures contract with a different delivery date.
- C. Find a trader with a long position in live cattle and settle up between yourselves, off the floor of the exchange.
- D. Take a long position of the same size in a live cattle futures contract with the same delivery date.

The correct answer is **D**.

Taking an exactly opposite position (long position in the given case) in the same futures contract with the same maturity date can reverse or terminate the contract without delivering the physical goods.

Options A and C are incorrect because it is virtually impossible and insanely expensive to settle a live cattle futures contract by purchasing cattle in India and delivering it in Chicago.

Q.624 Vanesa Fredrick is a senior derivatives investment manager at Unicorn Hedge Funds. While briefing a group of new employees in the accounting and finance unit of the fund, she made the following two statements related to the tax treatment of different parties:

Statement I: For corporations, all capital gains from futures contract are taxed at the same rate as their ordinary income, whereas capital losses from futures contracts are deductible only to the extent of capital gains. A corporate entity may carry forward the capital losses indefinitely.

Statement II: For non-corporate taxpayers, short-term capital gains from futures contracts are taxed at the ordinary income tax rate, but long-term (contracts held for more than a year) capital gains are taxed at the capital gains tax rate of 15-20% maximum. Capital losses for non-corporate taxpayers are non-tax deductible.

Which of the following is correct?

- A. Only statement I is correct.
- B. Only statement II is correct.
- C. Both statements are correct.
- D. Both statements are incorrect.

The correct answer is **D**.

Both statements are incorrect. For corporations, all capital gains from futures contracts are taxed at the same rate as their ordinary income, whereas capital losses from futures contracts are deductible only to the extent of capital gains. A corporate entity cannot carry forward the capital losses indefinitely, but it can carry back a capital loss for three years and carry it forward for up to five years.

For non-corporate taxpayers, short-term capital gains from futures contracts are taxed at the ordinary income tax rate but long-term (contracts held for more than a year) capital gains are taxed at the capital gains tax rate of 15-20% maximum. Capital losses of non-corporate taxpayers are tax-deductible to the extent of capital gains plus ordinary income up to \$3,000 and the losses can be carried forward indefinitely.

Reading 32: Using Futures for Hedging

Q.625 A Canadian importer has ordered \$1,000,000 US worth of oil drilling equipment to be delivered in six months. The current spot exchange rate is 1.3 CAD per 1.00 USD. However, the importer fears that the Canadian dollar will depreciate to 1.35 CAD per 1.00 USD in the next 6 months. As a result, the importer enters a forward contract to purchase \$1,000,000 at a forward rate of 1.32 CAD per 1.00 USD. If the Canadian dollar depreciates to \$1.35 CAD per 1.00 USD as predicted, what is the savings to the importer from his dealings in the forward market?

- A. \$350,000 CAD
- B. \$30,000 CAD
- C. \$50,000 CAD
- D. \$20,000 CAD

The correct answer is **B**.

The forward market will help the importer to lock in the exchange rate of 1.32 CAD per 1.00 USD. Thus, they will spend $1.32 * 1,000,000 = \$1,320,000$ CAD in the transaction.

Without the forward market, the importer would transact at 1.35 CAD per 1.00 USD, spending a total of $1.35 * 1,000,000 = \$1,350,000$ CAD

$$\text{Total savings} = 1,350,000 \text{ CAD} - 1,320,000 \text{ CAD} = 30,000 \text{ CAD}$$

Q.627 Colin Thomson, the risk manager of a tire manufacturing company, suggests that the company should focus its resources on its core business activities rather than investing resources in hedging the risks faced by the company. He further added that the shareholders have as much information as the management of the company. Therefore, shareholders can easily hedge the risks. Lastly, he argued that the shareholders hedge the company's stocks in much smaller quantities. Hence, it is cheaper for the shareholders to hedge the risk as compared to the company. Which of the following options is correct?

- A. Thomson's argument related to the availability of the company's information to the shareholders is incorrect. However, the argument related to the smaller costs incurred by shareholders for hedging risks is correct.
- B. Thomson's argument related to the availability of the company's information to the shareholders is correct. However, the argument related to the smaller costs incurred by shareholders for hedging risks is incorrect.
- C. Both arguments are correct.
- D. None of Thomson's arguments are correct.

The correct answer is **D**.

One of the arguments against hedging is that the shareholders are considered informed about the company's management, which is usually incorrect. Therefore Colin's first argument is incorrect. Since the company hedges its risk in many transactions, the company pays much smaller per dollar transaction costs and commissions than shareholders who pay higher transaction costs and commissions due to smaller transactions.

Q.628 The island of Godiva is a small hypothetical country in the Gulf of Mexico. Godiva has its own financial system, economic system, and laws. The only agricultural product of Godiva is rice, which is why the government sets weekly rice prices. The retailers of rice are only allowed to keep a maximum of 10% profit margin on rice sales. Coral Traders and Reef Enterprises are the two main retailers on the island. Coral does not hedge against the risk of changes in the price of rice, while Reef hedges the risk of an increase in prices by taking a long position in rice futures in a local futures exchange. Which of the following statements is correct?

- A. Coral Traders should have smoother profit margins than Reef Enterprises.
- B. Reef Enterprises should have smoother profit margins Coral Traders.
- C. Both companies will have the same profit margins.
- D. None of the companies have smooth profit margins.

The correct answer is **A**.

One of the arguments against hedging is related to the nature of the hedging company's industry. The argument states that if the prices are frequently changed in the industry, and the margins quickly adjust to new prices, the company that does not hedge against these frequent changes has smoother profit margins. In the given case, both companies are only allowed to keep a 10% margin on rice sales. Coral Traders, which do not hedge against the changes in rice prices, will earn a certain profit regardless of the fluctuation in rice prices. Conversely, Reef Enterprises, which has taken a long position in rice futures, will earn higher margins if the price of rice increases and earn lower or negative margins if the prices decrease.

Q.629 A risk analyst at a mid-sized alternative investment firm is responsible for hedging the company's multiple exposures to alternative assets. Suppose that the analyst has taken two positions, a long and a short in oil futures to hedge the risk of fluctuation in oil prices. If the basis of the hedge strengthens, then which of the following is true?

- A. If the basis of the hedge strengthens, the short positions of the firm will improve.
- B. If the basis of the hedge strengthens, the long positions of the firm will improve.
- C. If the basis of the hedge strengthens, the short positions of the firm will worsen.
- D. If the basis of the hedge strengthens, both the firm's positions will improve.

The correct answer is **A**.

A short position in a hedge improves as the basis of the hedge strengthens or increases. The basis is defined as:

Basis = Spot price of the asset to be hedged - Futures price of the contract used

An increase in the basis will improve the company's short position as the company will get a higher price for the asset after futures gains or losses are considered. In contrast, a decrease in the basis will worsen the company's short position as the company will pay a higher price for the asset after futures gains or losses are considered.

Professor's note:

$B = S - F$ (i.e., basis = spot - futures)

A short hedge comprises a long position in the spot (underlying asset) and a short position in the futures contract, so the short hedge is $+S - F$. It follows that the short hedge profits whenever the basis increases: $+B = +(S - F)$ because in this scenario, the basis "matches" the two positions making up the short hedge which are (I) long the spot, $+S$, and short the futures, $-F$.

How about a long hedge? This one combines a short in the spot and a long in the futures contract, so it is $-F + S$. It follows that the long hedge profits on anything that weakens the basis: $-B = -(S - F)$; because the basis matches the two positions making up the long hedge.

Q.630 Melanie Angebote is an instructor at a private business school in Vienna. She has recently begun teaching derivatives to undergraduate business management students. In one of her lectures, she asked the students to define their understanding of the strengthening and weakening of the basis of a hedge. Which of the following student comments is/are correct?

I. If the spot price increases relative to the futures price throughout the hedging period, the basis is strengthening.

II. Basis risk is the risk that the volatility of a futures contract will not move in line with that of the underlying exposure.

A. Only comment I is correct.

B. Only comment II is correct.

C. Both comments are correct.

D. None of the comments are correct.

The correct answer is **A**.

Only comment 1 is accurate. The correct evaluation of the basis risk of the hedge is:

1. If the spot price increases relative to the futures price over the duration of the hedging period, the basis is increasing or strengthening.

2. Basis risk is the risk that the value of a futures contract will not move in line with that of the underlying exposure.

Q.631 Togo Barrio, a portfolio manager at Mexico Asset Management Inc., is interviewing Linda Farris for the position of risk analyst in the firm's derivatives unit. To one of Barrio's questions related to the basis risk involved in hedging with futures contracts, Farris replied with the following three factors that affect the basis risk:

- I. Interruption in the convergence of the futures prices and spot prices
- II. Changes in the component of costs involved in hedging transactions
- III. A mismatch between the maturity of the cash asset and the hedged asset

Which of the factors provided by Linda affect the basis risk?

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

The correct answer is **B**.

Basis risk is the difference between the spot price and the futures price of the underlying instrument.

Basis risk can also be defined as the risk that the value of a futures contract will not move in a normal, steady correlation with the price of the underlying asset.

Statement I is, therefore, just the definition of basis risk, in other words, and thus it is not a factor that affects basis risk.

Changes in the component costs, such as storage costs, insurance costs, etc., can lead to the basis risk.

Sometimes it is difficult to find a hedge asset that closely matches the cash asset or the asset that is being hedged, which also leads to an increase or decrease in basis risk.

Q.632 Asim Hussain has recently joined the commodities trading desk of an investment bank in London. He is a hedger-trader who takes positions in futures contracts to earn profit from the difference in the spot price and futures price of a contract. He hedges the bank's exposure and also hedges on behalf of the bank's clients. One of the bank's clients knows they will need to buy oil at some time in March and believes the oil prices could fluctuate heavily by that time. Therefore, he

instructs Hussain to come up with a strategy to hedge oil with expiration in March.

Hussain knows that the delivery months of oil futures contracts are March, June, September, and December. Which of the following contracts is most suitable for the hedge that expires in March?

- A. Oil futures contracts with the delivery month of March.
- B. Oil futures contracts with the delivery month of June.
- C. Oil futures contracts with the delivery month of September.
- D. Oil futures contracts with the delivery month of December.

The correct answer is **B**.

The closest possible alternative to a hedge that expires in March is the futures contracts with the delivery month of June. Futures contracts with delivery in March are unsuitable because a hedger always has the risk of having to take delivery of the physical asset if the futures contract is held during the delivery month, which can be inconvenient and expensive. Therefore, the hedgers choose a delivery month that is as close as possible but later than the expiration of the hedge. As the difference between the hedge expiration date and the delivery month increases, the basis risk also increases.

Additional Explanation

Why choose a delivery month that's slightly ahead of the expiration of the hedge? The answer is basis risk.

Basis risk refers to a host of problems that could come up even with a good hedge in place, particularly the risk that at expiry, the spot price of the underlying could be significantly different from the futures price agreed upon in the contract used. This would render the hedge ineffective, and the hedger would still be faced with losses. Moreover, if the expiry matches the delivery month, a long hedger runs the risk of taking the physical asset's delivery. Taking delivery can be expensive and inconvenient. This is what we see in the question.

The client needs to buy oil; the broker would have to go long on a futures contract, meaning the client would be obliged to buy oil. At expiry, the short position can either deliver the physical oil or cash-settle. But in practice, the long would rather see the contract be cash-settled than receive oil. Why? Come to think of it. The long would possibly have to transport the oil from an inconvenient

location, incurring extra costs in the process. Remember that the long and the short transact through their broker and barely know each other, and therefore there's little or no room for negotiations.

For this reason, the trick hedgers use is to choose a delivery month that is as close as possible to but later than the expiration of the hedge. If the client wishes to buy oil in March, they will enter into a contract expiring in June and close out the contract in March. Closing out means they cash in on the contract and proceed to buy oil from their preferred supplier. It's all about exiting the contract conveniently.

Q.633 Futures contracts on jet fuel have maturity months in March, May, July, September, and December. An airline is hedging a purchase of 1 million barrels of fuel to be made on June 15 of this year. Which futures contract should it use?

- A. The July contract.
- B. The March contract.
- C. The December contract.
- D. The May contract.

The correct answer is **A**.

Most futures positions are closed out prior to the delivery period specified in the contract. With this fact in mind, a sensible rule of thumb for hedgers is that the maturity for a futures contract should be the earliest possible month after the maturity of the desired hedge. Doing so also avoids expiration month volatility. In this case, the asset will be purchased in June and so the best contract is the July contract.

Q.634 A German electronic appliances manufacturer expects to receive 30 million Turkish Liras at the end of March. The Lira futures contracts on the Eurex Exchange are available for the delivery months of March, June, September, and December. The size of one contract is 10 million Turkish Liras. The company shorts three June contracts on February 1 with the futures price of 0.6500 cents per Lira. If the futures prices and spot price on the closing date are 0.6250 and 0.6150, respectively, then calculate the effective price received in Euros for 30 million Liras.

- A. The effective price is Euro 10,500.
- B. The effective price is Euro 192,000.
- C. The effective price is Euro 187,500.
- D. The effective price is Euro 184,500.

The correct answer is **B**.

Since the company had a short position in futures contracts and the price of the futures contracts has decreased over the period of the hedge, the company has gained on its exposure in the futures contracts. The effective price obtained in cents per Lira is the final spot price plus the gain on the futures:

$$0.6150 + (0.6500 - 0.6250) = 0.6400$$

The total amount received by the German manufacturer for the 30 million Liras is 30,000,000 * 0.6400 cents = 19,200,000 cents or 192,000 Euros.

Q.635 Emanuel is a junior trader working in the derivatives and hedging unit of a brokerage firm. Emanuel's superior instructed him to take a hedged position for one of its clients who wants to hedge its exposure in 10 million tons of plastic. Since the underlying asset is plastic and difficult to find futures contracts with the underlying asset of plastic, the trader is advised to take a position in rubber futures contracts. The contract size of rubber is 45 tons. If the standard deviation of the spot prices of plastic is 0.019, the standard deviation of the futures prices of rubber is 0.032, and the correlation coefficient between the two is 0.87, then determine what should be the optimal hedge ratio.

- A. 0.52
- B. 0.59
- C. 1.46
- D. 1.68

The correct answer is **A**.

The optimal hedge ratio is calculated as:

$$HR = \rho * \left(\frac{\sigma_S}{\sigma_F} \right)$$

Where

σ_S is the standard deviation of the prices of the hedge asset;

σ_F is the standard deviation of the prices of futures asset; and

ρ is the correlation coefficient between σ_S and σ_F .

$$HR = 0.87 * \left(\frac{0.019}{0.032} \right) = 0.516.$$

Q.637 Melanie Gomez is a former trader and the anchor of a local business TV channel. She is famous for her analysis and forecasts of commodities prices. She also presents a weekly education program to educate beginner traders on complex derivatives instruments and hedging strategies. She made the following definitions of some jargons used for hedging in her TV program:

I. Cross hedging occurs when two offsetting positions are opened in futures contracts with identical underlying assets.

II. Tailing the hedge is a process of calculating the correlation between percentage one-day changes on the futures and spot prices to estimate the number of contracts needed to hedge over the next day.

Which of the following is correct?

A. Statement I is correct while statement II is incorrect.

B. Statement I is incorrect while statement II is correct.

C. Statement I is correct and statement II is also correct.

D. Statement I is incorrect and statement II is also incorrect.

The correct answer is **C**.

The definition of cross-hedging is correct. Hedging using identical assets can be considered as cross hedging since "identical" does not imply that we are using the same underlying asset.

The definition of tailing the hedge is also accurate. Tailing the hedge is a process conducted by analysts while hedging with futures contracts. It is the process of calculating the correlation between the percentage of one-day changes in the futures and spot prices in order to estimate the number of contracts needed to hedge over the next day.

Q.638 A portfolio manager has constructed a portfolio that perfectly mirrors the NASDAQ-100 index. The portfolio manager is worried about the changes in the portfolio's value, so he decides to hedge the portfolio using futures contracts on the mini NASDAQ-100 index. If the portfolio's value is \$16,165,000, the index futures price is 5,056 with each contract on \$20 times the index, then estimate the number of contracts required to hedge the portfolio.

- A. 138
- B. 142
- C. 160
- D. 101120

The correct answer is **C**.

160 NASDAQ-100 mini futures contracts are required to hedge a portfolio that mirrors the NASDAQ-100 index.

The number of stock contracts required to hedge the portfolio is calculated as:

$$\text{Number of stock contracts} = \text{Beta of the portfolio} * \left(\frac{\text{Value of the portfolio}}{\text{Futures price} * \text{Contract multiplier}} \right)$$

Since the portfolio perfectly mirrors the index, the beta of the given portfolio is considered 1.

$$\text{The number of stock contracts required} = 1 * \left(\frac{16,165,000}{101,120} \right) = 159.8 \text{ or } 160 \text{ contracts.}$$

Q.639 Julia Lange, an investment manager, has constructed a portfolio that somewhat mirrors the S&P 500 index. The investment manager intends to hedge the portfolio by taking a short position in S&P 500 futures. The current worth of the portfolio is \$672,000,000, and the S&P 500 index futures price is 2,906, with each contract on \$250 times the index. If the portfolio's beta is 0.78, then estimate the number of contracts Lange should short to hedge her portfolio.

- A. 1,455 S&P 500 futures contracts
- B. 925 S&P 500 futures contracts
- C. 876 S&P 500 futures contracts
- D. 722 S&P 500 futures contracts

The correct answer is **D**.

The number of contracts required to hedge the portfolio is calculated as:

$$\text{Number of stock contracts} = \text{Beta of the portfolio} * \left(\frac{\text{Value of the portfolio}}{\text{Futures price} * \text{Contract multiplier}} \right)$$

Since the portfolio doesn't perfectly mirror the S&P 500 index the beta of the portfolio of 0.78 will be considered in the calculation.

$$\text{The number of contracts required} = 0.78 * \left(\frac{672,000,000}{2,906 * 250} \right) = 722 \text{ contracts.}$$

Q.640 Julia Lange, an investment manager, has constructed a portfolio with a beta of 0.78 that somewhat mirrors the S&P 500 index. The investment manager hedged the portfolio 1 month ago by taking a short position in the S&P 500 futures. The portfolio had a value of \$672,000,000, and the S&P 500 index futures price at the time of the purchase was 2,906, with each contract on 250 times the index. If the S&P 500 futures contract price fell to 2,715 this month, then estimate the number of additional contracts Lange should buy/short to hedge her portfolio, assuming that the portfolio value does not change.

- A. The manager must short an additional 50 S&P 500 futures contract to hedge the portfolio.
- B. The manager must buy 50 S&P 500 futures contracts to hedge the portfolio.
- C. The manager must short an additional 2,715 S&P 500 futures contracts to hedge the portfolio.

D. The manager must short an additional 772 S&P 500 futures contracts to hedge the portfolio.

The correct answer is **A**.

The number of stock contracts required to hedge the portfolio is calculated as:

$$\text{Number of contracts} = \text{Beta of the portfolio} * \left(\frac{\text{Value of the portfolio}}{\text{Futures price} * \text{Contract multiplier}} \right)$$

Since the portfolio doesn't perfectly mirror the S&P 500 index, the beta of the portfolio of 0.78 will be considered in the calculation.

The initial number of contracts that the manager short at the time of purchasing the S&P 500 futures contract was:

$$\text{The number of contracts required} = 0.78 * \left[\frac{672,000,000}{(2,906 * 250)} \right] = 722 \text{ contracts.}$$

A month later, when the futures price fell from 2,906, to 2,715, the new number of contracts required to hedge the portfolio is now:

$$= 0.78 * \left[\frac{672,000,000}{(250 * 2,715)} \right] = 772 \text{ contracts}$$

Therefore, the manager must short an additional 50 futures contracts on the S&P 500 index.

Q.641 The index futures contracts are not only used to hedge the risk of the portfolio but sometimes the futures contracts are also used to change the current systematic risk or the beta of the portfolio to a desirable level. Here are two potential strategies to reduce and increase the beta of a portfolio:

- I. If the beta of the portfolio is to increase from its current beta, a short position in a specific number of additional futures contracts must be taken
- II. If the beta of the portfolio is to reduce from its current beta, a long position in a specific number of additional futures contracts must be taken

Which of the potential strategies is/are accurate?

- A. The strategy to increase the beta is accurate, but the strategy to reduce the beta is inaccurate.
- B. The strategy to reduce the beta is accurate, but the strategy to increase the beta is inaccurate.
- C. Both strategies to increase and reduce the beta of the portfolio are accurate.
- D. Neither strategies are accurate.

The correct answer is **D**.

None of the strategies are accurate. In order to increase the beta of a portfolio, a long position in a specific number of additional futures contracts must be taken. If the beta of the portfolio is to reduce from its current beta, a short position in a specific number of additional futures contracts must be taken.

Q.642 An investor owns a portfolio of some of the S&P 500 stocks that worth \$50 million. The systematic risk of the portfolio to the S&P 500 index is 0.96. The investor wants to remove the systematic risk from his portfolio completely, so he decides to reduce the portfolio's beta to zero. If the value of the S&P 500 index futures contracts is 1,111 and each index point costs \$250, how many contracts should he use to reduce the systematic risk?

- A. The investor must buy 173 index futures contracts
- B. The investor must short 173 index futures contracts
- C. The investor must buy 180 index futures contracts
- D. The investor must short 180 index futures contracts

The correct answer is **B**.

The investor must short 173 S&P 500 futures contracts to reduce the beta of the portfolio from 0.96 to 0.

$$\begin{aligned}\text{Number of contracts} &= (\text{Target beta} - \text{Portfolio beta}) * \left(\frac{\text{Value of the portfolio}}{\text{Futures price} * \text{Contract multiplier}} \right) \\ &= (0 - 0.96) * \left(\frac{50,000,000}{277,750} \right) = -173 \text{ contracts}\end{aligned}$$

The negative sign implies that the investor must short 173 S&P 500 index contracts to reduce the beta of the portfolio to 0.

Q.643 Adam Ryman was taking an aptitude test to join the graduate trainee program of a German investment bank. One of the questions in the exam asked to identify in which of the following processes an investor closes out the existing position as the maturity of the futures contract approaches and replaces it with another futures contract with a later delivery date or maturity. Which of the following is the correct answer to the question?

- A. Cross-over hedging.
- B. Rolling a hedge forward.
- C. Basis risk of hedging.
- D. Reducing the beta of the portfolio.

The correct answer is **B**.

Rolling a hedge forward is the process by which a trader or investor closes out the existing position as the maturity of the futures contract approaches and replaces it with another futures contract with a later delivery date or maturity. Option A is incorrect because a crossover hedge is defined as the process in which the asset to be hedged is different from the underlying asset of a futures contract that is used for hedging. Option C is incorrect because the basis risk arises due to an interruption in the convergence of the spot price and the futures price during the hedge period. Option D is also incorrect.

Q.644 A French carmaker expects to purchase 50,000 tons of copper at the end of April. The copper futures contracts on the Eurex Exchange are available for the delivery months of March, June, September, and December, and the size of one contract is for one ton of copper. The company took a long position in June contracts on March 1st at a futures price of 2.450 Euros per ton. If the futures price and spot price on the closing date are 2.42 and 2.30, respectively, then calculate the net cost in Euros and the gain or loss on the futures contract.

- A. The net cost is €116,500, and the loss on the contract is €6,000.
- B. The net cost is €121,000, and the loss on the contract is €6,000.
- C. The net cost is €116,500, and the loss on the contract is €1,500.
- D. The net cost is €121,000, and the loss on the contract is €7,500.

The correct answer is **C**.

Since the company has a long position in futures contracts and the futures contract price has decreased over the period of the hedge, the company has incurred a loss on its exposure in the

futures contracts.

Note the effective price (Net cost of asset when a long hedge is used) is given by:

$$\begin{aligned}\text{Net cost of asset when long hedge is used} &= F_0 + (S_t - F_t) \\ &= F_0 + b_t\end{aligned}$$

Where

F_0 : Futures price at the time the hedge is initiated,

F_t : Futures price at the time the hedge is closed,

S_t : Spot price of the asset being hedged at the time the hedge is closed, and

$b_t = S_t - F_t$ = Basis at time t

So in this case we have: $F_0 = 2.45$, $F_t = 2.42$ and $S_t = 2.30$. Thus:

$$\text{Net cost of asset when long hedge is used} = 50,000 [2.45 + (2.30 - 2.42)] = 116,500$$

The loss (gain) for long futures is given by:

$$\text{loss} = F_t - F_0 = 2.42 - 2.45 = -0.03 \text{ per ton} \Rightarrow \text{Loss in this case} = -0.03 \times 50,000 = -1,500$$

Reading 33: Foreign Exchange Markets

Q.880 Iron Cement Co. is a Pakistani company. In 2015, the company obtained a €200 million loan facility from The Bavaria Bank (headquartered in Frankfurt, Germany). The proceeds were used to build a new cement plant in Pakistan. Due to Pakistan's fast-paced growth in the past few years, the Pakistani rupee has appreciated against most of the actively traded currencies, including the euro. Which of the following impacts is accurate, if the company pays back the loan today?

- A. The liability of the Pakistani firm has increased due to the currency appreciation.
- B. The liability of the Pakistani firm has decreased due to the currency appreciation.
- C. The liability of the Pakistani firm remains unaffected due to the currency appreciation.
- D. The liability of the Pakistani firm has increased since the loan is denominated in Euros.

The correct answer is **B**.

If the Pakistani rupee strengthens against the euro, it will take fewer rupees to purchase one unit of the euro. Therefore, the company will spend less to pay its outstanding liability in full.

For instance, let's assume that when the \$200 million was obtained, the exchange rate was PKR 110/€. If the rate today stands at PKR 100/€, the firm's liability would drop from PKR 22 billion to PKR 20 billion.

Q.882 In recent years, India and China have become Asia's giants when it comes to information technology. India is a market leader in software development, while China is leading in the sector of IT. The two countries also have a bilateral trade agreement. India exports software to China and China sells hardware of the IT sector to Indian firms. If the Indian rupee has appreciated against the Chinese yuan, then determine which of the following effects of appreciation is correct.

- A. Indian goods will be cheaper for Chinese importers, while Chinese goods will become more expensive to Indian buyers.
- B. Indian goods will be more expensive for Chinese importers, while Chinese goods will be cheaper for Indian buyers.
- C. Indian goods will be cheaper for Chinese importers, and Chinese goods will also be cheaper for Indian buyers.
- D. Indian goods will be more expensive for Chinese importers, and Chinese goods will also be more expensive for Indian buyers.

The correct answer is **B**.

The appreciation in the value of the Indian currency will make the Indian goods more expensive for foreign buyers, while the foreign buyers will be able to sell more goods to Indian buyers as the foreign goods will be cheaper.

Option A is incorrect because if the Indian currency had depreciated, instead of appreciating, then the Indian goods have become cheaper for Chinese importers, and Chinese goods have become more expensive to Indian buyers.

Option C is incorrect: Indian goods will be more expensive(not cheaper)for Chinese importers.

Option D is incorrect: Chinese goods will be cheaper(not expensive)) for Indian buyers

Q.886 Jasmine Forst is a risk manager at Lifelong Insurance Company. The company has a number of outstanding exposures in various foreign currencies. Today, she is analyzing the company's current outstanding exposures in foreign currencies to derive the possible effects of exchange rates on these exposures. Which of the following is true regarding Lifelong Insurance Company?

- A. If the company has a net short position in a specific foreign currency, then the company's risk increases if the value of the foreign currency depreciates against the dollar.
- B. If the company has a net short position in a specific foreign currency, then the company's risk increases if the value of the foreign currency appreciates against the dollar.
- C. If the company has a net long position in a specific foreign currency, then the company's risk increases if the value of the foreign currency appreciates against the dollar.
- D. If the company has a net long position in a specific foreign currency, then the company's risk increases if the value of the domestic currency depreciates against the dollar.

The correct answer is **B**.

If the company has a net short position, then the risk related to the foreign exchange increases as the foreign currency rises in value. For instance, suppose the company has a net short position of -€100, and the exchange rate is \$1.2/€. The firm can purchase 100 euros for 120 dollars to balance the equation. Now suppose the euro appreciates to \$1.5/€, and it becomes more expensive to buy euros in terms of dollars. Then, the company has to spend \$150 to balance the equation. Therefore, the company's risk increases.

Q.887 Sandy Lee is a junior economist at a mid-sized asset management company based in Boston. The company is considering making an investment in foreign bonds denominated in Swiss francs. For this type of investment, it is vital to estimate the impact of the exchange rate on the investment value. Which of the following is accurate?

- A. If the supply for Swiss francs increases, the value of the investment of the company will increase.
- B. If the demand for Swiss francs increases, the value of the investment of the company will increase.
- C. If the supply of the US dollar decreases, the value of the investment of the company will increase.
- D. If the demand for Swiss francs increases, the value of the investment of the company will decrease.

The correct answer is **B**.

When the demand for Swiss francs increases, the Swiss franc appreciates, and the dollar depreciates. When the dollar depreciates, the value of the investment in Swiss francs therefore increases.

Option A is incorrect: If the supply for Swiss francs increases, then the Swiss will depreciate and the dollar will appreciate; hence, the value of the investment will decrease.

Option C is incorrect: If the supply of the US dollar decreases, the demand for US dollars will increase, and thus, the value of the company will decrease.

Option D is incorrect because it contradicts option B.

Q.893 An analyst is analyzing the exchange rate of the Turkish lira in terms of U.S. dollars. The current exchange rate is TRY 3.6 per USD, and the real interest rate in both countries is 2%. Suppose that the prices of Turkish goods increased by 7%, and the prices of U.S goods increased by only 5.5%, then determine which of the following statements is true.

- A. The Turkish lira has depreciated in value against the USD.
- B. The Turkish lira has appreciated in value against the USD.
- C. The USD has depreciated in value against the USD.
- D. There has been no impact on the exchange rates as the real interest rate is identical in both countries.

The correct answer is **A**.

High inflation in Turkey means that Turkish goods increase in price quicker than US goods. Therefore Turkish goods become less competitive. Demand for Turkish exports will fall, and therefore there will be less demand for the lira.

Also, Turkish consumers will find it more attractive to buy US imports. Therefore they will supply the lira to be able to buy dollar imports. This increase in the supply of the lira decreases its value.

Q.894 Which of the following theories suggests that the difference between the spot and the forward rates is due to the difference in interest rates?

- A. Purchasing power parity theory.
- B. Interest rate parity theory.
- C. Fischer theory.
- D. None of the above.

The correct answer is **B**.

The interest rate parity theory suggests that the forward exchange rates of a pair of currencies can be derived from the interest rates of these countries, which means the difference between spot and forward rates is due to the difference between the interest rates of these countries.

Option A is incorrect: The purchasing power parity postulates that Country X's currency would decline compared to Country Y's currency in order to equalize the cost of a basket of goods in the two countries,

Option C is incorrect: The Fischer theory states that since the real interest rate is equal to the nominal interest rate less the expected rate of inflation; as a result, real interest rates fall as inflation rises unless nominal rates rise at the same rate as inflation,

Q.895 A foreign currency analyst based in Dubai is forecasting the forward exchange rate USD/AED. Currently, the USD/AED spot exchange rate is 3.33. Suppose that the interest rate in the United Arab Emirates is 2% and the interest rate in the U.S. is 4%, determine the 1-year forward exchange rate of USD/AED.

- A. 3.455
- B. 3.400
- C. 3.395
- D. 3.266

The correct answer is **D**.

According to the interest rate parity theorem, the forward exchange rate must be derived with the following equation:

$$\begin{aligned} F &= \text{Spot Exchange Rate} \times \left(\frac{1 + R_{\text{AED}}}{1 + R_{\text{USD}}} \right)^T \\ &= 3.33 \times \left(\frac{1.02}{1.04} \right)^1 \\ &= 3.26596 \end{aligned}$$

Q.3573 Approximate the real interest rate if the nominal interest rate is 11% and inflation is 3.5%.

- A. 14.5%
- B. 13.5%
- C. 7.5%
- D. 7.25%

The correct answer is **C**.

Generally,

$$R_{\text{Real}} = \frac{1 + R_{\text{nom}}}{1 + R_{\text{Infl}}} - 1$$

However, the examiner is testing on the approximation of the above, which is given by:

$$R_{\text{Real}} = R_{\text{Nom}} - R_{\text{Infl}}$$

⇒ Real interest rate = 11% - 3.5% = 7.5%

Q.3575 Due to the upcoming elections, the exchange rate USD/CAD has risen from 1.17 to 1.31. Which of the following statement is correct?

- A. The Canadian dollar has appreciated by 11.97%
- B. The US dollar has depreciated by 11.97%
- C. The US dollar has appreciated by 10.69%.
- D. The Canadian dollar has depreciated by 10.69%

The correct answer is **D**.

You can think of this as the change in the price of the US dollars expressed in Canadian dollars. Since the exchange rate moved from 1.1700 to 1.3100, then the percentage change in the USD quote is

$$\frac{1.3100}{1.1700} - 1 = 11.97\%$$

That is, the USD has appreciated by approximately 11.97%.

On the other hand, the change in CAD quote is

$$\frac{\frac{1}{1.3100}}{\frac{1}{1.1700}} - 1 = -10.69\%$$

That is, the CAD has depreciated by 10.69%.

Q.3579 If the exchange rate quote for the euro (EUR/USD) changes from 1.3500 to 1.2600, then in approximate terms:

- A. The euro depreciated by 6.7%, and the dollar appreciated by 7.1%
- B. The dollar depreciated by 6.7%, and the euro appreciated by 7.1%
- C. The euro appreciated by 10.1%, and the dollar depreciated by 5%
- D. The euro depreciated by 5%, and the dollar appreciated by 10.1%

The correct answer is **A**.

You can think of this as the change in the price of the euro expressed in US dollars. If the exchange rate moved from 1.3500 to 1.2600, then the percentage change in the euro quote is $1.2600/1.3500 - 1 = -0.06667$ or depreciation of approximately 6.7%.

Conversely, the percentage change in the indirect quote is $(1/1.2600)/(1/1.3500) - 1 = 1.3500/1.2600 - 1 = 0.0714$ or 7.1%.

Q.3580 If the USD/BRL exchange rate changes from 3.1625 to 3.5000, then in approximate terms:

- A. The real depreciated by 9.6%, and the dollar appreciated by 10.7%
- B. The dollar depreciated by 9.6%, and the real appreciated by 10.7%
- C. The dollar appreciated by 9.6%, and the real depreciated by 10.7%
- D. The real appreciated by 9.6%, and the dollar depreciated by 10.7%

The correct answer is **A**.

The percentage change in the dollar is calculated as $3.5000/3.1625 - 1 = 0.1067$ or 10.7%.

The change in the real is $(1/3.5000)/(1/3.1625) - 1 = -0.0964$ or a depreciation of 9.6%.

Q.3581 If the exchange rate quote for the Mexican peso (USD/MXN) changes from 11.9500 to 12.4000, then in approximate terms:

- A. The peso depreciated by 3.8%, and the dollar appreciated by 3.6%
- B. The dollar depreciated by 3.8%, and the peso appreciated by 3.6%
- C. The peso appreciated by 3.8%, and the dollar depreciated by 3.6%
- D. The dollar appreciated by 3.8%, and the peso depreciated by 3.6%

The correct answer is **D**.

In the initial quote, you could buy 11.9500 pesos per US dollar.

After the change, the US dollar would buy 12.4000 pesos. The peso fell in value against the dollar. In percentage terms, it fell by $11.9500/12.4000 - 1 = -0.036$ or 3.6%.

The dollar appreciated by $12.4000/11.9500 - 1 = 0.0377$ or 3.8%.

Q.3814 The quote between currency X and Y is 1.3000, where currency Y is the base currency. What is the number of units of currency X required for the exchange of 50 units of currency Y?

- A. 65
- B. 70
- C. 85
- D. 64

The correct answer is **A**.

The base currency (in this case, Y) is always equal to one unit, and the quoted currency (in this case, X) is what that one base unit is equivalent to in the other currency.

So, the number of units of currency X in this case is:

$$1.3000 \times 50 = 65 \text{ units}$$

Q.3816 A UK-based company funds its Mexican investment by borrowing in euros (EUR) and buying the Mexican peso (MXN), and after some time, the company exchanges the money back to euros. What kind of transaction is this?

- A. Outright transaction
- B. FX swap
- C. Currency futures
- D. Forex forward

The correct answer is **B**.

An FX swap is a contract to buy (sell) a certain amount of a currency at one time and sell (buy) it at another later time. The description in the question fits the FX swap since the company borrows in the domestic currency, then converts to Mexican pesos, and after some time, the company exchanges the money back to euros.

Option A is incorrect: an outright transaction is a type of transaction where parties agree to trade one currency against another at some specified time in the future.

Option C is incorrect: currency futures are a type of exchange-traded futures contract that specifies the price in one currency at which another currency can be purchased or sold at a later date.

Q.3817 Firms in the foreign exchange market are exposed to risks. What is the difference between translation and transaction risks?

- A. Transaction risks are prone to transactions that are aligned to domestic currency while translation risk arises due to transaction aligned to foreign currency
- B. Transaction risks occur due to cash inflows and outflows in a foreign currency while the translation risk occurs due to exposure to FX gains and losses when the assets and liabilities dominated in a foreign currency are exchanged into domestic to generate financial statements.
- C. Translation risks arise due to cash inflows and outflows in a foreign currency while the transaction risk occurs due to exposure to FX gains and losses when the assets and liabilities dominated in a foreign currency are exchanged into domestic to generate financial statements.
- D. None of the above

The correct answer is **B**.

Translation risk comes up when an institution's assets and liabilities are in a foreign currency, which must be valued in the institution's domestic currency when the financial statements are made.

Transaction risk is associated with received and paid capital; cash inflows and outflows in a foreign currency.

Q.3818 Assume the USD/CAD spot quote is bid 1.2800 and ask 1.2950. The six-month forward points quote is bid 40.60 and ask 56.50 The forward bid-ask spread is closest to:

- A. 0.00565
- B. 0.30065
- C. 0.00406
- D. 0.01659

The correct answer is **D**.

The spot bid-ask spread is 0.015 ($= 1.2950 - 1.2800$)

The six-month forward bid quote is $1.2800 + 0.00406 = 1.28406$, and the six-month forward ask quote is $1.2950 + 0.00565 = 1.30065$

Thus, the forward bid-ask spread is $1.30065 - 1.28406 = 0.01659$

Things to Remember

- Forward points are basis points that are added or subtracted to the spot rate to determine the forward rate for delivery on a specific valuation date.
 - The points can either be positive or negative, in conjunction with lower or higher interest rates.
 - A forward point is equivalent to 1/10,000 of a spot rate.
 - When points are added to the spot rate, this is called a forward premium; when points are subtracted from the spot rate, they constitute a forward discount. In this case, we have forward premiums. <\li>
-

Q.3819 In a particular year, the inflation rate in China is higher than in the US. What is likely to happen to the US-China exchange rate according to Purchasing power parity?

- A. The US currency will weaken with respect to the Chinese yuan
- B. The Chinese currency (yuan) will decline relative to the US dollar
- C. There will be no change in the US-China exchange rate
- D. All of the above

The correct answer is **B**.

The purchasing parity theorem, implies that the strength of the Chinese yuan will decrease so that it covers for the equality of the price of a basket of goods in the two countries.

Q.3820 The spot rate for the USD/EUR is 1.3261. The interest rate in USD is 2% and in EUR is 3%. What is the 6-month EUR/USD forward rate?

- A. 1.3411
- B. 1.3326
- C. 0.7504
- D. 0.5321

The correct answer is **C**.

The forward rate for USD/EUR is given by:

$$\begin{aligned} F &= S \left(\frac{1 + i_{\text{EUR}}}{1 + i_{\text{USD}}} \right)^T \\ &= 1.3261 \times \left(\frac{1.03}{1.02} \right)^{0.5} = 1.3326 \end{aligned}$$

Now, to find the 6-month EUR/USD forward rate, we simply take the reciprocal of the above results, i.e.,

$$\frac{1}{1.3326} = 0.7504$$

Q.3821 The nominal interest rate in the country is 3% and the inflation rate is 5%.
What is the value of real interest rate?

- A. 10%
- B. 5%
- C. 2%
- D. -2%

The correct answer is **D**.

Recall that the real interest rate is approximated as:

$$r_{\text{real}} \approx r_{\text{nominal}} - r_{\text{inflation}}$$

So, in this case:

$$r_{\text{real}} \approx 3 - 5 = -2\%$$

Q.3822 The nominal interest rate in the country is 3% and the inflation rate is 5%. Which of the following statements is true about this country?

- A. When an investor earns at 3%, the investor's purchasing power decreases by 2% each year
- B. When an investor earns at 3%, the investor's purchasing power increases by 2% each year
- C. The total return by the investor in this country is equivalent to 8%
- D. An investor in this country should always expect a loss of 5% per year.

The correct answer is **A**.

We need to first calculate the real interest rate. That is:

$$r_{\text{real}} \approx r_{\text{nominal}} - r_{\text{inflation}}$$

So, in this case:

$$r_{\text{real}} \approx 3 - 5 = -2\%$$

So, this implies that, when an investor earns at 3%, the investor's purchasing power decreases by 2% each year due to inflation.

Q.3823 In a particular year, the interest rates for USD increase while that of the euro remain unchanged.

What will happen to the forward exchange rate USDEUR?

- A. It will increase.
- B. It will decrease.
- C. It will appreciate.
- D. None of the above.

The correct answer is **B**.

When the interest rates on the USD increase, it weakens in the forward market. Since the exchange rates are expressed as the number of units of EUR that are needed to buy one unit of USD, it will, therefore, take fewer units of EUR to buy one unit of USD in the forward market and thus the forward rate would decrease.

Note that the exchange rate USDEUR can also be denoted as USD/EUR. and is given by:

$$\text{USD/EUR} = S \left(\frac{1 + r_{\text{Euro}}}{1 + r_{\text{USD}}} \right)$$

Q.3824 The interest rate on the Nigerian Naira (NGN) is 2%, and that of the South African rand (ZAR) is 7%. Given that the spot rate NGN/ZAR is 1.3500, what is the 6-month forward exchange rate quoted as points?

- A. 135
- B. 327
- C. 365
- D. 478

The correct answer is **B**.

For an exchange rate XXXYYY, we have,

$$\begin{aligned}
 F &= S \frac{(1 + R_{YYY})^T}{(1 + R_{XXX})^T} \\
 &= S \frac{(1 + R_{ZAR})^T}{(1 + R_{NGN})^T} \\
 &= 1.3500 \frac{(1.07)^{\frac{1}{2}}}{(1.02)^{\frac{1}{2}}} \\
 &= 1.38269
 \end{aligned}$$

So, the points are given by:

$$10000(1.38269 - 1.3500) = 326.92 \approx 327$$

Q.3825 Which of the following statements is most likely to be incorrect?

- A. The bid-offer spread is the difference between the offer price and the bid price.
- B. The bid-offer spread is larger for very large transaction in the FX market
- C. The offer price is always lower than the bid price
- D. None of the above

The correct answer is C.

The bid-offer spread is the difference between the bid price for a security and its ask (or offer) price. It represents the difference between the highest price a buyer is willing to pay (bid) for a security and the lowest price a seller is willing to accept.

The offer (ask) price should always be **higher** than the bid price to compensate the dealer for providing foreign exchange to other market participants.

Option A is a correct statement: The bid-offer spread is given by the difference between the offer price and the bid price.

Option B is a correct statement. For example, let's say you call an investment bank intending to exchange some \$100 million for CAD. In this situation, the bank knows it may not be able to sell the entire amount quickly enough. A whopping \$100 million in its trading account may have to be sold (exchanged) for other currencies at a staggered pace, because the average transaction size is probably a few thousands, not millions. This means the bank may not sell the entire amount at the prevailing offer price. Some transactions could earn it much less (or even much more), depending on the direction the market takes. To recognize this risk, the bank will most likely quote you a bid price that's lower than that quoted to other traders with smaller transactions.

Q.3826 Consider the following information

Currency	Libor (annualized)	Currency Combinations	Spot Rate
CAD	0.62%	CAD/GBP	0.60
GBP	6.96%	AUD/GBP	0.0074
AUD	0.75%	AUD/CAD	0.95

If the covered interest rate parity holds, what is the forward rate of AUD/GBP currency for one year?

- A. 0.0070
- B. 0.0079
- C. 0.0063
- D. 0.0054

The correct answer is **B**.

Since we have assumed that the covered interest rate parity holds, then the forward rate parity holds. That is, a one-year spot rate should be equal to the one-year forward rate. That is,

$$F_{\frac{\text{AUD}}{\text{GBP}}} = S_{\frac{\text{AUD}}{\text{GBP}}} \left(\frac{1 + i_{\text{GBP}}}{1 + i_{\text{AUD}}} \right) = 0.0074 \left(\frac{1.0696}{1.0075} \right) = 0.007856 \approx 0.0079$$

Currency	Libor (annualized)	Currency Combinations	Spot Rate
CAD	0.62%	CAD/GBP	2.4812
GBP	6.96%	AUD/GBP	0.0074
AUD	0.75%	AUD/CAD	3.8618

Q.3827 In a given market, the nominal rate of interest is 3% and the estimated inflation rate is 4%. Which of the following statements is correct regarding the market?

- A. When an investor earns a return of 3%, the purchasing power of the investor is reduced by 1%.
- B. When an investor earns a return of 3%, the purchasing power of the investor is reduced by 5%.
- C. When an investor earns a return of 3%, the purchasing power of the investor is increased by 1%.
- D. When an investor earns a return of 3%, the purchasing power of the investor is reduced by 7%.

The correct answer is **A**.

Recall that the real rate of interest is approximated by:

$$R_{\text{real}} \approx R_{\text{Nominal}} - R_{\text{inflation}}$$

So in this case we have:

$$R_{\text{real}} \approx 3\% - 4\% = -1\%$$

Thus, when an investor earns a return of 3%, the purchasing power is reduced by 1% due to the inflation rate.

Q.3828 A USD/CAD currency rate of 1.6598 *most likely* implies that:

- A. One US dollar (USD) can buy 1.6598 Canadian dollars (CAD).
- B. One Canadian dollar (CAD) can buy 1.6598 US dollars (USD).
- C. The US dollar (USD) appreciates by 1.6598.
- D. The Canadian dollar (CAD) appreciates by 1.6598

The correct answer is **A**.

The base currency (in this case, USD) is always equal to one unit, and the quoted currency (in this case, CAD) is what that one base unit is equivalent to in the other currency. So, the USD/CAD currency rate of 1.6598 implies One US dollar (USD) can buy 1.6598 Canadian dollars (CAD). Note: When an exchange rate is quoted, there is a base currency and a quote currency. Currency pairs are typically indicated as XXXYYY or XXX/YYY (with XXX as the base currency and YYY as the quote currency).

Q.3829 A forex trader noticed the EUR/USD spot rate was 1.2960 and expected to be 1.2863 after one year. What is the euro (EUR) expected appreciation/depreciation against the US dollar over the next year?

- A. -0.748%
- B. 0.748%
- C. 0.651%
- D. -0.651%

The correct answer is **A**.

We know that we are dealing with EUR/USD quotes. So, we calculate as:

$$\frac{1.2863}{1.2960} - 1 = -0.00748 = -0.748\%$$

This was expected because clearly, there was a decrease in EUR/USD, indicating that EUR is depreciating.

Note: The Euro is actually the base currency in line with the XXX/YYY format favored by FRM examiners, where X is the base currency and Y the quote currency. Clearly, the euro has depreciated against the dollar; after one year, it can only get you 1.2863USD from a previous high of 1.296USD. Negative appreciation = depreciation

Q.3830 What does a 4% appreciation in the CNY/ZAR exchange rate imply?

- A. It represents a 4 percent appreciation in the South African Rand (ZAR) as compared to the Chinese Yuan.
- B. It represents a 4 percent appreciation in the Chinese Yuan (CNY) as compared to the South African Rand.
- C. It represents a 4 percent depreciation in both the Chinese Yuan (CNY) and the South African Rand.
- D. It represents a 4 percent depreciation in the South African Rand as compared to the Chinese Yuan (CNY)

The correct answer is **B**.

An increase/decrease in a given exchange rate represents an appreciation/depreciation of the base currency against the quote currency.

In this case, a 4% appreciation in the CNY/ZAR exchange rate implies that the Chinese Yuan appreciates by 4% against the South African Rand.

In other words, you now need more South African Rands to buy one Chinese Yuan.

Q.3831 Using the table of maturity and forward points or spot rate below, what is the three-month forward rate given that the spot exchange rate is 1.6459.

Maturity	Spot rate or forward points
One week	-0.2
One month	-1.0
Three months	-5.6
Six months	-12.7
Twelve months	-25.3

A. 1.64534

B. 1.45677

C. 1.63546

D. 1.65342

The correct answer is **A**.

When we divide the forward points of -5.6 by 10,000, we get -0.00056. The next step is to add this to our spot rate of 1.6459, which will lead us to a result of 1.64534.

Q.3832 The 6-month forward quote for the USD/CAD is 1.500. What is the corresponding CAD/USD future quote?

A. 0.86432

B. 0.98538

C. 0.66667

D. 0.56432

The correct answer is **C**.

The future quote is achieved by finding the reciprocal of the forward quote. That is:

6-month futures quote is: $\frac{1}{1.500} = 0.66667$ USD per CAD

Q.3833 Suppose that the quote between currency A and currency B is 1.5000 and that currency B is the base currency. How many units of currency A should be exchanged for 200 units of currency B?

- A. 150
- B. 1.5
- C. 200
- D. 300

The correct answer is **D**.

A is the quote currency. The quote indicates that 1.5 units of A should be exchanged for 1 unit of B. Thus, 300 units (1.5×200) of A are exchanged for 200 units of B

Q.3834 In India, the price index was 117 last year, and the price level index this year is 125. If the real interest rate in India is 7.5%, what is the nominal interest rate?

- A. 15.40%
- B. 14.34%
- C. 8.00%
- D. 11.5%

The correct answer is **B**.

Recall that

$$r_{\text{real}} \approx r_{\text{nominal}} - r_{\text{inflation}}$$

$$\Rightarrow r_{\text{nominal}} = r_{\text{real}} + r_{\text{inflation}}$$

According to the information given in the question:

$$\text{Expected inflation} = \frac{125}{117} - 1 = 0.06838 = 6.838\%$$

So,

$$r_{\text{nominal}} = 7.5\% + 6.838\% = 14.338\%$$

Q.3835 A multinational uses options for hedging against FX risk on its monthly transactions. Which of the following does the multinational need to do to minimize hedging costs?

- A. Purchasing options on each currency in the market.
- B. Purchasing options on a basket of currencies rather than individual currency
- C. Buy an option on a single exposure that applies in one time period (like one month)
- D. Buy an option on a single exposure that applies several months

The correct answer is **B**.

Since the multinational is exposed to several currencies each month, it can hedge itself from FX risk by buying options on a collection (basket) of currencies instead of just one currency. By doing this, the multinational distributes the risk and hence minimizing it.

Alternatively, the company can purchase an option on the average exposure that applies to many months rather than buying an option that exposes the company to risk each month.

Option A is incorrect: Purchasing options on each currency just anyhow in the market will increase the FX risk. Only selected currencies should be used for diversification.

Options C and D are incorrect since buying an option on a single exposure further amplifies FX risk.

Q.4453 Consider a hypothetical world of two countries only. A fund manager borrows funds from a country with interest rate X and invests in another country with interest rate Y , where $X < Y$. He intends to generate profit from the interest differential between the two countries. The major risk in this strategy is:

- A. None – it's a riskless strategy.
- B. The interest differential may increase.
- C. The exchange rate of the currencies may change.
- D. None of the above.

The correct answer is **C**.

The fund manager borrows in one currency, converts the currency into another currency, and invests the converted amount in the country with a higher interest rate. Thus, the profit generated in the transaction can be reduced/affected in case the exchange rate changes.

Q.4893 If the interest rates of currency AAA increases and that of currency BBB remains constant, what will happen to forward rates if the exchange rate is quoted as AAA/BBB?

- A. Forward rates increase.
- B. Forward rates decrease.
- C. Forward rates remain constant.
- D. None of the above.

The correct answer is **B**.

If the interest rates of currency AAA increases and that of currency BBB remains constant, then currency AAA will weaken relative to currency BBB. If the exchange rate is quoted as AAA/BBB, as in our case, then it represents the number of units of BBB that can be exchanged for one unit of AAA. If the interest rates of currency AAA increase, then it takes fewer units of BBB to purchase one unit of AAA in the forward market, and as such, the forward rate decreases.

Q.4895 Which of the following is the correct difference between translation and transaction risk?

- A. As compared to transaction risk, translation risk does not affect the cash flows of a company.
- B. As compared to translation risk, transaction risk does not affect the cash flows of a company.
- C. Translation risk is hedged using outright forward transactions and swaps.
- D. Transaction risk is hedged using the forward contracts.

The correct answer is **A**.

Transaction risk has direct effects on the cash flows of a company, which is not the case for translation risk.

However, the effects of translation risk on the reported earnings can be huge.

Option B is incorrect: It contradicts option A

Option C is incorrect: Transaction (not translation risk) is hedged using outright forward transactions and swaps.

Option D is incorrect: Translation risk (not transaction risk) is hedged using the forward contracts.

Q.4896 Which of the following is **not** a factor that determines the exchange rate?

- A. Inflation.
- B. Monetary policy.
- C. The purchasing power of a country.
- D. Balance of payments and trade flows.

The correct answer is **C**.

The exchange rate is not determined by the country's purchasing power.

Like any other financial asset, currency exchange rates cannot be determined with ultimate precision because they are influenced by supply and demand, which are also affected by other factors. Some of the factors affecting the exchange rates include:

- i. Balance of payments and trade flows
 - ii. Monetary policies
 - iii. Inflation
-

Reading 34: Pricing Financial Forwards and Futures

Q.665 An investment manager at Galaxy Asset Management instructs his broker to short sell 2,000 shares of Solar Computer Corp. in April. The broker borrowed the shares from another client and shorted the 2,000 shares of Solar at €456.8 per share. The manager then asked the broker to close the short position in mid-September when the price per share got to €455.8. If the shares paid a dividend of €1.85 per share in July, then calculate the net payoff of the investment manager after closing out the position. (For this question, assume there are no fees, commissions, or margins.)

- A. The investment manager will receive a net cash inflow of €913,600
- B. The investment manager will pay a net cash outflow of €911,600
- C. The investment manager will pay a net cash outflow of €1,700.
- D. The investment manager will pay a net cash outflow of €3,700

The correct answer is C.

The following are the cash flows of the investor during the months:

In April, the manager received a cash inflow of €913,600 as a result of shorting the 2,000 shares of Solar Computers Corp:

$$2,000 \text{ Short shares} * €456.8 \text{ per share} = €913,600$$

In July, the shares earned a dividend of €1.85 per share, which was transferred to the lender of the shares:

$$2000 \text{ shares} * €1.85 = €3,700$$

In September, the shares were purchased at a price of €455.8 to close the short position. Thus, the cash outflow for September is €911,600.

And the net cash flow of the investor is:

$$€913,600 - €3,700 - €911,600 = -€1,700.$$

Q.667 Which of the following situations correctly depicts a short squeeze scenario?

- A. The prices of shares of a specific firm are continuously decreasing causing more and more investors to short sell the shares of that firm.
- B. The prices of shares of a specific firm are decreasing rapidly, and the supply of shares is greater than its demand.
- C. The prices of shares of a specific firm are increasing rapidly, forcing short sellers to closeout their positions.
- D. The process of borrowing the shares of a specific firm from a client and selling them at the current rate with the expectation of purchasing the same shares at lower prices in the future.

The correct answer is C.

When the prices of the shares of a specific firm increase rapidly, it forces short sellers to close down their positions. When more and more short sellers purchase the shares to close their positions, the demand for the shares is greater than its supply, thus, increasing the prices further. This situation is known as a short squeeze, where the short sellers are squeezed out (closed out) of their positions.

Q.668 Brad Lee is a derivatives trader at AMG Investments based in California. Brad is analyzing the shares of Kevin Heart Shoes Company that are currently trading at \$119.4 per share. Kevin Heart shares are comparatively new in the market, as the company's IPO was the last quarter. A forward contract to purchase the stock in 6-month is being offered at \$122.98. If the risk-free rate is 6% per annum, compounded semi-annually, then determine which of the following transactions will bring positive net cash flow for Lee if he wants to close his position in exactly 6 months?

- A. Borrow \$119.4 at the risk-free rate to purchase the stock at the current price and then short the stock at the forward price of \$122.98.
- B. Short sell the stock at the current price of \$119.4, invest the proceedings at the risk-free rate, and take a long position in the forward contract to purchase the stock at \$122.98
- C. Both of the above-mentioned transactions will bring positive net cash flows
- D. None of the above-mentioned transactions will bring positive net cash flows

The correct answer is **D**.

None of the above-mentioned transactions will bring a positive net cash flow.

Transaction A: If the investor borrows \$119.4 at the risk-free rate to purchase the shares now, the loan amount, in 6 months, will grow to:

$$119.40(1.06)^{0.5 \times 2} = \$122.98$$

Since the investor will use the proceedings to enter into a contract to short the share at the forward price of \$122.93, the net cash flow of the trade will equal:

$$\$122.98 - \$122.98 = 0$$

Transaction B: If the investor short sells the stock at the current price of \$119.4, and invests the proceeds at the risk-free rate, then 6 months from now the investor will have:

$$119.40(1.03)^{0.5 \times 2} = \$122.98$$

Since the investor will take a long position to purchase the stock at the forward price of \$123.98, the net cash flow of the investor will equal:

$$\$122.98 - \$122.98 = 0$$

Q.669 Kevin Rodriguez is a candidate for the position of a junior trader at a mid-sized investment bank in Mexico. The bank's hiring process is rigid, consisting of 1 written exam and 2 interviews. Rodriguez has cleared the written exam and is currently being interviewed by the recruitment committee. The committee asked Kevin to describe the situation where an investor can make a risk-free profit on a forward contract. Kevin presented the following two scenarios:

I. If the forward price of the stock is greater than the current price, the investor can profit by purchasing shares at the current price and shorting shares at the forward price.

II. If the current price of the stock is greater than the forward price, the investor can profit by purchasing shares at the current price and shorting shares at the forward price.

Assuming that the forward price being considered differs from the forward price implied by the spot price and the current interest rate, which of the above-mentioned scenarios will generate profit?

- A. Scenario I will generate a profit, and scenario II will generate a loss
- B. Scenario I will generate a loss, and scenario II will generate a profit
- C. Scenario I will generate a profit, and scenario II will also generate a profit
- D. Scenario I will generate a loss, and scenario II will also generate a loss

The correct answer is **A**.

Scenario I will generate a positive cash inflow. If the price of the forward contract is higher than the current price of the share, then the investor can borrow the funds at the risk-free rate to purchase shares at the current price and short forward contracts to sell the asset at the higher forward price, thus earning a risk-free return.

Scenario II is incorrect because if the current price of a stock is greater than the forward price, the investor must short the shares now, invest the proceedings at the risk-free rate, and use the proceedings to take a long position in the forward contract.

Note that, the investor can only profit when the forward price is higher than the current price plus the risk-free interest payable to the lenders of the fund.

Q.670 Priyanka Singh is a derivative investment manager at Hind Investments based in Mumbai. Priyanka is analyzing the shares of Cosmetic World Company that are currently trading at \$76.2 per share. Cosmetic World has the largest market shares in the cosmetics market of Asia, and the company has been profitable for over a decade. The 3-month forward contract on the stock is being offered for the price of \$86.8. Priyanka Singh wants to trade 5,000 shares of Cosmetic World with the intention of closing the position in 3 months. If the risk-free interest rate is 5%, then determine the arbitrage profit.

- A. \$77,158
- B. \$68,485
- C. \$50,798
- D. \$48,324

The correct answer is **D**.

Since the forward price of the contract over Cosmetic World is higher than its current price, the investor can profit by borrowing the funds at the current rate to purchase shares at current prices and short forward contracts to sell the shares at higher forward prices.

If the investor borrows \$76.2 dollar at the risk-free rate to purchase shares now, the loan amount, in 3 months, will grow to:

$$\$76.20 \times (1.05)^{3/12} \times 5,000 \text{ shares} = \$385,675.72$$

Since the investor will use the proceedings to short a forward contract (sell the shares at the forward price of \$86.8), the cash flow from the short sell is:

$$\$86.80 \times 5,000 \text{ shares} = \$434,000$$

The arbitrage net cash flow is $\$434,000 - \$385,675.72 = \$48,324.28$

Q.671 Harry Gayle is a fixed investment analyst at one of the biggest investment banks in Boston. He is analyzing forward contracts on the bond of Cube Corp. The current price of Cube Corp is \$950, and the bond pays a semiannual coupon of 12%. The face value of the bond is \$1,000. The forward contract on Cube Corp's bond is available for the price of \$960 with maturity in 6 months, while the coupon on the bond is expected to be received in 3 months. If the risk-free rates for 3-month and 6-month treasuries are 3% and 4.2%, respectively (compounded annually), then what is the net gain or loss from the contract?

- A. Net gain of \$51.05
- B. Net loss of \$10.16
- C. Net gain of \$49.84
- D. Net loss of \$42.57

The correct answer is **A**.

Since the forward price is higher than the current price, the investor will borrow to purchase the stock at the current price.

As the bond pays a coupon of \$60 ($\$1,000 * 0.12/2$) in 3 months, which will be used to pay the loan, the amount to be borrowed for three months is:

$$\$60 * (1.03)^{-3/12} = \$59.56$$

The amount to be borrowed for 6 months is:

$$\$950 - \$59.56 = \$890.44$$

The remaining portion of the loan that will grow in 6 months at the rate of 4.2% is:

$$\$890.44(1.042)^{6/12} = \$908.946$$

Thus, the net cash flow at the end of the contract will be:

$$\$960 - \$908.95 = \$51.05$$

Note: Assuming there's no coupon, the bond buyer (also the short position in the contract) would need to borrow the full amount of the current price of the bond, i.e., \$950 for 6 months. However, the bond pays a \$60 coupon 3 months from today. Thus, the buyer can reduce the amount borrowed for 6 months and save on some costs. They will borrow the present value of \$60 for 3 months and then borrow the remaining amount for 6 months.

Q.672 George Brown, a fixed-income investment analyst, is determining the price of a 6-month forward contract on a unique asset. The risk-free rate of interest is 12% per year whereas the semiannual dividend yield on the asset is 7%. If the asset price is \$95, then what is the price of the forward contract?

- A. \$100.8
- B. \$98.32
- C. \$97.14
- D. \$96.13

The correct answer is C.

The price of a forward contract when the underlying pays a dividend is given by:

$$F = S \left(\frac{1+r}{1+q} \right)^T$$

where:

S= current asset price;

r = risk-free rate;

q =dividend yield paid by the underlying asset expressed on a per annum basis; and

T = time to maturity (in years) of the forward contract

Since the asset gives a 7% semiannual dividend yield, the annual dividend yield on the asset is:
 $(1 + 0.07/2)^2 - 1 = 0.071225$

Therefore, the price of the forward contract is:

$$\$95 \left(\frac{1.12}{1.071225} \right)^{0.5} = \$97.138$$

Things to remember:

We know that: Effective annual rate = $[1 + i/n]^n - 1$

where:

i = Nominal interest rate

n = Number of periods

Q.673 Karen Kindle is a master's student at one of the top business schools in Taiwan. He reads at least one book on the subject of stocks and derivatives every weekend. Last week's book was on the subject of pricing and valuation of forward contracts. From his understanding, he made the two following conclusions regarding the value of forward agreements:

I. The value of the contract at the time of initiation is always zero.

II. Once the forward contract is initiated, the contract can have a positive value to both counterparties at the same time.

Which of the conclusion is incorrect?

- A. Conclusion I is incorrect
- B. Conclusion II is incorrect
- C. Both conclusions are incorrect
- D. None of the conclusions are incorrect

The correct answer is **B**.

Conclusion II is incorrect because, once the forward is initiated, the value of the contract can be positive to one counterparty and negative to another, but the values cannot be positive to both at the same time.

Conclusion I is correct because the value of a forward contract is always zero at the initiation of the contract in order to remove arbitrage profit.

Q.674 Consider a forward contract on a stock index such as the S&P 500. Everything else being constant, which of the following statements is least accurate?

- A. The forward price will fall if interest rates rise
- B. The forward price is directly linked to the level of the stock market index
- C. If the time to maturity is increased, the forward price will rise
- D. The forward price will fall if dividend payments on the underlying stocks increase

The correct answer is **A**.

Increasing the level of interest rates, r , makes the forward contract more appealing to investors. Thus, the forward price will increase.

From the forward price formula,

$$F = (S - I)(1 + R)^T$$

Then,

Option B is accurate since F is directly proportional to S .

Option C is accurate since F is also directly proportional to T .

Option D is accurate since I is negative, hence, forward price, F will fall with an increase in I , that is, income including dividends.

Q.675 Hania Ahmed is a freelance blogger for a website that publishes articles on economics, finance, and international business. She mostly writes about derivatives trading strategies. In one of her latest articles regarding the relationship between forward and futures contracts, she concluded her article with the following two statements:

I. When the prices of the underlying assets are highly positively correlated with interest rates, the prices of forward contracts tend to be higher than the prices of futures contracts.

II. When the prices of the underlying assets are highly negatively correlated with interest rates, the prices of futures contracts tend to be higher than the prices of forwards contracts.

Which of the following options is correct?

A. Statement I is correct, while statement II is incorrect

B. Statement I is incorrect, while statement II is correct

C. Statement I is correct, and statement II is also correct

D. Statement I is incorrect, and statement II is also incorrect

The correct answer is **D**.

Both statements regarding the relationship between forward and futures contracts are incorrect. When the prices of underlying assets are highly positively correlated with interest rates, the prices of futures contracts tend to be higher than the prices of forward contracts. Conversely, when the prices of the underlying assets are negatively correlated with interest rates, the prices of forward contracts tend to be higher than the prices of futures contracts.

Q.676 Ellen Harper, a portfolio manager at Deutsch Investments Group (DIG), is considering investing in the 6-months futures contract on the German DAX-30 index. The DAX-30 is currently valued at 12,240 with a dividend yield of 1.7% per year. If the risk-free rate in Germany is 3.2%, then the price of the futures contract should be:

- A. 12,241
- B. 12,330
- C. 13,080
- D. 12,578

The correct answer is **B**.

The price of the futures contract on the DAX-30 index is calculated as:

$$\text{Price of futures contract} = \text{Current index} \times \left(\frac{1 + f}{1 + q} \right)^T$$

Where f is the risk-free rate and q is the annual dividend yield.

$$\text{Price of futures contract} = 12,240 \left(\frac{1.032}{1.017} \right)^{0.5} = 12,329.935$$

Q.677 Amy Damian is a portfolio manager at a local pension fund. She has recently received great appreciation from the upper management of the fund because of her arbitrage profit of \$1.6 million on index futures. She earned arbitrage profit during the period where the prices of futures contracts on the S&P 500 were trading lower than the current prices of the index. Which of the following trading strategies must she have used?

- A. Purchasing the stocks whose movement closely mirrors the S&P 500 index and short-selling S&P 500 futures
- B. Short-selling the stocks whose movement closely mirrors the S&P 500 index and taking a long position in S&P 500 futures
- C. Purchasing the stocks whose movement closely mirrors the S&P 500 index and taking a long position in S&P 500 futures
- D. Short-selling the stocks whose movement closely mirrors the S&P 500 index and taking a short position in S&P 500 futures

The correct answer is **B**.

If the prices of futures index contracts are lower than the current price of the index, an investor can earn arbitrage profit by short-selling the stocks of the underlying index and taking a long position in the index futures contract. As it is costly to purchase all the stocks underlying an index, an investor can purchase a small sample of the stocks whose movement closely mirrors the movement of the index.

Q.680 The person who takes a short position usually:

- A. sells an asset that he does not own with the intent of buying it back in the future at a lower price.
- B. buys an asset with the intent of selling it in the future at a higher price for profit.
- C. sells an asset that he does not own with the intent of buying it back in the future at a higher price.
- D. owns the asset but sells it with the intent of buying it back at a higher price.

The correct answer is **A**.

A short position refers to a trading technique in which an investor sells a security with plans to buy it later. Shorting is a strategy used when an investor anticipates the price of a security will fall in the short term.

Q.681 Harry McGuire is a recruitment specialist at a small size investment company that specializes in derivatives and fixed income assets. McGuire has a basic knowledge of investing and trading. He has prepared an informative presentation on the subject of derivatives, which is going to be used for the purpose of recruiting on university campuses. One of the slides from McGuire's presentation contained the following information:

"Futures and forward contracts can be written on many assets. These assets can be investment assets such as equities, bonds, gold, and crude oil, or consumption assets like corn, copper and livestock."

Which of the assets are incorrectly categorized?

- A. Gold
- B. Crude oil
- C. Copper
- D. Corn

The correct answer is **B**.

Crude oil is incorrectly categorized as an investment asset. Investment assets are those assets whose sole purpose is to be used as investments such as equities, bonds, currencies, gold, silver, etc. whereas consumption assets are those assets that are traded for the purpose of consumption or processing. These assets include copper, corn, crude oil and livestock, etc.

Q.3530 Long positions in futures contracts are more desirable to forward contracts when the correlation between futures prices and interest rates is:

- A. Zero
- B. Positive
- C. Negative
- D. Known in advance using the spot curve

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. The reason is that 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.

Q.4673 An investor considers investing in a forward contract to buy an asset currently valued at USD 500 for USD 800 in 2 years. Given that the current interest rate is 5% with annual compounding, what is the current value of the forward contract?

- A. 346.49
- B. -225.62
- C. 235.62
- D. -220.45

The correct answer is **B**.

A forward contract is a linear derivative whose value is given by:

$$S - PV(K)$$

S is the current asset price, and PV (K) denotes the present value of the asset's future price.

So in this, the value is given by:

$$500 - 800(1.05)^{-2} = -225.62$$

Q.4897 Suppose that Paul enters into a 3-year forward contract on a stock that pays no dividends and that the current stock price is USD 35 and the annually-compounded risk-free rate is 5% What is the forward price of this forward contract?

- A. \$40.52
- B. \$36.75
- C. \$30.23
- D. \$40.67

The correct answer is **A**.

This is a no-income case, and the forward price is given by:

$$F = S(1 + R)^T$$

Where,

S = Spot Price

F = Forward Price

R = Risk-free interest rate per year compounded annually

T = Time to maturity,

Thus,

$$\begin{aligned} F &= 35(1.05)^3 \\ &= 40.5268 \approx \$40.52 \end{aligned}$$

Q.4898 Suppose that John enters into a 3-year forward contract on a bond. The spot price of the bond is USD 80. The bond is expected to provide a coupon of USD 5 at the end of the 1st year and the 2nd year. The annually compounded risk-free rate for all maturities is 4% per year. What is the 3-year forward price?

- A. \$89.99
- B. \$79.38
- C. \$84.79
- D. \$ 83.90

The correct answer is **B**.

We first calculate the present value of income:

$$I = 5(1.04)^{-1} + 5(1.04)^{-2} = 9.43047 \approx \$ 9.43$$

Now, since this is a known-income case, we use the formula:

$$F = (S - I) (1 + R)^T$$

Where:

S = Spot Price

F = Forward Price

R = Risk-free interest rate per year compounded annually

T = Time to maturity

I = Income

Thus,

$$\begin{aligned} F &= (80 - 9.43) (1.04)^3 \\ &= \$79.38 \end{aligned}$$

Q.4899 What is the 2-year futures price on the stock index, whose value is USD 2,000, and that the annually compounded risk-free rate is 5% per annum, and the annual dividend yield on the index is 2%?

A. \$2,119.38

B. \$2,289.80

C. \$2,121.80

D. \$1,887.34

The correct answer is **A**.

The futures price is given by the formula:

$$F = S \left(\frac{1 + R}{1 + Q} \right)^T$$

Where:

S = Spot Price

F = Forward Price

R = Risk-free interest rate per year compounded annually

Q = Yield

T = Time to maturity

Thus, the two-year futures price is:

$$F = 2,000 \left(\frac{1.05}{1.02} \right)^2 = \text{USD } 2119.38$$

Q.4900 Paul enters into a two-year forward contract on a stock that pays no dividends and that the current stock price is USD 33 and the annually-compounded risk-free rate is 5% per year. Suppose that one year after the forward contract was initiated, the spot price is USD 35, and the risk-free rate has changed to 6% per annum. What is the value of this forward contract?

- A. 2.22
- B. 0.68
- C. 1.90
- D. 2.33

The correct answer is **B**.

The forward price, initially when the contract is initiated, is given by:

$$K = S(1 + R)^T = 33(1.05)^2 = \$36.38$$

After one-year, the forward price is given by:

$$F = S(1 + R)^T = 35(1.06)^1 = \$37.10$$

The value of the forward contract is

$$\frac{37.10 - 36.38}{1.06^1} = 0.6792 \approx 0.68$$

Q.4901 What would you expect when there is a negative correlation between return on assets and interest rates?

- A. The forward price is greater than the futures price.
- B. The forward price is less than the futures price.
- C. The forward price is equal to the futures price.
- D. None of the above.

The correct answer is **A**.

When there is a negative correlation between return on assets and interest rates, then, when the price of an asset rises, funds are typically invested at a lower rate. If the asset's price falls, on the other hand, funds may be invested at a higher rate. As a result, a long futures contract is less appealing than a long forward contract, as the futures price tends to be lower than the forward price.

Reading 35: Commodity Forwards and Futures

Q.804 Commodity futures and forward markets have been growing at an exponential rate in terms of size in the past years. It is said that more contracts are traded on futures contracts than they are traded on the commodities themselves. In the United States, futures contracts are available on almost every commodity except two. Identify these two commodities which are prohibited in futures markets by law.

- A. Potatoes and Onions.
- B. Movie receipts and lottery receipts.
- C. Onions and movie receipts.
- D. Potatoes and lottery receipts.

The correct answer is **C**.

In the United States, futures contracts are available on almost all tradable commodities except for two, onions and movie receipts of the box office. Violation of the law can end up in fines up to \$5,000.

Q.805 Henry Luis is a commodity trader at a mutual fund that focuses on derivatives and commodities investments. Luis was instructed to pay special attention to the storage costs and cost of carry while valuing the commodities futures contract. Which of the following commodities is likely to have the smallest storage costs?

- A. Crude oil
- B. Corn
- C. Livestock
- D. Gold

The correct answer is **D**.

The storage cost in gold futures contracts is small as compared to the other given commodities. The properties of gold closely match with a financial contract where the storage cost is not considered in the valuation of contracts. Due to the liquidity and availability of gold, the investor can readily purchase the gold for delivery at the maturity of the contract.

Q.806 Commodities futures markets consist of hundreds of different commodities with different properties and attributes. Some commodities do not consider the storage costs separately because, in those commodities, the forward price of the commodity compensates the commodity owner for the cost of storage. Such commodity markets are referred to as:

- A. Discount markets.
- B. Free markets.
- C. Carry markets.
- D. Forwards markets.

The correct answer is C.

A commodity is said to be in carry when it is being stored rather than traded. The concept is similar to financial markets where this term is called the financial cost of carry. In the case of commodities, this becomes more obvious since the process of producing and distributing them involves storing them as well.

Option A is incorrect: a discount market is a market where negotiable instruments such as bills and notes are traded.

Option B is incorrect: Free markets are markets where trade takes place based on the laws of demand and supply without government regulations.

Option D is incorrect: Forward markets refer to OTC markets where prices of financial instruments to be delivered in the future are determined,

Q.807 Anton Patrick is a finance and accounting professor at the Boston Business College (BBC). Currently, he is teaching the subject of commodities and derivatives to first-year undergrad finance students. During a surprise quiz, he asked some students to define the use of “lease rate” in commodities markets. Three of the students gave the following definitions. Which one of them is/are correct?

Student 1: “Lease rate is the risk-free rate at which a long position holder in the futures contract can finance his position.”

Student 2: “Lease rate is widely used as an underlying asset on a futures contract.”

Student 3: “Lease rate is the rate used by short-seller of the commodity to compensate the lender of the commodity for the lending.”

- A. Student 1 is correct.
- B. Student 2 is correct.
- C. Student 3 is correct.
- D. Students 2 and 3 are correct.

The correct answer is C.

Only student 3 is correct. The lending rate is the rate used for payments by the short seller of the commodity future to compensate the lender of the commodity for lending it. In the case of a financial asset, the short seller uses the lending rate to compensate the owner for the dividends. In the case of commodities, the short seller may use the rate to make lease payments to the owner of the commodity.

Q.808 John Sinclair is a high net worth individual investor and the owner of a chain of independent fossil fuel power plants in Saint Petersburg, Russia. During a web conference with his investment advisor from Canada's largest investment bank, the advisor advised Sinclair to invest in futures contracts on Crude and Brent oil. He mentioned that apart from the monetary gains, the investor might also receive nonmonetary benefits from the physical possession of these commodities. Which of the following benefits is the investment advisor referring to?

- A. Risk-free rate
- B. Lease yield
- C. Convenience yield
- D. Roll-over yield

The correct answer is C.

The nonmonetary benefit received by the owner of the commodity future due to physical possession of the underlying commodity is called the convenience yield. In the given case, since the investor also has a business related to the underlying commodities of Crude oil and rent oil, the owner can gain nonmonetary benefits like using the oil to produce power during, for instance, a short-term shortage of oil supply.

Option A is incorrect: Risk-free rate is the interest that an investor would expect from a riskless investment.

Option B is incorrect: Lease yield refers to the interest rate charged for borrowing the underlying asset.

Option D is incorrect: Roll-over yield refers to the profits realized in the futures market when an investor rolls a short-term contract into a longer-term contract and gains from the futures price convergence toward a higher spot price.

Q.809 Busra Turkmen is a business newscaster and an economic analyst at one of the leading business and finance-focused news channel in Germany. While writing the evening business report, she noticed that the prices in gold forwards contracts are upward sloping, which means the forward prices of longer maturity gold contracts are higher than the prices of shorter maturity gold contracts. Which of the following terms can she use to define the given trend in gold forward prices?

- A. Convenience yield.
- B. Backwardation.
- C. Upwardation.
- D. Contango.

The correct answer is **D**.

If the forward prices curve of the commodities is upward sloping, the market of the commodity is said to be in contango. In other words, in contango, the forward price of the distant maturity contract is higher than the forward price of the shorter maturity contract. The forward prices of gold, soybeans, and corn are traditionally in contango.

Option A is incorrect: Convenience yield refers to the nonmonetary benefit received by the owner of the commodity future due to physical possession of the underlying commodity.

Option B is incorrect: Backwardation refers to a situation where the futures price is **below** the spot price. It occurs when the benefits of holding the asset outweigh the opportunity cost of holding the asset as well as any additional holding costs. A backwardation commodity market occurs when the lease rate is greater than the risk-free rate.

Option C is incorrect: Even though the curve for contango is upward-sloping, it is also referred to as forwardation, not upwardation.

Q.810 In the United States, forward and futures contracts are available for trading on various commodities. These commodities are classified in the categories of extractable or renewable and primary or secondary. Which of the following commodities can be classified as renewable as well as a primary commodity?

- A. Oil
- B. Copper
- C. Livestock
- D. Gasoline

The correct answer is C.

Commodities can be classified as extractable or renewable. Extractable commodities are those commodities that are obtained by drilling or mining i.e. oil, natural gas, gold, copper, iron, etc. On the other hand, renewable commodities are obtained through agricultural means. Soybean, cotton, corn, livestock, pork bellies, and lumber are examples of renewable commodities. Secondary commodities are those that have been processed like gasoline while primary commodities are those that are traded unprocessed like soybean, oil, gold, livestock, etc.

Q.811 Mika Singh is the head of the commodities trading unit at an investment company. Singh has 5 years of experience in trading commodities derivative products. One of his subordinates seems to lack knowledge about forward prices. Singh wrote an email to his subordinate that contained the following two explanation regarding forward price:

- I. The prepaid forward price for a commodity is the present value of the futures price of a commodity that is to be received on a specific future date
- II. The forward price of a commodity is the future value of the prepaid forward price of the commodity

Which of the above-mentioned explanation is incorrect?

- A. Only explanation I is incorrect.
- B. Only explanation II is incorrect.
- C. Both explanations are incorrect.
- D. None of the above.

The correct answer is **D**.

Both the forward price and the prepaid forward price explanations are correctly defined. The forward price of a commodity is the future value of the prepaid forward price of the commodity. Alternatively, the prepaid forward price for a commodity is the present value of the futures price of a commodity that is to be received on a specific future date. In other words, it is the present value of the commodity on a future date.

Q.813 A commodities trader at an investment bank has analyzed the forward prices of gold contracts and realized that there might be an arbitrage profit present in gold futures contracts. The spot price for one ounce of gold is \$1,205 and the 6-month futures contract is quoted as \$1,253 per ounce. If the risk-free rate is 6% (compounded continuously), then the arbitrage profit for trading one gold futures contract is:

- A. \$7.81
- B. \$23.61
- C. \$11.31
- D. \$10.96

The correct answer is C.

The futures price of the 6-month gold contract is greater than the spot price. Therefore, an arbitrage opportunity exists.

An investor should take the following steps at time 0:

1. Borrow \$1,205 for 6 months at the risk-free rate
2. Buy gold at the spot price of \$1,205
3. Take a short exposure in the 6-month gold futures contract for the futures price of \$1,253

At the expiration of the futures contract:

1. Sell gold at the futures price of \$1,253
 2. Pay the borrowed money with interest of $\$1,205e^{0.06 \times 0.5} = 1,241.69$
 3. Earn the cash-and-carry arbitrage profit of $(\$1,253 - \$1,241.69) = \$11.31$
-

Q.814 Branden Berger is an active trader at Eclipse Funds. He has been closely monitoring the spot prices and forward prices of corn bushel for a long time. He has noticed that the spot price and the 1-year forward price of a corn bushel contract are identical at \$6.90 per corn bushel. If the risk-free rate is 8%, then which of the following strategy will earn him arbitrage profit?

A. Borrow the amount equal to the spot price of corn for 1 year at the risk-free rate of 8%, buy a corn bushel at the spot price, and take a short position in a 1-year corn forward contract. At the expiration of the contract, the investor will sell the corn bushel at the futures price and pay off the borrowed money with interest.

B. Borrow the amount equal to the spot price of the corn bushel, lend the money for one year at the risk-free of 8%, and take a long position in a corn forward contract. After one year, the investor will receive the lent money with interest, receive the corn bushel at the expiration of the contract, and deliver the corn bushel.

C. Short sell corn at the spot price of \$6.90 per bushel, lend the money for one year at the risk-free of 8% and take a long position in a corn forward contract. After one year, the investor will receive the lent money with interest, receive the corn bushel at the expiration of the contract, and deliver the corn bushel.

D. Since the spot price of the corn bushel is equal to the 1-year forward price of the corn forward contract, an arbitrage profit is not possible.

The correct answer is **C**.

An investor can earn an arbitrage profit if the trader short sells corn at the spot price of \$6.90 per bushel, lends the money for one year at the risk-free rate of 8%, and takes a long position in a corn forward contract for the price of \$6.90. After one year, he will receive the lent money with interest equal to \$7.45, receive the corn bushel at the expiration of the contract for \$6.90, and deliver the corn to the lender.

Note: Remember that the trader began by selling corn short, which means borrowing and selling it at the spot price. Selling short is selling that which you do not own but have only borrowed for eventual return to the owner. It's a popular speculation technique among bearish traders who expect the price of a stock or commodity to fall in the near future because they will sell high, buy low, and keep the difference.

Q.815 Branden Berger is an active derivative trader at the Eclipse Funds. He has been closely monitoring the spot prices and forward prices of corn bushel for a long time. He has noticed that the spot price and 1-year forward price of a corn bushel contract are identical at \$6.90 per corn bushel. If the risk-free rate is 8%, then the arbitrage profit is equal to:

- A. \$0
- B. \$0.53
- C. \$0.55
- D. \$1.06

The correct answer is C.

The investor should take the following steps at time 0:

1. Short sell corn at the spot price of \$6.90 per bushel
2. Lend the \$6.90 for 1 year at the risk-free rate
3. Take a long position in a 1-year corn forward contract

At the expiration of the futures contract:

1. Receive the lent money with interest for $\$6.90(1.08) = \7.45
2. Purchase the corn bushel at the forward price of \$6.90 and deliver the corn bushel
3. Earn the reverse cash-and-carry arbitrage profit of $(\$7.45 - \$6.9) = \$0.55$

Note: Selling short comes with a fee, but we ignore that for exam purposes.

Q.816 An investor is analyzing a 6-month oil forward contract that is quoted as \$54 per barrel. The spot price of oil is \$55 per barrel, and the risk-free rate is 10%. In order to earn risk-free profits, the investor short sells oil at the spot price of \$55, lends the money for 6 months at risk-free of 10%, and takes a long position in an oil forward contract for the price of \$54 per barrel. After 6 months, the investor receives the lent money with interest equaling \$57.68, purchases the oil at the forward price of \$54, and delivers the oil to earn an arbitrage profit of \$2.68 per barrel. Which of the following strategies has he most likely implemented?

- A. Cash-and-carry arbitrage strategy.
- B. Arbitrage-free strategy.
- C. Reverse cash-and-carry strategy.
- D. Binominal arbitrage strategy.

The correct answer is C.

The investor implemented the reverse cash-and-carry arbitrage strategy to earn an arbitrage profit. In a reverse cash-and-carry arbitrage strategy, the investor follows these steps:

At the time 0:

1. Short sell the commodity
2. Lend the short sale proceeds at market interest rates for the duration of the forward or futures contract
3. Take a long position in the futures contract at market price

At contract expiration:

1. Collect the lent proceeds with interest
2. Take delivery of the commodity for the futures price and deliver the commodity in the short sale commitment

Option A is incorrect: In a cash-and-carry arbitrage strategy, an investor takes a long position in the spot price of an asset while simultaneously taking a short position in a futures price contract. The asset is sold and held until the expiration date of the futures contract. The investor will then deliver the underlying asset against the futures price contract and thus lock in a risk-free profit.

Option B is incorrect: Arbitrage-free strategy involves valuing an asset without taking into account its price in other markets.

Q.817 Salona West is a portfolio manager at Global Hedge Fund Inc. She received an email from a junior investment analyst, suggesting that a reverse cash-and-carry arbitrage opportunity exists in 6-month gold futures contracts as the spot prices of gold are higher than the corresponding forward prices. West believes that such an opportunity would be unlikely in gold contracts due to the following reasons:

I. The suggested transaction doesn't include the consideration of a lease payment

II. Since an active lending market in the gold market exists, the lender uses the forward price to determine the lease rate, and a no-arbitrage pricing will be established

Which of the West's justification for no-arbitrage pricing is/are correct?

A. Statement I

B. Statement II

C. Both statements I and II

D. Neither statement I nor statement II

The correct answer is C.

When the lease rate is considered in the pricing of the forward contract, the arbitrage opportunity vanishes. The lease rate is the rate used to calculate the lease payment to the lender of the commodity. In shorting a commodity, the commodity is required to be borrowed, and therefore, the lender of this commodity will demand a lease payment. The lease payment in commodity forwards pricing is similar to the dividend yield in stocks.

Q.818 An investor is interested in taking a long position in a 12-month cotton forward contract. Estimate the 12-month forward price for cotton that has a spot price of \$37 per pound and an annual lease rate of 5% if the risk-free rate for the commodity is equivalent to 7.5% with annual compounding.

- A. \$39.88
- B. \$38.89
- C. \$37.88
- D. \$36.08

The correct answer is C.

The lease rate is used by the lender of the commodity to calculate the lease payment for lending the commodity to borrow. The lease rate must be incorporated into the equation to calculate the forward price of the commodity.

The forward price of cotton is calculated using the following equation:

$$F = S \left(\frac{1 + R}{1 + L} \right)^T$$

Where:

F = forward price

S = spot price

R = risk-free rate

L = lease rate

Thus,

$$F = 37 \left(\frac{1.075}{1.05} \right)^1 = \$37.88 \text{ per pound}$$

Q.819 Ahmet Abdullah is a research analyst at Klosky Investment Company. He is interested in analyzing the forward price curve trend of silver prices. Due to a lack of trading, he is unable to get the forward prices for silver. However, he found out that there is an established lending market for silver and the silver lease rate is 7.9%. If the risk-free rate is 8.2%, then which of the following is true?

- A. The market for silver is said to be in backwardation
- B. The market for silver is said to be in contango
- C. The market for silver is said to be in upwardation
- D. It cannot be ascertained without forward prices

The correct answer is **B**.

The market is said to be contango if the forward curve of commodity prices is upward sloping. This also suggests that the forward prices of the commodity are higher than the current spot prices. The relation between forward and spot prices can be analyzed using the following equation:

$$F = Se^{(\text{Risk-free rate} - \text{Lease rate})T}$$

If the risk-free rate is higher than the lease rate, the forward prices will be greater than spot prices and the market will be in contango.

Q.820 An analyst is identifying the effects of storage cost, lease rate, and convenience yield on the forward prices of storable commodities. After testing these effects, the analyst has concluded the following three points:

- I. The presence of a lease rate reduces the forward price of a commodity
- II. The presence of a convenience yield increases the forward price of a commodity
- III. The presence of storage costs reduces the forward price of a commodity

Which of the above statements are correct?

- A. I & II
- B. II & III
- C. I & III
- D. I only

The correct answer is **D**.

Statements II and III are incorrect. II is incorrect because the presence of a convenience yield **reduces** the forward price of a commodity. III is incorrect because storage costs **increase** the forward price of a commodity.

Q.821 An analyst is analyzing the effect of storage costs and convenience yields on the forward prices of livestock. The storage cost of the livestock is 1.3%, and the convenience yield is 2.9%. Evaluate the final impact on the forward price of livestock if the risk-free rate is 1.4%.

- A. The forward price of livestock will be greater than the spot price of livestock.
- B. The forward price of livestock will be lower than the spot price of livestock.
- C. The forward price of livestock will be equal to the spot price of livestock.
- D. The forward price of livestock cannot be ascertained.

The correct answer is **B**.

The forward price of livestock will be lower than the spot price of livestock. This is because the convenience yield is greater than the storage cost and risk-free rate. This relation can be demonstrated with this equation.

$$F = S * e^{(\text{Risk-free rate} + \text{Storage cost} - \text{Convenience yield})}$$

Since the convenience yield is greater than the sum of storage cost and the risk-free rate, the net effect will be negative, and the forward price will be lower than the spot price.

Q.822 Garry Johnson has recently joined the derivatives unit of Brilliance Investment Bank as a research analyst. He has been assigned to focus his research on the energy sector. Johnson is analyzing spot prices and forward prices of Crude and Brent oil contracts in the futures markets, and he notices a trend in forward prices. The forward prices of oil contracts are in a downward sloping curve, which means the forward prices with larger maturities are lower than the forward prices of oil futures with shorter maturities. This trend in forward prices is referred to as:

- A. Diminishing curve
- B. Backwardation
- C. Upwardation
- D. Contango

The correct answer is **B**.

The downward-sloping curve in the forward market is referred to as backwardation. In backwardation, the forward prices of the commodities with distant maturities are lower than the forward prices of the same commodity with shorter maturities.

In contrast, in a contango market, the forward prices of the distant maturity contracts are higher than the forward prices of shorter maturity contracts.

Q.823 An investment manager is analyzing the forward curve of a specific commodity, which will help him identify if the forward price of the commodity will be higher or lower than the spot price. Suppose that the manager has figured that the lease rate of the specific commodity is 6.5% and the risk-free rate is 6%, then determine which of the following option is true.

- A. The market of the commodity is in contango.
- B. The market of the commodity is in backwardation.
- C. The market of the commodity is in upwardation.
- D. It could not be ascertained without established forward quotes.

The correct answer is **B**.

The market is said to be in backwardation when the forward curve of commodity prices is downward sloping. This also suggests that the forward prices of the commodity are lesser than the current spot prices. The relation between forward and spot prices can be analyzed using the following equation:

$$F = Se^{(\text{Risk-free rate} - \text{Lease rate})T}$$

If the risk-free rate is lower than the lease rate, the forward prices will be lower than spot prices and the market will be in backwardation.

Q.3527 The spot price of oil is USD 95 per barrel, and the six-month futures price is USD 100 per barrel. The cost of storing oil for six months has a present value of USD 10 per barrel, and the risk-free rate is 5% per year.

Determine the convenience yield, Y.

- A. 7.6%
- B. 5.0%
- C. 4.5%
- D. 15.8%

The correct answer is **D**.

$$F = (S + U) \left[\frac{1 + R}{1 + Y} \right]^T$$

where:

F = futures price

S = spot price

U = present value of the storage cost

R = risk-free rate

Y = convenience yield

T = time to maturity of futures contract

We can rewrite the above equation So that:

$$\begin{aligned} Y &= \left[\frac{S + U}{F} \right]^{\frac{1}{T}} (1 + R) - 1 \\ &= \left[\frac{105}{100} \right]^{\frac{1}{2}} (1.05) - 1 \\ &= 0.157625 \end{aligned}$$

That is, the convenience yield is 15.8%

Reading 36: Options Markets

Q.724 Jessie Leeson has spent her last semester studying abroad at the University of Vienna. She took advanced finance and derivatives courses during her semester abroad where she studied pricing, valuing, hedging, and trading strategies involving derivatives. During a meeting with her colleagues, one of them asked her to outline the similarities and differences between options, futures, and forwards. She made the following statements:

- I. The cost of entering into an option or a futures contract is zero, but forward contracts have a cost.
- II. The holder of an option has a right but not an obligation to exercise the option, while the holder of a futures/forward contract has an obligation to honor the contract.

Which of the following is correct?

- A. Only statement I is correct.
- B. Only statement II is correct.
- C. Both statements are correct.
- D. None of the statements is correct.

The correct answer is **B**.

Statement I is incorrect because entering into options contracts requires initial transaction costs while forward and futures contracts do not require initial transaction costs.

Statement II is correct because an option gives the holder the right but not an obligation to exercise the option. For example, a holder of a call option has the right, not the obligation, to purchase the underlying asset at a specific price and time, whereas the holder of futures/forward contracts has an obligation to honor the contract.

Q.725 Adam Smith is a former computer engineer who has been actively trading stocks and derivatives after his early retirement from a 35-year engineering career. Smith holds 5,000 stocks of Banana Computers. He recently entered into a transaction where he has the right to buy 1,000 stocks from another investor if the value of the stock increases beyond a predefined price. Which of the following accurately defines the transaction?

- A. Smith is long put options.
- B. Smith is short on equity swaps.
- C. Smith is long on equity forwards.
- D. Smith is long call options.

The correct answer is **D**.

A long call is a bullish position that gives the holder the right but not the obligation to buy the underlying asset from the writer at a specified (strike) price. The party that's long the call (long position) is effectively the buyer/holder of the contract. The short position is the writer of the call. In a call option, the buyer is bullish in the sense that they expect the stock to increase in price in the near future. As such, the strike price is usually more than the market price prevailing at the time of writing the contract. The decision of whether or not to exercise rests with the holder (long position), and the short position has an obligation to honor the contract if it is exercised. The buyer can only exercise price if the prevailing stock price at maturity is greater than the strike price because, in that scenario, they stand to make a profit (equal to stock price - strike price - premium paid).

Q.727 Emmy Annie, a finance student at the University of Kennesaw, regularly invests her extra income in stocks and derivatives. She owns stocks of ABC Inc., a cleaning company, which are currently trading at \$45. She believes the stock will trade below \$45 if new regulations on cleaning companies are introduced next month. She is interested in entering an option position that gives her the right to sell her stocks at \$45. If the price of the stock goes below \$45, suggest the most appropriate option position for Annie.

- A. A long call option with the strike price of \$45.
- B. A short call option with the strike price of \$45.
- C. A Long put option with the strike price of \$45.
- D. A short put option with the strike price of \$45.

The correct answer is C.

Emmy Annie should purchase a put option or take a long position in a put option on the stocks of ABC Inc. The put option should have a strike price of \$45 (hypothetically), so if the price of the stock falls below the strike price of \$45, Annie can exercise her right to sell her stocks at the price of \$45 per share.

Q.728 Franky M. purchased an American put option from Lee V. on the stocks of Fast Cars Co. to sell 2,000 shares of stock at a price of \$3.30 per share. The put option has a strike price of \$31.70. If the stock price at the expiration of the option is \$30, then which of the following statements is true?

- A. Franky lost \$6,600 on the short position while Lee gained \$6,600 on the long position.
- B. Franky lost \$6,600 on the long position while Lee gained \$6,600 on the short position.
- C. Franky lost \$3,200 on the long position while Lee gained \$3,200 on the short position.
- D. Franky lost \$3,200 on the short position while Lee gained \$3,200 on the long position.

The correct answer is C.

Franky is the purchaser of the put option or the long position holder in a put option so his gain for the option ($(\$31.70 - \$30) * 2,000 = \$3,400$) is offset by the cost of purchasing the option ($\$3.30 * 2,000 = \$6,600$). His net loss is -\$3,200.

Lee is the seller or the short position holder in the put option. His gain on the sale of the put option ($\$3.30 * 2,000 = \$6,600$) is reduced due to the loss on the underlying ($(\$31.70 - \$30) * 2,000 = \$3,400$). His total gain is \$3,200.

Q.729 Which of the following statements regarding the features of put and call options is correct?

I. The long position holder in a call option is also referred to as the writer of the option

II. The short position holder in a put option is referred to as the seller of the option

A. Only statement I is correct

B. Only statement II is correct

C. Both the statements are correct

D. None of the statements are correct

The correct answer is **B**.

Statement I is incorrect. The long position in a put or call option is the buyer of the option, not the writer of the put/call option.

Statement II is correct because the short position holder in a put/call option is known as the writer or seller of the put option.

Q.730 Nina Singh has recently started investing in options after watching some options investing tutorial videos, so her knowledge of options is limited. She has analyzed that she can take one of the four positions in the options market. She can take either a long/buyer position or a short/seller position in a call option. Similarly, she can also take either a long or a short position in put options. Which of the abovementioned positions has unlimited potentials for loss?

- A. A long position in a call option.
- B. A short position in a call option.
- C. A long position in a put option.
- D. A short position in a put option.

The correct answer is **B**.

The seller of a call option or the short position in a call option has unlimited loss potential. As the price of the underlying asset has an infinite potential of increase, the difference between the strike price and the stock price at any given time also has an unlimited potential to increase.

Options A and C are incorrect because the loss potential of a long call and long put is limited to the premium or initial cost at the time of the purchase of the option.

Option D is incorrect because the price of an asset cannot be negative. Therefore the loss potential of a short put is limited to zero.

Q.731 Franklin Cole, an investment manager at Small Lounge Investments Co., has conducted a fundamental research on the shares of Red Hat Corp and instructed his assistant to sell put options on the shares with a strike of \$30. The assistant receives a premium of \$0.50. If the price of the stock increases from \$30 to \$33, determine the position's payoff and profit.

- A. payoff = \$0; profit = \$0.50
- B. payoff = \$0.5; profit = \$0.50
- C. payoff = \$0; profit = \$0
- D. payoff = \$3; profit = \$0.50

The correct answer is **A**.

$$\begin{aligned}\text{Payoff to the long position} &= P_T = \max(0, X - S_T) \\ &= \max(0, \$30 - \$33) = 0\end{aligned}$$

$$\begin{aligned}\text{Payoff the short position, payoff} &= -P_T = -0 = 0 \\ \text{Profit to the short position} &= P_0 - P_T\end{aligned}$$

where P_0 is the option premium

$$\text{Profit} = \$0.50 - 0 = \$0.50$$

Detailed Response

In option contracts, there are always two parties:

(I) the buyer, who takes the long position, and

(II) the seller (writer) who takes the short position

It follows that the seller (short position) of a put option is the trader that promises to buy the underlying stocks at the expiry of the contract. The buyer (long position) is the party that has a right but not the obligation to sell the stocks at expiry. The buyer is also called the holder.

Holder:

At expiration, the holder will only benefit if the prevailing market price is less than the exercise/strike price. The payoff is equal to $P_t = X - S_T$, i.e., strike price minus the market price. If the stock stays at X or above, the payoff will be zero.

The holder's profit is always given as the option payoff minus the premium paid at time 0.

Seller:

At expiration, the seller will only “benefit” if the prevailing market price is greater than the exercise/strike price. The payoff is equal to the negative value of the holder's payoff.

Also, the seller's profit will be the negative value of the holder's profit.

In short, options are a zero-sum game. What's lost by one party is gained by the other.

Franklin and his assistant sell the option; they hold a short position.

So they receive a premium of 0.50, and to their luck, the stock price actually rises, meaning that the

buyer cannot exercise their right to sell.

Thus, the payoff to the buyer is zero, and the payoff to Franklin is “-0”

The holder's profit: option payoff less the premium paid, i.e., $0 - 0.50 = -0.50$.

The seller's profit is $-(-0.50) = 0.5$

Again, the zero-sum game is at play here.

Q.732 Management at Digi Computational Investments has analyzed that the finance and banking sector of the U.S. is currently in turmoil. The sector has not properly recovered from the last financial crisis, and the new variables underlying the financial sector have already started tumbling. Taking this into consideration, Digi Computational Investments took a long position in a European call option on the Nasdaq-100 Index (NDX) which is composed of 108 non-financial companies at a price of \$20 per index option. The strike price of the index option is 3,355, and the option expires in March 2020. If the current index price is 3,457, then estimate the total gain or loss for the buyer of the call option.

- A. \$ 102
- B. \$ 98
- C. \$ 78
- D. \$ 82

The correct answer is **D**.

Since the current index price is higher than the strike price, the buyer of the call option will exercise the index option. If the option is exercised, the gain to the buyer of the index option is:

Net gain on the call option = Gain on the option - Premium on the option

Net gain on the call option = $3,457 - 3,355 - 20 = \$ 82$

Q.733 A treasury manager at a large manufacturing firm believes that the price of the shares of Bright Star Hospitals Group (HBHG) will increase by at least 30% in value in the coming 2 to 3 years. The manager, therefore, is interested in taking a long position in an option that allows him to purchase the stock anytime it increases in value above some determined strike price, and the option should have an expiry of at least 38 months. Which of the following options is suitable for the manager?

- A. Equity call option
- B. Index call option
- C. Long-term equity anticipation securities
- D. Covered call option

The correct answer is C.

Long-term equity anticipation securities (or LEAPS) are options with an expiration date of up to 39 months.

Options A and B are incorrect because call and put options usually expire in 3, 6, 9, or 12 months.

Option D is incorrect because a covered call is a protective call option with an expiration identical to other traditional options.

Q.734 The following are the strike prices, current prices, and expiration dates for options on equities of various companies.

	Call option on Sun Inc.	Call option on Moon Corp.	Put option on Pluto Co.
Strike price	\$109	\$113	\$87
Current price	\$111	\$109	\$89

If you have long positions in all of these options, then which of the following options is true?

- A. The call on Sun Inc. is in the money, the call on Moon Corp. is in the money, and the put on Pluto Co. is out of the money.
- B. The call on Sun Inc. is in the money, the call on Moon Corp. is out of the money, and the put on Pluto Co. is in the money.
- C. The call on Sun Inc. is in the money, the call on Moon Corp. is out of the money, and the put on Pluto Co. is out of the money.
- D. The call on Sun Inc. is out of the money, the call on Moon Corp. is in the money, and the put on Pluto Co. is out of the money.

The correct answer is C.

A call option is in the money if the current price of the option is greater than the strike price. In contrast, if the current price is lower than the strike price, the call option is considered out of the money. In the case of put options, the option is considered in the money if the current price is lower than the strike price, whereas if the current price is higher than the strike price, the option is referred to as out of the money. In both call and put options, the option is considered at the money if the strike price is equal to the current price.

Q.735 Xiamen Lee has a long position in an American call option on oil futures contract with a strike price of \$40 per contract expiring in September. The current price of the oil futures contract has increased to \$46, but the investor believes that the price of the contract can further increase. Since it is an American option, the investor can exercise the contract anytime until its expiration in September. Which of the following is the last day on which Xiamen can trade his call option?

- A. The third Friday of August is the last trading day of the call option.
- B. The third Monday of September is the last trading day of the call option.
- C. The third Monday of August is the last trading day of the call option.
- D. The third Friday of September is the last trading day of the call option.

The correct answer is **D**.

In exchanges in the United States and most other exchanges, the last trading day of put and call options is the third Friday of the month in which the specific contract is expiring. For instance, the buyer of a September put option can trade the option until the third Friday of September. The exact expiration date of the contract is the Saturday after the third Friday of September.

Q.736 Hessen Jersey is a final year student in the undergraduate finance and investing program at the Hockenheim University. During the derivatives class at university, the lecturer asked him to define the portions of the option premium. Hessen gave the following definitions:

- I. Option premiums consist of two portions, the intrinsic value, and the time value
- II. The intrinsic value of a call option is the difference between the current price of the underlying asset and the strike price
- III. The time value of a call option is the part of the premium which is in excess of intrinsic value

Which of Jersey's definitions is/are incorrect?

- A. Definition I is incorrect.
- B. Definition II is incorrect.
- C. Definition III is incorrect.
- D. None of the definitions are incorrect.

The correct answer is **D**.

None of Jersey's definitions regarding option premiums are incorrect.

The intrinsic value of a call option is the current price of the underlying minus the strike price, and an in the money call option has an intrinsic value. Conversely, the intrinsic value of a put option is equal to the strike price minus the current price of the underlying, and an in the money put option has an intrinsic value. The part of the option premium which is in excess of the intrinsic value is called the time value of an option. Therefore,

Option premium (or total value) of an option = Intrinsic value + Time value

Q.738 An investor is considering an option on the stock of a specific company, which has the strike price of \$29 per share and the option expiry date of March. The option is constructed in a way that if the final per share price of the stock reaches \$71 at the expiration, the option will give a payoff of \$100 to the buyer.

Which of the following best describes this type of option?

- A. European call option
- B. American call option
- C. Binary call option
- D. LEAPS call option

The correct answer is **C**.

A binary call option is an option structured such that the payoff is the fixed amount of money if either (I) a specified price is reached/exceeded as of the expiration or (II) the option is simply in-the-money as of the expiration.

Options A and B are incorrect because the payoff in American and European call options is not fixed to \$100, rather the pay of the American and European option is equal to the maximum of zero or the difference between the final price and the strike price.

Option D is incorrect: LEAPS (long-term equities anticipation securities) are options that have the same characteristics as standard options but with expiration dates of up to 39 months.

Q.741 A portfolio manager at Sea Breeze bank owns 10,000 shares of PNG Corp. The manager does not expect an appreciable price increase in the next six months. To diminish his volatility, the manager has written an option over the shares of PNG Corp. that expires in 6 months. Which of the following defines the manager's position in the option?

- A. Covered put option
- B. Covered call option
- C. Protective put option
- D. Protective call option

The correct answer is **B**.

The portfolio manager has a covered call position. When the writer of the call option owns the underlying shares of the option, the option is said to be a covered call option. Covered call options are less risky than naked options because you both own the asset (long position) and write (sell) a call option (short position).

Q.742 Which of the following is responsible for ensuring that the writer of the option must honor the option or must fulfill the obligations determined under the terms of the option?

- A. The exchange
- B. The market maker
- C. The options clearing corporation
- D. The buyer of the option

The correct answer is C.

The options clearing corporation (OCC) guarantees that the writer of the option must honor the option or must fulfill the obligations determined under the terms of the option. It works as the clearinghouse in futures markets. The OCC works with the help of its members; all orders processed through members are required to carry a specific amount of capital and a special fund that can be used in case of default.

Option A is incorrect: An exchange provides a platform for traders to trade their securities.

Option B is incorrect: Market makers are simply market participants who buy and sell securities with the aim of making profits from the bid-ask spread.

Option D is incorrect: The buyer of the option is only obliged to pay premiums by signing a contract but he/she is not responsible for ensuring that the writer of the option honors the option.

Q.743 Harry Wilson owns a call option on the shares of Blue Company and a put option on the shares of Green Company. Both companies belong to the booming communication sector of Holland. The sector has been growing at a rate of 7% for the last 5 years. Blue Company recently announced a cash dividend of \$1.20 on its stock while Green Company announced a 4-for-3 stock split. Which of the following impacts on the options is accurate?

- A. Only the call option on Blue Company will be adjusted for the cash dividend.
- B. Only the put option on Green Company will be adjusted for the stock split.
- C. Options on both of these companies will be adjusted for the cash dividend and the stock split.
- D. None of the companies' options will be adjusted.

The correct answer is **B**.

Options are only adjusted for stock splits or stock dividends, as in both cases the number of shares/stocks will increase. On the other hand, call/put options are not adjusted for cash dividends. The consequences of cash dividends are incorporated in option valuation models.

Q.3561 Jason Briggs purchased a 3-month call option by paying \$0.08. The exercise price of the option is \$1.32 while the underlying is priced at \$1.35.

Is the option currently in-the-money and at what price will break-even occur?

- A. In-the-money: No; Break-even price: \$1.27
- B. In-the-money: Yes; Break-even price: \$1.40
- C. In-the-money: Yes; Break-even price: \$1.35
- D. In-the-money: No; Break-even price: \$1.40

The correct answer is **B**.

The call option is in-the-money as the underlying price is greater than the exercise price (\$1.35 vs. \$1.32, respectively).

Break-even price = $X + C_0 = \$1.32 + \$0.08 = \$1.40$

Q.3562 Which of the following relationships is correct?

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

The correct answer is **A**.

Option Premium = Intrinsic Value + Time Value. The time value of an option is the amount by which the option premium exceeds the intrinsic value.

Q.3563 Which of the following *best* describes the obligation of the writer of a put option?

- A. The obligation to buy the underlying security at the option's strike price if the option is exercised
- B. The obligation to sell the underlying security at the option's strike price if the option is exercised
- C. The right, but not the obligation, to buy the underlying security at the option's strike price if the option is exercised
- D. The right, but not the obligation, to sell the underlying security at the option's strike price if the option is exercised

The correct answer is **A**.

When you write (sell) a put option, you receive the premium and, in exchange, you have the obligation to purchase the underlying security at the option's strike price if the option is exercised. The buyer of an option (either a call or a put) has "the right, but not the obligation" whereas the writer (seller) of an option has an obligation.

Reading 37: Properties of Options

Q.744 Which of the variables given below is likely to have the smallest impact on the prices of plain vanilla stock options?

- A. The strike price of the option
- B. Expected dividend
- C. Risk-free rate
- D. The creditworthiness of the counterparty

The correct answer is **D**.

The creditworthiness of the counterparty in a plain vanilla stock option least likely affects the prices of options. Since plain vanilla stock options are usually standardized and are traded on exchanges, the options clearing corporation (OCC) guarantees that the writer of the option does not default on their obligations.

The following are the six factors that affect the value of an option:

- i. The current stock price
 - ii. The strike price of the option
 - iii. The time to the expiration of the option
 - iv. Short-term risk-free interest rate
 - v. The present value of the dividend of the underlying stock
 - vi. The expected volatility of stock prices over the life of the option
-

Q.745 Raj Kumar is an individual options investor. He recently started investing in equity options because of his informal experience in investing in equities. He opened two options positions on the stock of Red Horse Auto Inc. Kumar purchased a call option on the company's stock with a specific strike price and later also purchased a put option on the same stock with the same strike price. If the current stock price decreases, then which of the following shows the accurate effect on option prices?

- A. The price of the call option will increase while the price of the put option will decrease.
- B. The price of the call option will decrease while the price of the put option will increase.
- C. The price of the put option will increase while there will be no impact on the price of the call option.
- D. The price of the call option will increase while there will be no impact on the price of the put option.

The correct answer is **B**.

Recall that the payoff of a call option is given by:

$$\max(0, S_T - K)$$

and that of a put option is given by:

$$\max(0, K - S_T)$$

Where S_T is the stock price at time T , and K is the strike price

Now,

If the current stock price (or the final stock price, S_T) of a specific share decreases, the price of a put option on the stock will increase as the option is most likely to be on the money. In contrast, if the current stock price or the final stock price of a specific share decreases, the price of a call option on the stock will decrease as the option is most likely to be out of the money.

Q.746 The prices of options on the stocks or equities are affected by a number of variables. Some variables directly impact the options while others have an impact on the underlying stock, which in turn also affects the prices of stock options. If the strike price of an option is increased, then which of the following depicts the accurate impact of this increase?

- A. The increase in strike price will decrease the price of European put and American put options but increase the price of European call and American call options.
- B. The increase in strike price will increase the price of European put and American put options but decrease the price of European call and American call options.
- C. The increase in strike price will increase the price of European put and American call options but decrease the price of European call and American put options.
- D. The increase in strike price will decrease the price of European put and American call options but increase the price of European call and American put options.

The correct answer is **B**.

The increase in the strike price of an option will have a similar impact on American and European call options, and an opposite impact on American and European put options. An increase in strike price will decrease the likelihood of call options to be in the money, and thus, decrease the price of American and European call options. Conversely, an increase in strike price will increase the likelihood of put options to be in the money, and thus, it will increase the price of American and European put options.

Q.747 Jack Anderson, a portfolio manager at Vito Investment Company, manages an \$800 million mutual fund that invest in a large variety of financial instruments. A significant portion of the portfolio is invested in call and put options on the S&P 500 index (SPX), NASDAQ-100 Index (NDX), and Dow Jones Industrial Average (DJX). However, due to upcoming elections in the U.S., the volatility of these indices has increased. Which of the following best describes the impact on index options?

- A. The increase in volatility will increase the prices of call index options but decrease the prices of put index options.
- B. The increase in volatility will decrease the prices of call index options but increase the prices of put index options.
- C. The increase in volatility will decrease the prices of both call and put index options.
- D. The increase in volatility will increase the prices of both call and put index options.

The correct answer is **D**.

With increased volatility, the prices of all options on the underlying - both calls and puts - tend to increase. This is because the chances of all options finishing in the money likewise improve. Higher volatility means higher upside risk or higher downside risk. However, the downside risk in both calls and puts is limited to the premium paid. But the upside potential is unlimited. This makes upside risk more rewarding while limiting downside risk.

Q.748 Kelly Jackson is a junior research analyst at an Asian Investment Fund. The fund has a large exposure to US stocks and options. Jackson is given the task of analyzing the impact on the prices of call and put options if the underlying stock pays a cash dividend. Jackson came up with the following scenarios that show the impact of an increase in cash dividends on call and put options. Which of the four scenarios is consistent with the principles of option pricing?

- A. An increase in the expected cash dividend will increase the price of put and call stock options.
- B. An increase in the expected cash dividend will decrease the price of put and call stock options.
- C. An increase in the expected cash dividend will decrease the price of put options but increase the price of call stock options.
- D. An increase in the expected cash dividend will increase the price of put options but decrease the price of call stock options.

The correct answer is **D**.

The stock price drops by the amount of the dividend on the ex-dividend date. As such, higher expected cash dividends imply lower call premiums (because the options are now more likely to be in the money) and higher put premiums (because the options are now more likely to be out of the money).

Note: The stock price reflects the value of a company. Paying a cash dividend eats into the company's reserves; this reduces the value of the firm, and the stock price also declines to reflect as much. You can also look at the share price as the present value of all future cash flows. Once a dividend has been paid out, that's one less cash flow in the present value equation.

Q.749 Mehmet Orkan, a junior investment analyst at an Istanbul-based investment company, is analyzing various call options on U.S. stocks. He has obtained the following call options quotes on some blue-chip companies in the U.S consumer goods sector. Which of the following options has the highest value?

Name	Nature of the option	Expiration date
A	European call option	3 months
B	European call option	9 months
C	American call option	3 months
D	American call option	9 months

A. Option A

- B. Option B
- C. Option C
- D. Option D

The correct answer is **D**.

As the time to expiration increases, the price of the option increases or stays the same. Therefore, the 9-month American call and 9-month European call will be worth more than the 3-month options. Among the 9-month European and 9-month American call options, the 9-month American call option will have the highest price because the buyer of the option has a right to exercise his option any time until the expiration date, while the buyer of the European call option can only exercise the option at expiry.

Q.751 Upper and lower pricing bounds for American and European call and put options are important in order to prevent investors from earning arbitrage profits. If option prices are above the upper boundary or below the lower boundary, an investor can earn arbitrage profit by opening a position in an options contract and in the underlying stock simultaneously. Which of the following statements is consistent with the upper boundary limit of the American put option?

- A. The price of an American put option should be equal to or higher than the current price of the underlying stock.
- B. The price of an American put option should be equal to or higher than the strike price of the option on the underlying stock.
- C. The price of the American put option should be equal to or lower than the current price of the underlying stock.
- D. The price of the American put option should be equal to or lower than the strike price of the option on the underlying stock.

The correct answer is **D**.

The price or the value of an American or European put option should not be worth more than the strike price of the option. In other words, the price of an American or European put option should only be equal or lower than the strike price of the option. If the price of a put option on a stock is greater than the strike price, the investor can sell the put option, invest the proceeding at the risk-free rate, and earn arbitrage profits.

Q.752 Adam Gilbert is a risk manager that works with Global Trade Brokerage Firm in New York City. Global Trade Brokerage is a member of the options exchange which provides brokerage services to option traders and also works as the market maker in the exchange. Gilbert's job responsibility is to derive upper and lower boundaries for options so the prices are arbitrage-free. Which of the following is an accurate estimation of the lower band for European call option prices on a non-dividend-paying stock, if the current stock price is \$92 and the strike price of the option on that stock is \$89? Suppose the option is expiring in 6 months and the risk-free rate is 8%.

- A. \$3
- B. \$3.97
- C. \$6.49
- D. \$6.36

The correct answer is **D**.

The lower bound of the European call option on a non-dividend paying stock is equal to:

$$S - K(1 + r)^{-t} = 92 - 89 * 1.08^{-0.5} = 6.3597$$

Where S = current price; K = strike price; r = risk-free rate; and t = time to expiration.

Therefore, an arbitrage opportunity exists if the value of the European call option is below \$6.3597

Q.753 Vijay Singh works as an investment manager at Global Investment Company in New York. Global also provides brokerage services to its clients. Therefore, it is a usual task at Global to derive upper and lower boundaries for options so the prices are arbitrage-free. Which of the following given options is the accurate estimation of the lower price boundary for European put options on a non-dividend paying stock that expires in 3 months, if the current stock price is \$31, the strike price is \$33, and the risk-free rate is 10%?

- A. \$2.37
- B. \$1.22
- C. \$2.80
- D. \$1.19

The correct answer is **B**.

The lower bound of the European put option on a non-dividend paying stock is equal to:

$$p \geq K(1 + r)^t - S \Rightarrow 33(1.10)^{-0.25} - 31 = 1.22298$$

Where p = put option price; S = current stock price; K = strike price; r = risk-free rate; and t = time to expiration.

An arbitrage opportunity exists if the value of the European put option is below \$1.22

Q.754 Johanna Smith is a treasury manager at Easy Bank. She manages the treasury affairs and also the investment advisory activities of the bank. She invests in treasury and money market instruments to manage short-term cash, but for long-term cash management, she uses other instruments. Currently, she has invested in zero-coupon bonds with the face value of \$100, and at the same time, she has also taken a long exposure in call options with the strike price of \$100. Which of the following accurately depicts Smith's strategy?

- A. Smith has constructed a put-call parity.
- B. Smith has constructed a covered call.
- C. Smith has constructed a fiduciary call.
- D. Smith has constructed a protective put.

The correct answer is **C**.

A fiduciary call is a combination (or portfolio) consisting of a zero-coupon bond that pays X amount at maturity and a call option with the strike price of X . The payoff of the fiduciary call is X if the call option expires out of the money, and it is $S(X + S - X)$ if the call option expires in the money (S = current stock price).

Option A is incorrect because the put-call parity is the combination of a fiduciary call and a protective put.

Option B is incorrect because a covered call is a strategy where the owner of the stock writes a call option on the stock, so if the price of the stock is above the strike price, he will simply forfeit the stocks. If the current price of the stock is below the strike price, he will earn a call premium.

Option D is incorrect because a protective put refers to owning the stock together with a put option.

Things to Remember:

A Fiduciary call is a creative strategy used to reduce and control losses using options rather than stocks. You're able to control the same amount of stocks using call options as you would have if you had bought the shares directly. So how does it really work? Instead of buying 100 shares of a stock using all your money, you simply buy 1 contract of its call options (1 contract = 100 shares) with just a small fraction of the money and invest the rest into an interest-bearing risk-free investment vehicle. This way, you increase your overall profits and reduce your maximum risk exposure to just the amount of money you used towards buying the call options.

Q.755 Johanna Smith is a treasury manager at Easy Bank. She manages the treasury affairs and also the investment advisory activities of the bank. She invests in treasury and money market instruments to manage short-term cash, but for long-term cash management, she uses other instruments. Currently, she has invested in a zero-coupon bond with the face value of X, and at the same time, she has also taken a long exposure in call options on the stocks of a specific firm with the strike price of X. Suppose that at the time of expiration of the call options, the final price of the stock is A, which is below X. If the bond matures on the options expiration date, then estimate the payoff of the combination of the bonds and call options.

- A. The payoff is A
- B. The payoff is X
- C. The payoff is A+X
- D. The payoff is zero

The correct answer is **B**.

The net payoff of the combination of a zero-coupon bond and a call option is X (the face value of the bond). This is further described below:

The combination of a zero-coupon bond which pays X amount at maturity and a call option with the strike price of X is called a fiduciary call.

The payoff of the zero-coupon bond at the maturity is X.

The payoff of the call option, if the option is in the money, is $S - X$ (where S is the current price and X is the strike price). If the option is out of the money, the payoff of the option is 0.

Therefore, the payoff of a fiduciary call with an in the money option = $(S - X) + X = S$

And the payoff of a fiduciary call with an out of the money option = $(0) + X = X$

As mentioned in the question the current price of the stock is A which is below X, so the option expired out of the money, and the payoff of the fiduciary call is X.

Q.756 An investor is testing the relationship of a put-call parity for which he has constructed a fiduciary call and a protective put. His fiduciary call consists of a Millers Corp. zero-coupon bond with a face value of \$95 and the bond is expected to mature in March 2017, and a call option on Millers Corp.'s common stock with the strike price of \$95 and the option expiring in March 2017. Suppose that in March 2017, the current price of the stock is \$90, then what is the total cash inflow that the investor will receive at maturity?

- A. \$90
- B. \$95
- C. \$100
- D. \$185

The correct answer is **B**.

The net payoff of the combination of a zero-coupon bond with a face value of \$95 and a call option with a strike price of \$95 is \$95 (the face value of the bond). This is further described below:

The combination of a zero-coupon bond which pays X amount at maturity and a call option with a strike price of X is called a fiduciary call.

The payoff on the zero-coupon bond at maturity is \$95.

The payoff of the call option, since the option is out of money = $(90 - 95) = 0$

And the payoff of the fiduciary call with an out of the money option = $(0) + X = (0) + 95 = \$95$

Q.757 The put-call parity is an important relationship in options pricing. The put-call parity relationship is established on the payoff of the combination of two portfolios, a fiduciary call, and a protective put. The fiduciary call is composed of a risk-free discount bond and a call option, while the protective put consists of a put option and a stock. Which of the following principle must hold true in the put-call parity?

- A. The face value of the discount bond must be below the strike price of call and put options.
- B. The face value of the discount bond must be above the strike price of call and put options.
- C. The face value of the discount bond must be equal to the final price of call and put options.
- D. The face value of the discount bond must be equal to the strike price of call and put options.

The correct answer is **D**.

Since the put-call parity relationship is derived from the payoffs of the fiduciary call (that is composed of a discount bond and a call option), and a protective put, which is constructed off a put option and an underlying stock, the face value of the discount bond at maturity must be equal to the strike price of a call option and a put option at expiration.

Q.758 Vijay Mehta is a portfolio manager at First American Investments. He manages a portfolio that invests in a wide variety of financial instruments. Currently, a large portion of his portfolio consists of stocks and options. Recently, he purchased the stock of Jack Ville Inc. and at the same time, he also took a long exposure in a put option on the stocks of Jack Ville Inc. with the strike price of X . Suppose that, at the time of expiration, the final price of the stock, S , is below the strike price, X , then estimate the payoff of the combination of the stock and the put option.

- A. The payoff of the combination of the stock and the put option is S .
- B. The payoff of the combination of the stock and the put option is X .
- C. The payoff of the combination of the stock and the put option is $S+X$.
- D. The payoff of the combination of the stock and the put option is zero.

The correct answer is **B**.

By investing in the stock of Jack Ville Inc. and taking a long exposure in a put option on Jack Ville Inc. stock, the portfolio manager has constructed a protective put.

A protective put consists of a stock and a put option on the same stock with a strike price of X .

The payoff of the put option if the option is in the money is $X-S$ (where S is the current price and X is the strike price).

If the option is out of the money, the payoff of the option is 0.

The payoff of the stock will be equal to the current price or the final price of stock i.e. S

Therefore, the payoff of the protective put with in-the-money put option = $(X-S) + S = X$

And the payoff of a fiduciary call with an out of the money option = $(0) + S = S$

As mentioned in the question, the current price of the stock, S , is below X , so the option is in the money, and the payoff of the protective put is X .

Q.760 The put-call parity relation suggests that the portfolios with identical payoffs must sell for the same price in order to prevent arbitrage profit or riskless gains. The put-call parity is, therefore, constructed of the fiduciary call and protective put options. Which of the following equation is inconsistent with the put-call parity equation?

A. $S = c - p + X(1 + r)^{-t}$

B. $p = c - S + X(1 + r)^{-t}$

C. $X(1 + r)^{-t} = S + c - p$

D. $c = S + p - X(1 + r)^{-t}$

The correct answer is C.

The equation described in C is inconsistent with the put-call parity equation.

The put-call parity equation holds true when both sides of the following equation are equal:

$$c + X(1 + r)^{-t} = S + p$$

Where,

c = call price

p = put price

$X(1 + r)^{-t}$ = PV of zero-coupon bond

S = Current price of stock.

Thus,

$$c = S + p - X(1 + r)^{-t}$$

A, B, and D are all equivalencies for each of the individual securities in the put-call parity relationship

Q.761 Jacob Clarke is an investment manager at one of the largest investment banks in Canada. Clarke has a wide variety of investment options to invest in. However, he is interested in constructing the payoff of a synthetically created long position in call options. Which of the following positions should he take to create the payoff of a synthetic call option?

- A. Long a stock, short a put option, and short a zero-coupon bond.
- B. Long a call option, short a put option, and short a zero-coupon bond.
- C. Short a stock, long a put option, and long a zero-coupon bond.
- D. Long a stock, long a put option, and short a zero-coupon bond.

The correct answer is **D**.

To create the synthetic payoff of a long position in a call option, an investor should take a long position in a stock, a long position in a put option, and a short position in a zero-coupon or discount bond. This relation can be constructed through the put-call parity equation.

Since

$$c + X(1 + r)^{-T} = S + p$$

The synthetic call is

$$c = S + p - X(1 + r)^{-T}$$

Q.763 Giana Greg, a Slovakian consultant, has recently graduated in finance from one of the well-known business schools of Bratislava. She is now an independent consultant that provides trading strategies in stocks and derivatives to individuals and corporations. While replying to an email from one of her clients regarding the put-call parity, she stated the following:

- I. The put-call parity is constructed when the strike price and the time to maturity of the put and call options are equal.
- II. Puts and calls must be American-style for the put-call parity relationship to hold true.

Which of the abovementioned statement(s) is/are inconsistent with the put-call parity relationship?

- A. Only statement I is incorrect.
- B. Only statement II is incorrect.
- C. Both statements are incorrect.
- D. None of the statements are incorrect.

The correct answer is **B**.

Statement I is correct: For put-call parity to hold, the put and call options must be of the same class; that is, they should have the same strike price and expiration date.

Statement II is inconsistent with the assumptions underlying the put-call parity. For the put-call parity relationship to hold true, the puts and calls should be European-style that can only be exercised at expiration which is consistent with the maturity date of the discount bond.

Q.3413 A stock is currently trading at \$60 per share. A European call option having an exercise price of \$71 and one year to maturity is currently trading at \$10. If the risk-free rate is 7%, per annum, then what is the put option price?

- A. \$3.80
- B. \$16.36
- C. \$16.20
- D. \$5.06

The correct answer is **B**.

Using the put call-parity equation:

$$\begin{aligned}
 S_0 + P &= C + X(1+r)^{-T} \\
 P &= C + X(1+r)^{-T} - S_0 \\
 &= 10 + 71 \times (1.07)^{-1} - 60 = 16.35514 \approx 16.36
 \end{aligned}$$

Q.3514 Rabi Koch took a long position in a March put option with the strike price of \$65. What is the outcome of the position if the spot price is \$78 at expiration?

- A. \$11 positive payoff
- B. \$13 negative payoff
- C. \$13 positive payoff
- D. \$0 payoff

The correct answer is **D**.

Since the spot price of the put option is higher than the strike price the option is out of the money. The payoff to the option buyer is:

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

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 long that option (holds the long position), and the trader who wrote that option is 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.

Q.3564 Which of the following conditions will create the biggest discrepancy in price between a long-term European put option and 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
- D. Both A and B

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.

Q.3565 The value of a European put option will increase with higher:

- A. Volatility
- B. Carrying costs
- C. risk-free interest rates
- D. Both A and C

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.

Option 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.

Option C is incorrect. A higher risk-free interest rate will lower the present value of the receipt to the exercise price upon exercise. This will decrease the value of a European put.

Q.3566 Which of the following is NOT a factor that determines the value of an option?

- A. The price of the underlying asset
- B. The volatility of the underlying asset
- C. The inflation rate
- D. The interest rate

The correct answer is C.

The price and volatility of the underlying asset and the risk-free interest rate all play an important role in determining the value of an option.

Other factors that affect the value of an option include:

- i. The strike price of the option
 - ii. The time to the expiration of the option
 - iii. The present value of the dividend of the underlying stock
-

Q.3567 Which of the following conditions will increase the value of a call option?

- A. A decrease in volatility
- B. An increase in risk-free rate
- C. A decrease in stock price
- D. An increase in the dividend rate

The correct answer is **B**.

An increase in the risk-free rate, increase in volatility, or increase in stock price will increase the value of a call option. As the dividend increases, the value of a call decreases since dividends decrease the stock price and hence the call option is likely to be out of the money.

Things to Remember:

How Interest Rates Affect the Prices of Calls and Puts

When interest rates increase, the call option prices increase while the put option prices decrease.

But why?

Let's illustrate: Assume that you have some spare cash to the tune of \$1,000,000, and you are interested in buying Tesla stock, currently selling at \$1,000 per share. On the one hand, you could buy 1,000 shares at \$1,000 each with a total investment of \$1,000,000. On the other hand, you could also purchase a call option selling for only \$10, making a total investment of $\$10 \times 1,000 = \$10,000$. If you take this second option, you will be left with a cool \$9,990,000 which you can invest in Treasury bills/bonds and earn interest. The higher the interest rates, the higher your interest income would be. This makes the call option more attractive and more expensive.

For put options, it is the opposite: the higher the interest rates the lower the put option price. Let's say you get into a short call contract that obliges you to sell Tesla stock to some other investor after six months if the call is exercised. This means you will have to hold the stock for the length of the contract so that you can deliver it when the time comes. If interest rates increase, you would not have the option to sell the stock and use the proceeds to invest at a higher rate. This makes the put option less attractive and hence less costly when interest rates are high.

Q.3568 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 accurate regarding her decision to:

- A. Purchase call options
- B. Purchase put options
- C. Buy the underlying short
- D. All of the above

The correct answer is **A**.

Based on the rearranged put-call parity (see below), in order to synthetically short sell (issue) a risk-free bond, call options should be purchased while the underlying and put options should be sold short.

$$-\frac{X}{(1+r)^T} = c_0 - p_0 - S_0$$

Q.3569 According to the put-call parity, a long position in a put option can be replicated by going:

- A. Short a call option, short the underlying, and long a risk-free bond
- B. Short a call option, long the underlying, and short a risk-free bond
- C. Long a call option, short the underlying, and short a risk-free bond
- D. Long a call option, short the underlying, and long a risk-free bond

The correct answer is **D**.

The put-call parity is represented by the equation:

$$S_0 + p_0 = c_0 + X/(1+r)^T$$

Rearranging the equation:

$$p_0 = c_0 + X/(1+r)^T - S_0$$

Therefore, a long put option position can be replicated by going long a call option, short the underlying, and long a risk-free bond.

Q.3570 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
- D. \$8.48

The correct answer is **B**.

Using the put-call parity relationship:

$$\begin{aligned}c_0 + X(1 + r)^{-T} &= S_0 + p \\ \Rightarrow p_0 &= \$8 + (\$55(1.043)^{-0.25}) - \$60 = \$2.4241\end{aligned}$$

Reading 38: Trading Strategies

Q.765 Mahesh Kumar has recently joined Singapore Standard Bank, the largest investment banks in South-East Asia. Kumar has analyzed an open position his bank has in the stock of a Singaporean carmaker. The current value of the stock is \$44, but he believes that the price of the stock will have trouble reaching above \$48 because of technical and fundamental factors. Kumar called one of the bank's traders and shared his analysis regarding the stock. The analyst informed the manager that he is going to lock the profit with a covered call strategy.

How exactly is he going to apply the covered call?

- A. Since the bank already owns the stocks, the trader is going to buy out-of-the-money call options at the strike price of \$48.
- B. Since the bank already owns the stocks, the trader is going to sell in-the-money call options at the strike price of \$44.
- C. Since the bank already owns the stocks, the trader is going to buy at-the-money call options at the strike price of \$44.
- D. Since the bank already owns the stocks, the trader is going to sell out-of-the-money call options at the strike price of \$48.

The correct answer is **D**.

In order to lock the profit or bound the upside potential of the stock, the investor can write or sell call options. In the given case, since the manager believes that the stock does not have the potential to increase beyond \$48, the trader will sell out-of-the-money call options with the strike price of \$48.

Q.766 Investments banks create customized derivative products for risk-averse retail investors. These products have features of multiple instruments. The payoff on these customized products depends on underlying assets like stocks, indices, and other risky assets. However, the investments in these assets cannot decrease below the initial principal. Which of the following products have these features?

- A. Covered call
- B. Protective put
- C. Principal protected notes
- D. Straddle notes

The correct answer is **C**.

Principal Protected Notes are specialized investment products that banks create to cater to risk-averse retail investors. The payoffs or the return on these products depends on underlying assets like stock, indices, and other risky assets, but these products do not decrease in value beyond the principal investment. John Greenwood has recently joined

Option A is incorrect: A **covered call** describes a trading strategy where the seller (writer) of a call option also owns the underlying stock. The writer sells call options for the same amount (or less) of stock. If the option is not exercised, the writer gets to keep the premium. If the option is exercised, the writer simply hands the option buyer their shares.

Option B is incorrect: in a protective put, the investor who owns the asset buys a put option on those stocks in exchange for a put premium. If the price of the stock increases, the investor will make slightly smaller gains as the value of the portfolio increases but if the value of the stock decreases, the put option will be exercised and the investor will limit its losses to the strike price of the put option.

Option D is incorrect; A straddle involves two transactions on the same security, with positions that offset one another. A **long straddle** is created by purchasing a call and a put with the same strike price and expiration. A **short straddle** is created by selling a call and a put with the same strike price and expiration.

Q.767 John Greenwood has recently joined A.K.K. Investment Company as a junior investment analyst. Greenwood has very little past experience in trading options. Therefore, he frequently has to refer to his superiors for trading strategies and terminologies. Recently Greenwood was instructed to apply a bull spread strategy on Blue Balloon Corp. stock options. Which of the following transactions correctly depicts the bull spread strategy?

- A. Taking a long position in a European put option with a specific strike price and simultaneously taking a short position in a European call option with a higher strike price
- B. Taking a long position in a European put option with a specific strike price and simultaneously taking a short position in a European put option with a lower strike price
- C. Taking a long position in a European call option with a specific strike price and simultaneously taking a short position in a European call option with a higher strike price
- D. Taking a long position in a European call option with a specific strike price and simultaneously taking a short position in a European call option with a lower strike price

The correct answer is C.

Spread trading strategies require taking positions in two or more options at the same time with the same expiration date. The **bull call spread strategy** is a spread trading strategy in which an investor buys a European call option with a specific strike price (X_1) and simultaneously sells a European call option with a higher strike price (X_2). If the current price is below X_1 , the payoff of the investor is zero. If the current price is between X_1 and X_2 , the payoff of the investor is the current price minus X_1 . If the current price of the stock is higher than X_2 , the payoff of the investor is $X_2 - X_1$.

We can also have a **bull put strategy** which consists of one short put with a higher strike price and one long put with a lower strike price. Both puts have the same underlying stock and the same expiration date.

Note: In a bull spread strategy, both options have to be calls or puts (There cannot be a call and a put)

Q.768 An investment manager at Skyline Bank frequently invests in stocks and derivatives. He is always testing different options strategies to maximize the value of the assets under management. Recently, he applied a bull spread strategy on Ocean Shipping Co. stock options. The manager applied a strategy by purchasing European call options on the stock of the firm with a strike price of \$89, and at the same time, he sold European call options on the same stocks with a strike price of \$92. Suppose that the final price of the stocks at expiration is \$97, then estimate the payoff of the strategy. Ignore the cost of the strategy.

- A. \$8
- B. \$5
- C. \$3
- D. -\$2

The correct answer is C.

In a bull spread strategy, an investor buys European call options with a specific strike price (\$89) and simultaneously sells European call options with a higher strike price (\$92).

If the current price (\$97) is higher than the strike price of the short call option (\$92), both call options will be exercised, and the payoff of the investor will be $X_2 - X_1$ or $\$92 - \$89 = \$3$.

Q.769 Saddam Ahmed is a junior portfolio manager at Westend Investments. His investing activities are focused on equities and options. Recently, he purchased a 6-month European call option on a specific stock for \$5 with a strike price of \$110. At the same time, he sold a 6-month European call option on the same stocks for \$3 with a strike price of \$115. Suppose that the final price of the stock at expiration is \$113, then estimate the profit/loss of the strategy.

- A. -\$2
- B. \$1
- C. \$3
- D. \$6

The correct answer is **B**.

The investor has applied a bull spread strategy. In a bull spread strategy, an investor buys a European call option with a specific strike price (\$110) and simultaneously sells a European call option with a higher strike price (\$115).

Since the investor paid \$5 to buy the call option and received \$3 for selling the other call option, the net cash outflow or the cost of the strategy is \$2.

Since the current price of the stock is \$113, which is higher than the strike price of the long call option but lower than the strike price of the short call option, the payoff of the investor is:

Profit/Loss = Current price - Strike price of the long call - Net cost of the strategy

Profit/Loss = \$113 - \$110 - \$2 = \$1

Additional explanation on how bull spread strategies work

In a bull-spread strategy, this is what happens:

(I) You buy a call option- giving you the right to buy the underlying at some point in the future at a specified strike price x . To do so, you pay a premium A

(II) You sell a call option - requiring you to sell the underlying at some point in the future at a specified strike price y , where $y > x$. Here, you receive a premium B

This is a bullish strategy meaning you expect the stock price to rise. If that happens, you will exercise the call option (I), i.e. buy low and sell the underlying at the prevailing market price, making a profit. However, your profit has a ceiling. If the market price soars above the strike price of the short position, you will not make any more money because the holder of the second option will most likely exercise the right to buy (and you will have no choice but to sell to them).

The maximum loss, on the other hand, is equal to $B - A$; the net cost of the two positions; the difference between what you receive for the short position (B) and what you pay for the long position (A).

Q.770 Nancy Smith is an independent individual investor. She has 5 years of experience trading equities, bonds, and options. Smith has recently learned about spread strategies in options that could be implemented to earn protected profits. She is particularly interested in implementing the bear spread strategy. Keeping in view Smith's intended spread strategy, determine how she can implement the bear spread strategy.

- A. She can implement the bear spread strategy by buying a European put option with a specific strike price and simultaneously selling a European put option with a higher strike price.
- B. She can implement the bear spread strategy by selling a European put option with a specific strike price and simultaneously buying a European put option with a higher strike price.
- C. She can implement the bear spread strategy by buying a European put option with a specific strike price and simultaneously buying a European call option with a lower strike price.
- D. She can implement the bear spread strategy by selling a European put option with a specific strike price and simultaneously buying a European put option with a lower strike price.

The correct answer is **B**.

Spread trading strategies require taking positions in two or more options at the same time with the same expiration date. In the bear spread strategy, an investor sells a European put option with a strike price, X_1 , and simultaneously buys a European put option with a higher strike price, X_2 . If the current stock price, S_T is below X_1 , the payoff for the investor is $(X_2 - X_1)$. If the current stock price, S_T is between X_1 and X_2 , the payoff for the investor is $X_2 - S_T$. If the current price of the stock is higher than X_2 , the payoff for the investor is zero.

Note that bull spreads involve buying at a lower strike price and selling at a higher strike price. Bear spreads, on the other hand, involve buying at a higher strike price and selling at a lower strike price.

Q.771 Ahmet Gogh believes the price of the stocks of Red Bus Co. has more downside potential than upside potential. Therefore, he has purchased a European put option on the stock of Red Bus with a strike price of \$42 and simultaneously sold a European put option with a strike price of \$38. At expiration, the final price of the stock is \$43. What is the payoff of the strategy?

- A. \$0
- B. \$1
- C. \$4
- D. \$5

The correct answer is **A**.

The payoff always ignores the cost of the option(s).

The investor has applied a bear spread strategy by buying a European put option with a strike price of \$42 and simultaneously selling a European put option on the stock with the strike price of \$38.

Since the current price of the stock is \$43, which is higher than the strike price of both the long put option and the short put option, the payoff of the investor is zero.

Q.772 During a trader's brainstorming session on the subject of spread trading strategies in options trading, a senior trader and trainer made the following statements regarding the definition and payoffs of a box spread strategy:

- I. A box spread strategy is the combination of a bull spread strategy and a bear spread strategy
- II. The payoff of the box spread strategy will always be the difference between the higher strike price and the lower strike price ($X_2 - X_1$)

Identify the incorrect statement(s).

- A. Only statement I is incorrect.
- B. Only statement II is incorrect.
- C. Both statements are incorrect.
- D. None of the statements are incorrect.

The correct answer is **D**.

Both statements mentioned by the trader in regards to the definition of the box spread options strategy are correct. Statement I is correct because a box spread is a combination of a bull spread and a bear spread. In other words, in a box strategy, the investor has four positions in options: a long call and a short put option with the strike price X_1 , and a short call and a long put with the strike price of X_2 . Statement II is also correct because no matter whether the final or current price is below X_1 , between X_1 and X_2 , or above X_2 , the payoff of the box spread will always be $X_2 - X_1$, where X_2 is the higher strike price, and X_1 is the lower strike price.

Q.773 Phillip Harris is a senior arbitrageur investor at Dynamic Arbitrage Investment Co. He recently found out that if the value of a box spread is not equal to the present value of the payoff of the box spread, an investor could earn an arbitrage profit. He also found out that if the market value of a box spread is too high, it is profitable to sell the box spread. What positions should Harris take in call and put options to sell a box spread?

- A. Harris must buy a European call option and buy a European put option with a specific strike price (X1), and simultaneously sell a European call option and sell a European put option with a higher strike price (X2).
- B. Harris must sell a European call option and sell a European put option with a specific strike price (X1), and simultaneously buy a European call option and buy a European put option with a higher strike price (X2).
- C. Harris must buy a European call option and sell a European put option with a specific strike price (X1), and simultaneously sell a European call option and buy a European put option with a higher strike price (X2).
- D. Harris must sell a European call option and buy a European put option with a specific strike price (X1), and simultaneously buy a European call option and sell a European put option with a higher strike price (X2).

The correct answer is **D**.

In order to sell a box spread, an investor must sell a European call option and buy a European put option with a specific strike price (X1), and simultaneously buy a European call option and sell a European put option with a higher strike price (X2).

Q.775 A Masters of Science (M.Sc.) in Finance graduate, who is also a teacher's assistant, is helping undergraduate students prepare for their final exams. In today's lecture, he is giving a presentation on spread trading strategies using options. He presented that, in a butterfly spread trading strategy, investors take positions in three options. He also makes the following statements regarding the payoff of butterfly spreads:

I. If the current price of the stock is less or equal to the strike price, X_1 then the payoff from a long put is equal to the difference between the strike price, X_1 and the current price, S_T . In other words, if $S_T \leq X_1$, then $\text{Payoff} = X_1 - S_T$.

II. If the current price of the stock is greater than the strike price, X_3 , then the payoff from a long put is equal to the difference between X_3 and the current price, S_T . In other words, if $S > X_3$, then $\text{Payoff} = X_3 - S_T$

Which statement(s) is/are correct?

- A. Statement I only
- B. Statement II only
- C. Both statements
- D. None of the statements

The correct answer is **A**.

Statement I is correct because if the current price of the stock is less or equal to the strike price, X_1 then the payoff from a long put is equal to $X_1 - S_T$.

Statement II is incorrect If the current price of the stock is greater than the strike price, X_3 , then the payoff from a long put is equal to zero.

Note

There's a difference between the terms "payoff" and "profit." The payoff is the future cash flow associated with the contract.

Profit = payoff - initial investment.

Payoff ignores the premium, but profit doesn't

Example

An investor could create a butterfly spread by buying one call at \$10 with a \$65 strike price, buying one call at \$5 with a \$75 strike price, and selling two calls each at \$7 with a \$70 strike price.

It costs $\$10 + \$5 - (2 \times \$7) = \1 to create the spread. If the stock price in 6 months is greater than \$75 or less than \$65, the total payoff is zero, and the investor incurs a profit of -\$1 (net loss of \$1). If the stock price is between \$66 and \$74, a profit is made.

Q.776 An investor is interested in a spread trading where he can sell a European call option and buy a European call. If the investor wishes for the expiration date of the long call to be greater than the short call, then which of the following is the strategy he is interested in?

- A. Bull spread
- B. Bear spread
- C. Butterfly spread
- D. Calendar spread

The correct answer is **D**.

In a calendar spread trading strategy, the investor must sell a European call option and simultaneously buy a European call option with a longer expiration date or maturity date.

A calendar spread is a spread trading strategy in which an investor can invest in two positions in European call options with the same strike price and different expiration dates. Following are features of calendar spreads:

1. To create a calendar spread with put options, an investor must buy a long-maturity put option and sell a short-maturity put option
2. A bullish calendar spread involves a higher strike price than the current stock price, whereas a bearish calendar spread involves a lower strike price

Option A is incorrect: A bull spread involves buying a put/ a call with a lower strike price and selling a put/a call at a higher strike price.

Option B is incorrect A bear spread is a bearish options strategy designed to take advantage of a moderate decline in the price of the underlying in the near term. A bear spread involves buying a put/a call at a higher strike price and selling the put/ call at a lower strike price.

Option C is incorrect: A butterfly spread is a neutral, limited risk strategy that involves a combination of various bull spreads and bear spreads. The holder combines four options contracts having the same expiry date at three strike price points. Two option contracts are bought – one at a higher strike price and one at a lower strike price - and two option contracts are sold at a strike price in between.

Q.777 A calendar spread is a spread trading strategy in which an investor can invest in two positions in European call options with the same strike price and different expiration dates. Following are features of calendar spreads:

I. To create a calendar spread with put options, an investor must buy a long-maturity put option and sell a short-maturity put option

II. A bullish calendar spread involves a higher strike price than the current stock price, whereas a bearish calendar spread involves a lower strike price

Which of the following statements is/are correct?

- A. Statement I is correct only.
- B. Statement II is correct only.
- C. Both statements are correct.
- D. None of the statements is correct.

The correct answer is C.

Both statements are correct. A calendar spread can be created with call options as well as put options. In a put option, the investor must buy a long-maturity put option and sells a short-maturity put option.

On the other hand, with call options, an investor must sell a European call option on the stock and simultaneously buy a European call option with a longer expiration date or maturity.

Q.778 A hedge fund manager sent a quarterly newsletter to its clients via email, which contained information on the earnings and the strategies used by the manager throughout the quarter. One of the clients inquired about the straddle combination strategy used in trading and asked for details. The manager of the fund replied to the email with the following explanations of the straddle trading strategy:

I. In a straddle options trading strategy, the investor buys European call and put options with the same strike prices and expiration dates

II. The straddle trading strategy is used when a big movement in stock price is expected, but the direction of the movement is unknown

Which of the explanatory statements is/are wrong?

- A. Statement I is wrong.
- B. Statement II is wrong.
- C. Both statements are wrong.
- D. None of the statements are wrong.

The correct answer is **D**.

None of the statements are wrong.

Statement I is correct: In a straddle combination options trading strategy, an investor buys European call and put options with the same strike prices and expiration dates.

Statement II is also correct, the straddle trading strategy is used when a large move in price is expected, but the direction of the price is uncertain.

Q.779 Suppose an individual investor has implemented a straddle trading strategy. The investor purchased a 6-month European call option with a strike price of \$58 on the stock of a specific firm for \$5, and simultaneously purchased a 6-month European put option on the stock of the same firm for \$4 with a strike price of \$58. If the current price of the underlying stock is \$65, which of the following is closest to the profit of the straddle strategy?

- A. \$7
- B. \$0
- C. -\$2
- D. -\$9

The correct answer is **C**.

In a straddle strategy, the investor buys a European call option and put option with the same strike price and expiration. In the provided case, the investor purchased a 6-month European call option for \$5 with the strike price of \$58, and at the same time, purchased a 6-month put option for \$4 with a strike price of \$58.

The total cost of the straddle is the sum of the call premium and the put premium.

Cash outflow (cost) = \$5 + \$4 = \$9

Payoff on a put option = $(X - S, 0) = 0$

Payoff on a call option = $(S - X, 0) = (65 - 58) = \7

Profit of the straddle = \$7 - \$9 = -\$2

Q.780 Irene Schmidt has recently joined the Hessen Investments Company based in Frankfurt, which largely invests in equities and options. Since Schmidt is new to derivatives trading strategies, she has created a chart that explains options trading strategies. After analyzing the chart, determine the incorrectly represented strategy.

Option Strategy	Strike price of calls and puts	Expiration date of calls and puts
Bull spread strategy	Different	Same
Butterfly spread strategy	Different	Same
Calendar spread Strategy	Same	Different
Diagonal spread strategy	Same	Different

- A. The bull spread strategy is incorrect.
- B. The butterfly spread strategy is incorrect.
- C. The calendar spread strategy is incorrect.

D. The diagonal spread strategy is incorrect.

The correct answer is **D**.

In the diagonal spread strategy, the strike price of calls and puts is different. Moreover, the expiration date of calls and puts is also different. Option A is correct because, in the bull spread strategy, the strike price of calls is different, but the expiration date is identical. Option B is also correct because, in the butterfly spread strategy, the strike price of calls and puts is different, but they all expire on the same date. Option C is also correct because, in the calendar spread, the options strike price is the same, but the expiration is different.

Q.781 An investor has recently learned about spread trading strategies. To test one of the spread combinations, the investor purchased a 3-month European call option on stocks of Big Corp. with a strike price of \$101. At the same time, he also took a long position in two 3-month European put options on the stocks of Big Corp. with a strike price of \$101. Which of the following strategies is he most likely testing?

- A. Straddle strategy
- B. Butterfly strategy
- C. Strap strategy
- D. Strip strategy

The correct answer is **D**.

A strips options trading strategy is implemented by purchasing a European call option and purchasing two European put options with the same strike prices and expiration dates.

Option A is incorrect because, in a straddle strategy, the investor buys a European call option and put option with the same strike prices and expiration dates.

Option B is incorrect because, in the butterfly spread strategy, the investor takes three positions in the options market. Firstly, the investor purchases a European call option on a stock with the strike price X_1 , then sells two European call options with a slightly higher strike price (X_2), and lastly, buys another European call option with a further higher strike price (X_3).

Option C is incorrect because, in a strap trading strategy, the investor purchases two European call options and also purchases one European put option with the same strike prices and expiration dates.

Q.782 An investment manager has realized that there is a great potential for profits in the options market without tying up much capital. To test the potential of options trading, he implemented a spread strategy by purchasing two 6-month European call options on stocks of a specific firm with the strike price of X and, at the same time, buying a 6-month European put option on the stocks of the same firm with the same strike price.

Which strategy is he most likely using?

- A. Straddle strategy
- B. Strip strategy
- C. Strap strategy
- D. Strangle strategy

The correct answer is C.

In a straps trading strategy, the investor purchases two European call options and buys one European put option with the same strike prices and expiration dates.

Option A is incorrect because, in a straddle strategy, the investor buys a European call option and a put option with the same strike prices and expiration dates.

Option B is incorrect because a strip options trading strategy is implemented by purchasing a European call option and purchasing two European put options with the same strike prices and expiration dates.

Option D is incorrect because a strangle trading strategy is implemented by buying a European call and a European put option on the stock of a specific firm with the same expiration dates but different strike prices.

Q.783 An investment manager has realized that there is a great potential for profits in the options market without tying up much capital. To test the potential of options trading, he implemented one of the spread strategies by purchasing a 9-month European call option on the stocks of Petro Co. with a strike price of \$37, and at the same time, buying a 9-month European put option on the stocks of the same firm with a strike price of \$32.

Which of the following strategies is the investment manager most likely testing?

- A. Calendar spread strategy
- B. Straddle strategy
- C. Strip strategy
- D. Strangle strategy

The correct answer is **D**.

A strangle trading strategy is implemented by buying a European call and a European put option on the stock of a specific firm with the same expiration date but different strike prices.

Option A is incorrect because, in the calendar spread strategy, an investor buys and sells European call options or buys and sells European put options with the same strike price but different expiration dates.

Option B is incorrect because, in the straddle strategy, the investor buys a European call option and a put option with the same strike price and expiration.

Option C is also incorrect because the strip options trading strategy is implemented by purchasing a European call option and purchasing two European put options with the same strike price and expiration date.

Q.4623 A portfolio X consists of a five-year zero-coupon bond and a five-year call option on portfolio Y. The current price of portfolio Y is \$20,000, and the strike price of the option is also \$20,000. The interest rate is 7% per annum. To ensure no losses to a trader while still providing the trader with room for profits, the premium paid to secure the call option should cost less than:

- A. 20000
- B. 5740.28
- C. 15740.28
- D. 14259.72

The correct answer is **B**.

Principal Protected Notes act by reducing losses while still providing room for potential gains.

To hedge against losses, the trader should buy a zero-coupon bond that will yield, at maturity, the \$20,000 needed to exercise the option.

Therefore, the price of the bond should be equal to the present value of the strike price.

$$\begin{aligned}PV &= 20,000(1 + 0.07)^{-5} \\ &= 14,259.72\end{aligned}$$

To make the portfolio profitable, the premium paid to secure the call option should cost less than:

$$\$20,000 - \$14,259.72 = \$5,740.28$$

Q.4624 With respect to interest rates, when are Principal Protected Notes (PPNs) most profitable?

- A. When interest rates increase
- B. When interest rates decrease
- C. When interest rates remains constant
- D. When interest rates are volatile

The correct answer is **A**.

When using Principal Protected Notes, profits are higher when the price of the option is less than $K - PV(K)$, where K is the strike price needed to purchase the underlying asset in the portfolio.

Consider the following table for illustration:

Interest rates	Time (years)	K	PV(K)	$K - PV(K)$
0%	3	100	100	0
5%	3	100	86.38	13.62
10%	3	100	75.13	24.87

From the table above, we can see that the difference between K and the $PV(K)$ increases as the interest rate increases.

Q.4625 The strike price of a three-month call and a three-month put option with the same time to maturity is \$50. The cost of the call option is \$4, whereas the cost of the put option is \$6. Using a short straddle strategy of trading, by how much should the asset price move in order to incur a loss?

- A. 4
- B. 6
- C. 2
- D. 10

The correct answer is **D**.

The question is testing the use of the short straddle trading strategy, a trading strategy that involves selling a call and a put option with the same strike price and time to maturity.

Strike price = \$50

Benefit of setting up the short straddle = \$4 + \$6 = \$10

Upper price bound of the asset price at maturity = \$50 + \$10 = \$60

Lower price bound of the asset price at maturity = \$50 - \$10 = \$40

Therefore, for a loss to be incurred, the asset price at maturity should be either above \$60 or below \$40.

Q.4626 Consider two call options with strike prices of \$30 and \$35 and two put options with strike prices \$30 and \$35. How can a trader create a bear spread trading strategy using two options?

- A. Buy the put option with a strike price of \$30 and sell the put option with a strike price of \$35.
- B. Buy the put option with a strike price of \$35 and sell the put option with a strike price of \$30.
- C. Buy the put option with a strike price of \$30 and sell the call option with a strike price of \$35.
- D. Buy the put option with a strike price of \$35 and sell the call option with a strike price of \$30.

The correct answer is **B**.

The question is testing the use of the bear spread strategy of trading. In a bear spread trading strategy, the trader buys the higher strike price put option and sells at the lower strike price put option.

Option A is incorrect. Buying the lower price put option and selling the higher price put option would create a bull put spread, as shown below:

Options C and D are incorrect. Bear (and also bull) spreads are created using the same type of options, i.e., only puts or only calls.

Q.4627 Consider two call options with strike prices of \$30 and \$35 and two put options with strike prices of \$30 and \$35. How can a trader create a bull spread trading strategy using two options?

- A. Buy the call option with a strike price of \$30 and sell the call option with a strike price of \$35.
- B. Buy the call option with a strike price of \$35 and sell the call option with a strike price of \$30.
- C. Buy the put option with a strike price of \$30 and sell the call option with a strike price of \$30.
- D. Buy the put option with a strike price of \$35 and sell the call option with a strike price of \$35.

The correct answer is **A**.

The question is testing the use of the bull spread strategy of trading. A bull-spread trading strategy is where the trader buys a call option with a lower strike price and sells a call option with a higher strike price.

Option B is incorrect. Buying the higher price call option and selling the lower price put option would create a bear call spread, as shown below:

Options C and D are incorrect. Bear (and also bull) spreads are created using the same type of options, i.e., only puts or only calls.

Q.4873 An investor creates a bull put spread by purchasing a put option for a premium of \$25. The put option comes with a strike price of \$95 and expires in July 2022. At the same time, the investor sells a put option for a premium of \$50. The put option comes with a strike price of \$140 and expires in July 2022. The underlying asset is the same and is currently trading at \$145. Determine the maximum loss.

- A. 40
- B. 20
- C. 25
- D. 15

The correct answer is **B**.

$$\begin{aligned}\text{Max loss} &= \text{strike price of short put} - \text{strike price of long put} - \text{net premium received} \\ &= 140 - 95 - (50 - 25) = 20\end{aligned}$$

Note: A bull put spread is a strategy utilized by an investor when they believe the underlying stock will exhibit a moderate increase in price. It involves purchasing an out-of-the-money (OTM) put option and selling an in-the-money (ITM) put option with a higher strike price but with the same underlying asset and expiration date. A bull put spread works when the market is exhibiting an upward trend. The maximum gain is the net premium received.

Q.4912 Peter creates a bear spread using put options with strike prices of USD 35 and USD 40 with the same time to maturity. The options cost USD 3 and USD 5, respectively under what circumstances will Peter make a profit?

- A. If the asset price is less than 40.
- B. If the asset price is less than 38.
- C. If the asset price lies between 38 and 40.
- D. If the asset price is greater than 38.

The correct answer is **B**.

The cost of setting up the bear spread is $5 - 3 = \text{USD } 2$

Now, when the asset price is less than 35 which is less than 40, the payoff is $40 - 35 = 5$.

The cost of setting the bear spread is 2 so that when the asset price is less than 35, we have a profit of $5 - 2 = 3$

When the asset price lies between 35 and 40, we will have a payoff of $40 - S$. This payoff must be greater than 2 (cost of setting up the bear spread) in order to make a profit.

When the asset price is less than 38, we have a profit of $40 - S - 2$.

Thus, Peter will make a profit when the asset price is less than 35 or when the asset price is less than 38. That is, he makes a profit when the asset price is less than 38.

Note that, when calculating the cost of setting up the bear spread, we take the net cost, which is the difference between the cost of the two options.

Q.4913 Hassan intends to create a bull spread on put options on an asset with strike prices of USD 20 and USD 25 and the same time to maturity. The options cost USD 2 and USD 2.5, respectively. How can Hassan create the intended bull spread?

- A. Buying the option with a lower strike price and simultaneously selling the put option with a higher strike price.
- B. Buying the option with a higher strike price and simultaneously selling the put option with a lower strike price.
- C. Buying the option with a lower strike price, and at the same time, buying the put option with a higher strike price.
- D. None of the above.

The correct answer is **A**.

A bull spread is created by buying the option with a lower strike price and simultaneously selling the put option with a higher strike price.

In this case, a bull spread is created by buying the option with a strike price of 20 and selling the put option with a strike price of 25.

Option B refers to a bear spread strategy.

Q.4914 Suppose a strangle is created from a call option with a strike price of USD 35, which costs USD 1, and a put option with a strike price of USD 20, which costs USD 2. The two options have the same time to maturity. What is the profit as a function of the asset price, S_T at option maturity, when $S_T \leq 20$?

- A. 0
- B. $17 - S_T$
- C. -3
- D. $S_T - 38$

The correct answer is **B**.

When $S_T \leq K_1$, then the payoff from a long call with a strike price $K_2 = 35$, will be,

$$\max(0, S_T - 35) = 0$$

and the payoff from a long put option with a strike price $K_1 = 20$, will be, $\max(0, 20 - S_T) = 20 - S_T$

But the total cost of setting up the strategy is USD 3; thus, the profit is given by,

$$20 - S_T - 3 = 17 - S_T$$

Q.4915 A straddle is created from a call and a put with the same strike price of USD 45. If the options have the same time of expiration and that the cost of setting up the straddle is 5, what conditions will lead to a profit on the straddle?

- A. If $S_T > 50$ or if $S_T < 40$
- B. If $S_T < 40$
- C. $S_T < 10$
- D. $10 < S_T < 50$

The correct answer is **A**.

A straddle is created by buying the call and buying the put.

In a straddle strategy, a profit can be made if $S_T > K + C$ or $S_T < K - C$ where S_T is the asset price at time T, K is the strike price, and C is the cost of setting up the straddle.

In our case, a profit is made if, $S_T > 50$ or if $S_T < 40$

Note that a straddle involves two transactions on the same security, with positions that offset one another.

A long straddle is created by purchasing a call and a put with the same strike price and expiration. A short straddle is created by selling a call and a put with the same strike price and expiration.

Reading 39: Exotic Options

Q.784 Susanne Alexander is a junior investment analyst at JCB Investment Bank in Tokyo. She is no prior experience in trading equities and derivatives. She has been assigned to the trading unit of the bank where she is taking her initial training from the senior management of the trading unit. In one of the training sessions, she was asked to identify the option that most likely trades in the over-the-counter options market. Identify for Alexander the correct option.

- A. Plain vanilla options
- B. Covered calls
- C. European options
- D. Exotic options

The correct answer is **D**.

Exotic options trade in over-the-counter (OTC) markets while plain vanilla options like calls and puts trade in exchanges. Exotic options are more customized and are designed to meet the requirements of investor, which is why they trade on OTC markets. Vanilla options like American and European-style calls and puts are more standardized options, which is why these options trade in exchanges.

Q.785 In the valuation of exotic options, the yield on the underlying asset must be taken into considerations. The yield on the underlying assets is present in different forms and variables for different options. For instance:

I. In the valuation of exotic options on stock indices, the yield is set equal to the dividend yield on the index

II. In the valuation of exotic options on currencies, the yield is set equal to the domestic risk-free rate

III. In the valuation of exotic options on futures, if the domestic currency is the base currency, then the yield would be the domestic risk-free rate

Which of these yield measures is incorrect?

- A. The yield measure on exotic options on stock indices is incorrect.
- B. The yield measure on exotic options on currencies is incorrect.
- C. The yield measure on exotic options on futures is incorrect.
- D. None of the exotic options have incorrect yield measures.

The correct answer is **B**.

In the valuation of exotic options on currencies, the yield is set equal to the foreign, not domestic, risk-free interest rate.

Option A is incorrect because it correctly presents that the yield is set equal to the dividend yield in the valuation of exotic options on the stock indices.

Option C is also incorrect because it correctly depicts that if the domestic currency is the base currency, then the yield would be domestic risk-free rate but if the foreign currency is the base currency, then the yield would be foreign risk-free.

Q.786 Ryan Holland is an options trader that uses standard European calls, standard European puts, forward contracts, cash, and the underlying asset to create exotic options known as packages. He believes that range forward contracts have the following features. Determine which of these features are correct.

- I. A range forward contract is created with a long call and a short put or a short call and a long put
- II. In the case of the long call and the short put, the call strike price is greater than the put strike price
- III. The combination of costs from the two positions typically nets to zero

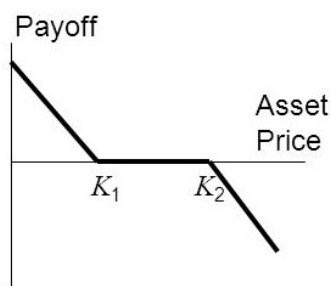
- A. Features I and II are correct.
- B. Features II and III are correct.
- C. Features I and III are correct.
- D. Features I, II, and III are correct.

The correct answer is **D**.

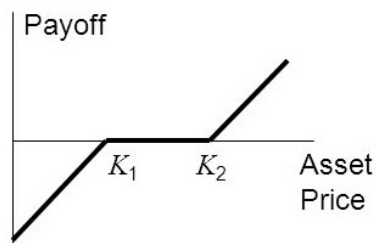
Feature I is correct. A range forward contract is created with a combination of a long call and a short put or a short call and a long put.

Feature II is correct. In a long-range contract, the call strike price is greater than the put strike price.

Feature III is correct. The strike prices are set in a way that the value of the call is usually equal to the value of the put.



Short
Position



Long
Position

Q.787 Ganesh Singh is a junior options trader at an Indian brokerage house. He was recently promoted from the equity division to the derivatives unit of the firm. One of her clients asked Singh to take a long position on his behalf in a Bermudan option. Since Singh is unfamiliar with Bermudan options, describe the unique feature of these types of options.

- A. A Bermudan option is a non-standard European option, which can be exercised any time until its expiration.
- B. A Bermudan option is a non-standard American option, which can be exercised any time until its expiration.
- C. A Bermudan option is a non-standard European option, which can only be exercised at certain dates until its expiration.
- D. A Bermudan option is a non-standard American option, which can only be exercised at certain dates until its expiration.

The correct answer is **D**.

A Bermudan option is a non-standard American option whose exercise is restricted to certain dates until its expiration date.

It Should be noted that premiums for Bermudan options are lower than those of American options; however, Bermudan options are more expensive than European options.

Q.788 Some of the exotic options that are created by brokers and traders are created with non-standard American style options that can be exercised at any time until expiration. These options trade in over-the-counter markets. Which of the following features are unlikely present in non-standard American options?

- A. These options can have the features of both American and European options, which allows them to be exercised only at certain dates until their expiration.
- B. These options may be allowed to exercise early.
- C. The strike price of non-standard American options may change during the life of the option.
- D. These options have a lockout feature, which means these options can not be used in combination with other options.

The correct answer is **D**.

The lockout feature refers to the fact that some American options can only be exercised at a date after the specific lockout period.

Option A is correct because non-standard American options have the Bermudan feature, which allows them to be exercised only at certain dates until expiration.

Option B is correct because these options may be allowed to be exercised early.

Option C is also correct as the strike price of non-standard American options may change during the life of the option.

Q.789 A gap option is a non-standard option that is created with a European call option. However, the European call option used in the construction of a gap option is different from the regular European call option. Which of the following is the accurate difference between a gap European call option and a regular call option?

- A. A gap option has two strike prices i.e. X_1 and X_2 (where $X_2 > X_1$). When the final stock price is greater than X_2 ($S > X_2$), the payoff of the gap call option is $S - X_1$.
- B. A gap option has two strike prices i.e. X_1 and X_2 (where $X_2 > X_1$). When the final stock price is greater than X_2 ($S > X_2$), the payoff of the gap call option is $S - X_2$.
- C. A gap option has two strike prices i.e. X_1 and X_2 (where $X_2 > X_1$). When the final stock price is greater than X_1 ($S > X_1$), the payoff of the gap call option is $S - X_1$.
- D. A gap option has two strike prices i.e. X_1 and X_2 (where $X_2 > X_1$). When the final stock price is greater than X_1 ($S > X_1$), the payoff of the gap call option is $S - X_2$.

The correct answer is **A**.

A regular European option will have a single strike price, X . If the price of the stock is greater than X , the payoff of the option will be $S - X$. With a gap option, however, there are two strike prices: a strike price X_1 and a trigger strike X_2 , (where $X_2 > X_1$). When the current stock price is above X_2 , the payoff of the gap call option is $S - X_1$.

For example, consider a gap call option where the underlying's price is 50, the stated strike price is 50, and the payoff/trigger strike is 55. This means that the option can be exercised when the underlying's price reaches or crosses 50. However, it pays nothing unless the underlying reaches or crosses 55. If the price of the underlying rises to 57, for example, the payoff of the option will be 7 ($= 57 - 50$)

Q.790 Hannah Bruce is a derivatives investment adviser at Dot Investments in New York. She provides advisory services to retail as well as institutional investors. One of her clients, a small size community insurance company, intended to invest in equities option that starts at some future date and expires at an expiration date further in the future. Which of the following options should Bruce recommend?

- A. A European gap option
- B. An employee option
- C. A futures option
- D. A forward start option

The correct answer is **D**.

A forward start option is a non-standard option that allows the option to start at a future date T_1 and expire at another future date T_2 . A forward start option is synonymous with employee stock options, in which the employer commits to grant an at-the-money option at a future date.

Option A is incorrect: A gap option is a European call or put option with a trigger price and a strike price, in which the trigger determines whether there will be a payoff, and the strike price is used to calculate the payoff.

Option B is incorrect: Employee stock options are options that a company issues on its own stock and are reserved for its own employees.

Option C is incorrect, the futures option works like a typical standard European option, but the only difference is that the underlying security in a futures option is a futures contract.

Q.791 Gabriela Clarke is a senior derivatives investment manager at one of the largest investment banks in London. She specializes in constructing complex exotic options for her clients. Currently, she is investing in a series of call options with a strategy in which she purchases an option with the strike price of K and expiry date of T_1 . She then invests in another option that starts at T_1 and expires at T_2 . This option will have a strike price equal to the price of the underlying at T_1 . She invests in many such options with the same strategy, where one option starts as the last option expires. The series of such options is called a:

- A. Cliquet option
- B. Gap option
- C. Forward start option
- D. Futures option

The correct answer is **A**.

A cliquet option is an exotic option consisting of a series of consecutive forward start options. The first option is active immediately. The second then becomes active when the first expires, etc. Each option is struck at the money when it becomes active.

Option B is incorrect: A gap option is a European call or put option with a trigger price and a strike price, in which the trigger determines whether there will be a payoff, and the strike price is used to calculate the payoff.

Option C is incorrect: A forward start option is a non-standard option that allows the option to start at a future date T_1 and expire at another future date T_2 .

Option D is incorrect, the futures option works like a typical standard European option, but the only difference is that the underlying security in a futures option is a futures contract.

Q.792 Jiao Bu is a Chinese retail investor who has recently moved to the United States. Bu mistakenly invested in an exotic option that has two strike prices and two exercise dates. On the first exercise date T1, Jiao is entitled to pay the first strike price of X1 and receive a call option, which will give her the right to purchase the underlying asset for the second strike price of X2 on the second exercise date T2. In which of the following exotic options has she mistakenly invested?

- A. Compound option
- B. Cliquet option
- C. Forward start option
- D. Barrier option

The correct answer is **A**.

A compound option is an option on an option that has two strike prices and two expiration dates. On the first exercise date T1, if the current price of the underlying asset is above X1, Bu is entitled to pay the first strike price of X1 and receive a call option, which will give her the right to purchase the underlying asset for the second strike price of X2 on the second exercise date T2. This is called a call on-call compound option. Compound options can also be call on put, put on call, and put on put options.

Option B is incorrect: A cliquet option is an exotic option consisting of a series of consecutive forward start options. The first option is active immediately. The second then becomes active when the first expires, etc. Each option is struck at the money when it becomes active.

Option C is incorrect: A forward start option is a non-standard option that allows the option to start at a future date T1 and expire at another future date T2.

Option D is incorrect: A barrier option is an option whose existence depends upon the underlying asset's price reaching a predetermined barrier level

Q.793 Compound options are exotic options in which the holder of the option has an option on the option. The following are the features of compound options. Which of these features are inconsistent with compound options?

- I. Compound options are of four types, i.e., call on call, call on put, put on put, and put on call
- II. Compound options have the same strike price, but two expiration dates
- III. The holder of a call on a call only purchases a plain vanilla option if, on the first expiration date T1, the price of the stock is greater than the first strike

- A. Feature I is inconsistent with the definition of compound options.
- B. Feature II is inconsistent with the definition of compound options.
- C. Feature III is inconsistent with the definition of compound options.
- D. None of the features are inconsistent with the definition of compound options.

The correct answer is **B**.

Feature II is inconsistent with the definition of compound options. A compound option has two expiry dates and two strike prices. In a call on call compound option, if the current price of the underlying asset is above X1 on the first exercise date T1, then the investor is entitled to pay the first strike price of X1 and receive a call option, which will give him the right to purchase the underlying asset for the second strike price of X2 on the second exercise date T2. Features I and III are consistent with the definition of compound options.

Q.794 Adam McGill is a hedge fund manager who is interested in purchasing an exotic option on the stock of Turkish Airlines stocks. Turkey is currently holding a referendum and the referendum results will either have a significantly positive or negative impact on the tourism industry as well as the Turkish Airlines stocks. Since Adam is not sure about the direction of the prices of the stocks, he intends to purchase an option that gives him the right to decide if the option is a call or a put at a specific date. Determine which of the following options is suitable for him.

- A. Call on call compound option
- B. Chooser option
- C. Ratchet option
- D. Forward start option

The correct answer is **B**.

A chooser option or, as you like it option, is an exotic option in which the holder of the option the right to decide whether the option is a call or a put after a specified period of time. The value of the option is equal to the value of a call and a put option at the time when the holder makes the decision.

Option A is incorrect: A call on a call (CoC) gives the investor the right to buy a call option at a set price for a set period of time.

Option C is incorrect: A ratchet option, also known as a cliquet option, is an exotic option consisting of a series of consecutive forward start options. The first option is active immediately. The second then becomes active when the first expires, etc. Each option is struck at the money when it becomes active.

Option D is incorrect: A forward start option is a non-standard option that allows the option to start at a future date T_1 and expire at another future date T_2 .

Q.795 A recent M. Sc. Finance graduate made the following two statements:

- I. The down-and-out call option is a knock-out type of barrier option in which a regular call option comes in existence when the price of underlying asset reaches a specific lower barrier which is below the initial asset price.
- II. The down-and-in call option is a knock-in type of barrier option, which ceases to exist as soon as the price of the underlying asset reaches a specific lower barrier.

Which of the following is correct?

- A. The definition of the down-and-out call knock-out option is incorrect.
- B. The definition of the down-and-in call knock-in option is incorrect.
- C. The definition of the down-and-out call and down-and-in call options are both incorrect.
- D. Neither the down-and-out call nor the down-and-in call options definitions are incorrect.

The correct answer is **C**.

Both definitions are incorrect. The down-and-out call option is a knock-out type of barrier option in which a regular call option ceases to exist when the price of the underlying asset reaches a specific lower barrier which is below the initial asset price. The down-and-in call option is a knock-in type of barrier option, in which the call option comes into existence as soon as the price of the underlying asset reaches a specific lower barrier.

Q.796 A type of barrier option in which a regular put option on the underlying asset comes into existence when the price of the underlying asset reaches a specific barrier, which is set equal to or above its initial level is called a:

- A. Down-and-in put option.
- B. Down-and-out put option.
- C. Up-and-in put option.
- D. Up-and-out put option.

The correct answer is **C**.

An up-and-in put is a type of barrier option where a regular put option on the underlying asset comes into existence when the price of the underlying asset reaches a specific barrier, which is set equal to or above its initial level.

Q.798 Hakim Ahmed is a junior derivatives trader who has recently started trading exotic options. A week ago, he purchased an exotic option that pays off nothing if the price of the underlying asset reaches above the strike price at a predetermined date and pays a fixed amount if the underlying asset price reaches below the strike price. Which of the following options has he purchased?

- A. Asset-or-nothing call binary option.
- B. Asset-or-nothing put binary option.
- C. Cash-or-nothing call binary option.
- D. Cash-or-nothing put binary option.

The correct answer is **D**.

A cash-or-nothing put is a type of binary option which pays a fixed amount if the price of the asset is below the strike price at the expiration date and pays nothing if the price of the underlying is above the strike price at expiry.

Option A is incorrect: Cash-or-nothing call pays a fixed amount if the asset price is above the strike price at maturity and pays nothing if the asset price is below the strike price at expiry.

Option B is incorrect: An asset-or-nothing put binary option pays an amount equal to the asset price if the price of the underlying asset is below the strike price at the expiration date and pays nothing if the price of underlying is above the strike price at expiry.

Option C is incorrect: An asset-or-nothing call pays an amount equal to the asset price if it is above the strike price at maturity and pays nothing if the asset price is below the strike price at expiry.

Q.799 In which of the following exotic options is the payoff the final current price of the asset minus the minimum or lowest asset price that the underlying asset has achieved during the life of the option?

- A. Floating lookback call option.
- B. Floating lookback put option.
- C. Fixed lookback call option.
- D. Fixed lookback put option.

The correct answer is **A**.

The payoff of a lookback option depends on the maximum (high price), or the minimum (low price) price the underlying asset has reached during the period of the option.

In a floating lookback call option, the payoff for holding the option is the final current price of an asset minus the minimum or lowest asset price that the underlying asset has achieved during the life of the option.

Option B is incorrect: A floating lookback put gives a payoff equal to the maximum asset price minus the final asset price.

Option C is incorrect: A fixed lookback call gives a payoff equal to $\max(S_{\max} - K, 0)$, where S_{\max} is the maximum asset price in a given time frame and K is the strike price.

Option D is incorrect: A fixed lookback put gives a payoff equal to $\max(K - S_{\min}, 0)$, where S_{\min} is the minimum asset price in a given time frame and K is the strike price.

Q.801 Katja Firos is an investment analyst at Frankfurt Securities, a brokerage and investment company. She was instructed by the head of the investments unit to hedge the portfolio of exotic options through static options replication. Which of the following steps should she take to implement the static replication method?

- A. The static replication method involves searching for a portfolio of the same exotic options which other market participants are using for hedging.
- B. The static replication method involves searching for a portfolio of actively traded options with opposite attributes that inversely replicates the exotic options and then taking a short position in this portfolio in order to hedge the exotic options.
- C. The static replication method involves searching for a portfolio of actively traded options with similar attributes that approximately replicates the exotic option and then taking a short position in this portfolio in order to hedge the exotic options.
- D. The static replication method involves searching for a portfolio of similar exotic options with similar attributes and then taking a long position in this portfolio in order to hedge the exotic options.

The correct answer is C.

The static replication method involves searching for a portfolio of actively traded options with similar attributes that approximately replicate the exotic option and then take a short position in this portfolio in order to hedge the exotic options.

Option D is incorrect because taking a long position in a replicated portfolio of actively traded options will not hedge the portfolio but increase the exposure in risky options.

Q.802 Exotic options are customized and designed to meet the requirements of investors, which is why these options trade on OTC markets. These options have features that allow them to change the expiration date and strike prices. Forward start options are also non-standard options that allow the investor to purchase an option that will start at a future date. Which of the following options is most similar to a forward start option?

- A. Warrants
- B. Butterfly spread options
- C. Gap options
- D. Employee options

The correct answer is **D**.

Forward start options are considered synonymous to employee stock options. In forward start options, investors benefit from a feature which allows the option to start at a future date T1 and expire at another future date T2. This is similar to employee options, in which the employer commits to grant an at-the-money option at a future date.

Option A is incorrect: Warrants are options (usually call options) issued by a corporation on its own stock. However, they can also be options to buy or sell another asset, and they are often traded on an exchange once issued.

Option B is incorrect: A butterfly spread option involves various bull spreads and bear spreads. The holder combines four option contracts having the same expiry date at three strike price points, X_1 , X_3 , $X_2 = \frac{X_1 + X_3}{2}$. Two option contracts are bought - one at a higher strike price and one at a lower strike price - and two option contracts are sold at a strike price in between. A butterfly trader has reason to believe the underlying asset will not move too far away from the current price.

Option C is incorrect: A gap option is a European call or put option with a trigger price and a strike price, in which the trigger determines whether there will be a payoff, and the strike price is used to calculate the payoff.

Q.803 Which of the following mentioned options is NOT referred to as a series of call or put options with a strategy in which numerous options are purchased?

- A. Cliquet option
- B. Ratchet option
- C. Barrier options
- D. Strike reset option

The correct answer is **C**.

Barrier options are options where the payoff of the options depends on the condition that the price of the underlying asset has reached a certain level during a certain period of time. Cliquet options are also known as a ratchet or strike reset options. These are exotic options consisting of a series of consecutive forward start options.

Reading 40: Properties of Interest Rates

Q.645 Donald Gregg is a senior professor of economics at the University of Vikings. He has authored various books on the subject of macroeconomics, financial instruments, and derivatives. He is famous for conducting a bi-yearly informative seminar where he delivers his analysis on finance-related topics. In his last seminar, he said that the government also borrows funds from public institutions in exchange for their guarantee to return the funds with interest. These transactions are considered risk-free as governments are not likely to default. Which of the following rates do governments use to borrow funds denominated in their own currency?

- A. LIBOR.
- B. Fed funds rate.
- C. Repo rate.
- D. Treasury rate.

The correct answer is **D**.

The Treasury rate is the rate the government uses to borrow funds from investors (individual and institutional) in exchange for treasury bills and treasury bonds. Treasury bills and treasury bonds are risk-free financial instruments that governments sell to investors in order to borrow funds/loans.

Option A is incorrect because the LIBOR (or London Interbank Offer Rate) is an unsecured short-term borrowing rate used between banks.

Option B is incorrect because the Fed funds rate is an overnight rate used by banks to borrow or lend their surplus funds in order to meet the Fed's reserve requirements.

Option C is also incorrect because the Repo Rate is the borrowing rate that is used by financial institutions to sell the securities that they own for a certain price to buy them back at a later date at a higher price.

Q.646 Franky Johnson is a junior trader at the Beijing office of a large German investment bank. He is an Ivy League graduate and brings with him very little experience in derivatives trading. Today, he is instructed by his investment team to purchase the floating vs. floating interest rate swaps in the derivatives markets. Which of the following rates is he most likely to use to value a floating interest rate swap?

- A. LIBOR.
- B. Fed funds rate.
- C. Repo rate.
- D. Treasury rate.

The correct answer is **A**.

The LIBOR (or London Interbank Offer Rate) is an unsecured short-term borrowing rate used between banks. It is widely used as a reference rate for the valuation and transaction of interest rate swaps. The British Banking Association (BBA-UK) publishes the estimates of LIBOR rates on a daily basis for the maturities ranging from one day to one year. The LIBOR is used as a reference rate for millions of transactions.

Option B is incorrect because the Fed funds rate is an overnight rate used by banks to borrow or lend their surplus funds in order to meet the Fed's reserve requirement.

Option C is also incorrect because the Repo Rate is the borrowing rate that is used by the financial institutions to sell the securities that they own for a certain price to buy them back at a later date at a higher price.

Option D is incorrect because the Treasury rate is the rate governments use to borrow funds from investors (individual and institutional) in exchange for treasury bills and treasury bonds.

Q.647 Since the LIBOR rate is composed of estimates, not actual rates, it has been seen in recent years that the banks were involved and sanctioned for manipulating the LIBOR rate. An excerpt from a newspaper reads:

“As the LIBOR rates are published on the basis of the estimates provided by banks, the traders at some of the larger banks conspired to provide inaccurate rates in order to manipulate the average of rates used for the LIBOR.”

One of the analysts at a local business news channel suggested the following two factors for the manipulation of the LIBOR:

I. One motive for banks to manipulate the LIBOR was to make exceptional profits on instruments like interest rate swaps, whose cash flows depend on the LIBOR.

II. Another factor that motivated banks to manipulate the LIBOR downward is that if the LIBOR is lower, then the reserve requirement for the banks is also lower and the banks have more funds to invest.

Which of the factors for the banks to manipulate the LIBOR is/are correct?

- A. Only factor I is a correct factor that motivated banks to manipulate the LIBOR.
- B. Only factor II is a correct factor that motivated banks to manipulate the LIBOR.
- C. Both factors motivated banks to manipulate the LIBOR.
- D. None of the factors motivated banks to manipulate the LIBOR.

The correct answer is **A**.

Factor I correctly defines one of the factors that motivated bankers to manipulate LIBOR quotes as the banks manipulated the LIBOR to make higher gains on interest rate swaps, whose cash flows depend on the LIBOR. Another reason that motivated banks to manipulate LIBOR is that the banks wanted to give the impression that their bank's borrowing rates were cheaper than others and they were much healthier in terms of risk and return.

Q.648 Xiaojun Lee is the treasury manager at the Atlanta Small Business Bank. She works in a team that supervises all the branches of the banks in Atlanta. Her core responsibility is to look after treasury transactions and to make sure the bank, at all time, meets its reserve requirements with the Federal Reserve. Today, Lee has analyzed that the bank will fall short \$200 million from its reserve requirements. In order to avoid penalties, the bank must borrow some funds from another bank. Which of the following rate must Lee use as the reference rate for borrowing \$200 million overnight?

- A. Treasury rate.
- B. Fed funds rate.
- C. Repo rate.
- D. None of the above.

The correct answer is **B**.

The Fed funds rate is an overnight rate used by banks to borrow or lend their surplus funds in order to meet the Fed's reserve requirements.

Option A is incorrect because the Treasury rate is the rate governments use to borrow funds from investors (individual and institutional) in exchange for treasury bills and treasury bonds.

Option C is also incorrect because the Repo Rate is the borrowing rate that is used by financial institutions to sell the securities that they own for a certain price and buy them back at a later date at a higher price.

Q.649 Mohan Das is the treasury manager of a bank based in Frankfurt. He is responsible for looking at the bank's treasury operations and the compliance unit of the bank closely supervises his department. Today, Das is informed by the front office that the bank has to disburse a large fund to an institutional client which they believe will affect the bank's reserves with the central bank. The management suggested borrowing the funds from another bank to meet the central bank's reserve requirements, but he argues that the bank, instead, should sell its securities to another bank with the promise to purchase the securities back at a higher price. Which of the following interest rates is the manager most likely to use for the given transaction?

- A. LIBOR.
- B. Fed funds rate.
- C. Repo rate.
- D. Treasury rate.

The correct answer is **C**.

The Repo Rate or Repurchase Agreement rate is a borrowing rate that is used by financial institutions to sell the securities that they own for a certain price and buy them back at a later date for a higher price.

Option A is incorrect because the LIBOR (or London Interbank Offer Rate) is an unsecured short-term borrowing rate used between banks.

Option B is incorrect because the Fed funds rate is an overnight rate used by banks to borrow or lend their surplus funds in order to meet the Fed's reserve requirements.

Option D is incorrect because the Treasury rate is the rate governments use to borrow funds from investors (individual and institutional) in exchange for treasury bills and treasury bonds.

Q.650 Gamze Goc is an independent wealth advisor that focuses on providing investment and savings advice to professionals. She advised one of her clients to invest \$10,000 for 5 years into a government's national saving plan which pays a monthly interest of 8% per year. This rate is fixed regardless of the tenure of the investment. Since the client does not have an alternative option to invest his savings, he asked what interest rates he would earn if the rate was compounded continuously. Identify the most appropriate answer to the client's inquiry.

- A. The continuously compounded interest rate is 9.23%.
- B. The continuously compounded interest rate is 8.33%.
- C. The continuously compounded interest rate is 8.05%.
- D. The continuously compounded interest rate is 7.97%.

The correct answer is **D**.

The formula used to convert a rate that is compounded at a certain frequency into a continuously compounded rate is:

$$R_c = m * \ln \left(1 + \frac{R_m}{m} \right)$$

Where

m is the compounding frequency,

R_m is the compounded rate at m frequency

And R_c is the continuously compounded rate

$$R_c = 12 \times \ln \left(1 + \frac{0.08}{12} \right) = 0.07973$$

Q.651 Ahmed Hatti is an undergrad business and finance student at the University of Millennials. Along with his friend, he manages a small hypothetical fund from his dorm room. The fund consists of small investments from his colleagues and family. As a fund manager, he is also responsible for generating a quarterly income newsletter, which he has to email to all fund contributors.

Recently, Hatti decided to invest a small portion of his fund into an interest-bearing account that quotes an interest rate of 16% compounded continuously. In order to add the interest rate into the quarterly newsletter, he must convert the continuously compounded rate into a quarterly compounded rate. Which of the following is the most appropriate conversion of the rate?

- A. The quarterly compounded rate is 15.6%.
- B. The quarterly compounded rate is 16%.
- C. The quarterly compounded rate is 16.3%.
- D. The quarterly compounded rate is 17.1%.

The correct answer is **C**.

The formula used to convert a continuously compounded rate into a rate that is compounded at a certain frequency is:

$$R_m = m \left\{ e^{\frac{R_c}{m}} - 1 \right\}$$

Where

m is the compounding frequency,

R_m is the annual rate, compounded m times a year

And R_c is the continuously compounded rate

$$R_m = 4 \left(e^{\frac{0.16}{4}} - 1 \right) = 16.32\%$$

Q.652 A news anchor at a business TV channel made the following statements regarding bonds and their rates.

Statement I: Zero rates are the appropriate discount rates that are used for discounting a single cash flow at a particular future time or maturity. Zero rates correspond to zero-coupon bond yields.

Statement II: A bond's yield, also known as spot rate, is the unique discount rate that, if applied to all cash flows, makes the bond price equal to its market price.

Statement III: The par yield is the coupon rate that, if applied, makes the price of a bond equal to its par value.

Which of the statements are correct?

- A. Statements I and II are correct
- B. Statements II and III are correct
- C. Statements I and III are correct
- D. Statements I, II, and III are correct

The correct answer is C.

Statements I and III are correct.

Statement I is correct because a zero rate is the discount rate that is used for discounting a single cash flow at a particular future time or maturity and zero rates correspond to zero-coupon bond yields.

Statement III is correct because a par yield is the coupon rate of a bond with a certain maturity that, if applied, makes the bond price equal its par value.

Statement II is incorrect. The yield is not also known as the spot rate. The spot rate is the price for a transaction that is happening immediately.

Q.653 An investor has invested \$1,000 in a 7-year zero-coupon bond with continuous compounding. If the bond is quoted as 9% per year compounded continuously, then estimate the value of the investment at the end of 7 years.

- A. The future value of a zero-coupon is \$1,656.0.
- B. The future value of a zero-coupon is \$1,828.0.
- C. The future value of a zero-coupon is \$1,877.6.
- D. The future value of a zero-coupon is \$1,912.0.

The correct answer is **C**.

Since the zero-coupon bond is compounded continuously, the future value of this 7-years 9% per annum bond is:

$$\begin{aligned} \text{FV} &= \text{Face value} * e^{\text{rate} * \text{period}} \\ &= 1000 * e^{0.09 * 7} \\ &= 1,877.6 \end{aligned}$$

Q.654 John Johnson works in the fixed-income investments department of Fast Asset Management, headquartered in London. Today, the head of the department asked Johnson to calculate the 6-month spot rates using the quotes of zero-coupon GILTs (UK Treasury bonds) provided in the table below.

Bond Principal (in GBP)	Time to Maturity (in year)	Bond Price
100	0.25	99.15
100	0.5	97.80
100	1	94.25

What is the semi-annual spot rate?

- A. 0.0341
- B. 0.0445
- C. 0.0488
- D. 0.0592

The correct answer is **B**.

Following is the bootstrapping method used to derive spot rates or zero rates from Treasury bills and coupon-bearing Treasury bonds:

$$100 = 97.8e^{R*0.5} \\ \Rightarrow R = 0.0445 \text{ or } 4.45\%$$

Detailed Steps

Here's how we work this out:

$$100 = 97.8e^{R*0.5} \Rightarrow \frac{100}{97.8} = e^{(R*0.5)} \\ \Rightarrow 1.02249 = e^{(R*0.5)}$$

Introducing natural logs on both sides,

$$\ln(1.02249) = \ln(e^{(R*0.5)})$$

Now $\ln(\exp) = 1$

So, $\ln(1.02249) = (R*0.5)$

$$R = \ln \frac{(1.02249)}{0.5} = 0.04449 = 4.45\%$$

Q.655 The process by which traders can use the quotes of treasury bills and coupon-bearing treasury bonds to derive a zero-coupon yield curve or spot curve is referred to as:

- A. Interpolation
- B. Duration
- C. Bootstrapping
- D. Calibration

The correct answer is **C**.

Bootstrapping is a method of deriving the zero rate yield curve (or spot rate curve) using the rates and quotes of zero-coupon and coupon-bearing Treasury bonds.

Q.656 Every year, thousands of students in Turkey take the Certified Trader exam. The exam tests in detail the knowledge of students who are willing to join the banking sector. In last year's exam, a question asked the students to calculate a 1-year forward rate 2 years from now. The question also provided the following table of zero spot rates p.a:

Year	Zero rates (per year)
1	6%
2	6.5%
3	7.2%

Using the information provided in the table, which of the following is the accurate 1-year forward rate 2 years from now?

- A. 6.5%
- B. 7.2%
- C. 8.6%
- D. 9.3%

The correct answer is C.

The 1-year forward rate 2 years from now is calculated as:

$$\text{Forward Rate} = \text{Spot Rate}_{\text{year 3}} + (\text{Spot Rate}_{\text{year 3}} - \text{Spot Rate}_{\text{year 2}}) * \left(\frac{\text{Time}_2}{(\text{Time}_3 - \text{Time}_2)} \right)$$

$$\text{Forward Rate} = 0.072 + (0.072 - 0.065) * \left(\frac{2}{(3 - 2)} \right) = 0.086 \text{ or } 8.6\%$$

Alternative Approach

Let's start off by assuming that there are two people, each with \$100

A chooses to invest his cash for 3 years straight at the 3-year spot rate.

B opts to invest his cash for 2 years at the 2-year spot rate and then reinvest his proceeds for a further year at the 1-year forward rate at that point.

In a fair market, both A and B should have the same amount of money at the end of year 3.

What that means, therefore is that the 3-year spot rate is equal to the 2-year spot rate multiplied by the 1-year forward rate two years from today.

In other words,

$$(1 + 3\text{-year spot})^3 = (1 + 2\text{-year spot})^2(1 + 1\text{-year forward})$$

We should set the forward rate such that B ends with the same amount of money as A.

$$1.072^3 = 1.065^2 \times 1\text{-year forward rate}$$

$$1\text{-year forward rate} = 0.086$$

Q.657 Beijing Shipping Corp. enters into a forward rate agreement with Geneva Bank to receive a 7% fixed rate on the principal of \$50 million based on a three-month rate beginning in six-month time. If the three-month rate in six-month time is 6.8%, then what is the cash inflow/outflow for the Beijing Shipping at the end of the sixth month?

- A. Cash outflow of \$25,000.
- B. Cash inflow of \$24,582.
- C. Cash outflow of \$24,500.
- D. Cash outflow of \$24,582.

The correct answer is **B**.

The FRA's payoff will take place in the ninth month. The net payoff will be the difference between the receipt of the fixed rate of 7% and the floating rate payment. As given in the question, if the floating rate is 6.8% in six months, so the payoff at the end of the ninth month is calculated as:

$$\begin{aligned}\text{Payoff} &= \text{Principal} \times (\text{Fixed rate} - \text{Floating rate}) \times \text{Time} \\ &= 50,000,000 \times (0.07 - 0.068) \times 0.25 \\ &= 25,000\end{aligned}$$

Although any interest should be due at the end of the FRA period (e.g., 9 months in this question), the common practice is for the FRA to be settled at the beginning of the FRA period or rather as soon as the floating rate becomes known. Therefore, we can find the payoff at the end of the sixth month by discounting any payoffs for three months, with the floating rate as the discount rate.

$$\text{Payoff} = \frac{\$25,000}{(1 + \frac{0.068}{4})} = \$24,582$$

Since the payoff is positive, Beijing Corp. will receive a cash inflow of \$24,582 at the six-month point.

Q.658 A German bank and a French bank entered into a forward rate agreement contract where the German bank will pay a fixed rate of 4.2% compounded semiannually and receive the floating rate on the principal of €700 million. The forward rate between 0.5 years and 1 year is 5.1%. If the risk-free rate is 6% with continuous compounding, then which of the following is the true value of the FRA contract between the two banks?

- A. €6,300,000
- B. €6,143,344
- C. €3,056,903
- D. €2,966,558

The correct answer is **C**.

The value of the contract is calculated using the following formula:

$$\begin{aligned}\text{Value of FRA} &= \text{Principal} * (\text{Floating rate} - \text{Fixed rate}) * 0.5e^{-R_2 * T} \\ &= 700,000,000 * (0.051 - 0.042) * 0.5e^{-0.06 * 0.5} \\ &= €3,056,903.43\end{aligned}$$

Q.660 Hina Bibi is a fixed-income analyst at Vio Investment Company. She is responsible for analyzing the risk and return of a company's portfolio of fixed income investments. She is analyzing the change in the price of a hypothetical 7-year bond with the face value of 100 and the price of 96.86. If the duration of the bond that she analyzing is 1.962, then which of the following options presents the accurate change in the price of the bond if the yield on the bond increases by 50 basis points?

- A. The price of the bond will increase by \$0.95
- B. The price of the bond will decrease by \$0.95
- C. The price of the bond will increase by \$0.98
- D. The price of the bond will decrease by \$0.98

The correct answer is **B**.

The change in the price of a bond given the change in the yield can be predicted by duration. In the given question, where the price of the bond is 96.86, and the duration of the bond is 1.962, a 50 basis point increase in the yield will decrease the price of the bond by:

Change in price = -Bond price * Duration * Change in yield

Change in price = -96.86 * 1.962 * 0.005 = -0.950

Therefore, the price of the bond after the 50 basis point increase in yield is 96.86 - 0.950 = 95.91.

Q.661 Matt Christian is a former equity trader who has recently lost his job due to the rise of algorithmic trading. Christian is aiming to change his focus from equity trading to fixed-income assets trading. He regularly educates himself by taking online seminars on fixed income assets and using demo accounts to trade bonds. During an online podcast, he heard the following definitions of duration:

- I. The duration of a bond entails the average time it takes the holder to receive cash flows on the bond; it is the most suitable measure if the yield on a bond is continuously compounding.
- II. Modified duration is a similar measure to duration but is more suitable when the yield on the bond is not continuously compounded.
- III. Dollar duration is defined as the duration multiplied by the price of the bond.

Which of these statements is/are INCORRECT?

- A. The definition of duration is incorrect
- B. The definition of modified duration is incorrect
- C. The definition of dollar duration is incorrect
- D. More than one definition is incorrect

The correct answer is **C**.

Dollar duration is not the product of duration and the price of the bond; it is the product of the **modified** duration and the price of the bond.

The definition of duration is accurate because the duration of a bond entails the average time it takes the holder to receive cash flows on the bond. It is the most suitable measure if the yield on a bond is continuously compounding.

The definition of modified duration is accurate as it is used when the yield on the bond is not continuously compounded.

Q.662 There are different measures available that are used to measure the change in the price of the bond given the change in the yield curve. Which of the following measures is used for the purpose of estimating changes in bond prices if the changes in the yield curve are larger?

- A. Duration
- B. Convexity
- C. Modified duration
- D. Concavity

The correct answer is **B**.

Convexity is a measure to estimate the changes in the prices of the bond given larger changes in the yield curve. Duration only measures small changes and linear relationships whereas convexity measures the changes in the price of the bond due to changes in the curvature of the yield curve.

Q.663 Fredrick Hessen is a senior professor in the department of macroeconomics at Welth Business School. In the current semester, his course focuses on interest rates and the term structure of interest rates. One day, he made the following comment:

“There is no relationship between short-term, medium-term, and long-term interest rates. These interest rates are independently determined by the supply and demand in their specific bond market. For instance, the short-term interest rate is determined by the supply and demand of short-term bonds”.

Which of the following theories is associated with the professor’s comment?

- A. Expectation theory
- B. Market segmentation theory
- C. Liquidity preference theory
- D. None of the above

The correct answer is **B**.

The market segmentation theory suggests that there is no relationship between short-term, medium-term, and long-term interest rates. These interest rates are independently determined by the supply and demand in their specific bond market. For instance, the short-term interest rate is determined by the supply and demand for short-term bonds. Some investors, such as pension funds and insurance companies, invest in bonds with a certain maturity, and they are not likely to switch from one maturity to another based on liquidity.

Option B is incorrect: Expectations theory argues that the interest rate term structure reflects the future market expectations of interest rates. The interest rate term structure will have long-maturity rates being higher than short-maturity rates (upward sloping curve) if the market expects interest rates to rise. The opposite is true if the market expects interest rates to fall.

Option C is incorrect: Liquidity Preference argues that most investors will prefer short-term investments to long-term investments if the expectations theory holds. This is because of liquidity considerations – the funds invested in short-term investments will be available earlier to meet any need.

Q.664 Transactions worth billions of dollars depend on the shape of the zero rate curve. The shape of the zero curve has gained the attention of economists, mathematicians, and investors. Many theories exist that present their perspective about the shape of the zero curve. One of those theories suggests that investors are likely to invest their funds for a shorter period while borrowers are more willing to borrow the funds at long-term fixed rates. The theory also concludes that the forward rates are greater than the future spot rates, which justifies the empirical result that the yield curve tends to be upward sloping. Which of the following theories provides the above-mentioned conclusion?

- A. Expectation theory
- B. Market segmentation theory
- C. Liquidity preference theory
- D. None of the above

The correct answer is **C**.

The liquidity preference theory suggests that the investors are likely to invest their funds for a shorter period while borrowers are more willing to borrow the funds at long-term fixed rates. The theory also concludes that the forward rates are greater than the future spot rates, which justifies the empirical result that the yield curve tends to be upward sloping.

Option A is incorrect: Expectations theory argues that the interest rate term structure reflects the future market expectations of interest rates. The interest rate term structure will have long-maturity rates being higher than short-maturity rates (upward sloping curve) if the market expects interest rates to rise. The opposite is true if the market expects interest rates to fall.

Option B is incorrect: The market segmentation theory suggests that there is no relationship between short-term, medium-term, and long-term interest rates. These interest rates are independently determined by the supply and demand in their specific bond market. For instance, the short-term interest rate is determined by the supply and demand for short-term bonds.

Q.3533 Stock IIK is currently selling for \$80. The 28 analysts offering 12-month price targets for IIK have a median target of \$91. Given that the stock reaches the median target of \$91 in 12 months, what is the continuously compounded return of this asset?

A. 0.1375

B. 0.1198

C. 0.1319

D. 0.1288

The correct answer is **D**.

$$\text{Future value} = \text{Present Value} \times e^{RT}$$

Where R is the continuously compounded rate of interest, and T is the time to maturity.

$$\begin{aligned} 91 &= 80e^{R \times 1} \\ \Rightarrow e^R &= \frac{91}{80} \\ \Rightarrow R &= \ln\left(\frac{91}{80}\right) \\ &= 0.12883 \end{aligned}$$

Alternatively,

$$\begin{aligned} \text{Holding period return} &= \frac{S_T}{S_0} - 1 \\ &= \frac{\$91}{\$80} - 1 \\ &= 1.1375 - 1 = 13.75\% \end{aligned}$$

$$\text{Continuous Return} = \ln(1 + i) = \ln(1 + 13.75\%) = 0.12883$$

Q.3534 An investor invested \$154,856 into a mutual fund 5 years ago. If the investment is now worth \$201,694, what is the compound annual growth rate of the investment?

- A. 6%
- B. 7.9%
- C. 5.4%
- D. 5.9%

The correct answer is **C**.

$$\begin{aligned}\text{Compound annual growth rate (CAGR)} &= (\text{Ending value}/\text{Beginning value})^{1/n} \\ &= (201,594/154,856)^{1/5} - 1 = 5.4\%\end{aligned}$$

Q.3535 A bank advertises that it pays an annual interest of 10% with semi-annual compounding on its savings account. What is the effective annual rate?

- A. 10.375%
- B. 10.25%
- C. 10.5%
- D. 10.42%

The correct answer is **B**.

$$\begin{aligned}\text{EAR} &= \left(1 + \frac{\text{Annual rate}}{\text{Compounding frequency}}\right)^{\text{Compounding frequency}} - 1 \\ &= (1 + 10\%/2)^2 - 1 = 0.1025 = 10.25\%\end{aligned}$$

Q.3536 The price of a stock increases from \$24 to \$40 in two years. What is the continuously compounded annual return for the stock?

- A. 43.10%
- B. 28.00%
- C. 51.08%
- D. 25.54%

The correct answer is **D**.

The continuously compounded 2-year return = $\ln(40/24) = 51.08\%$
Annually compounded rate of return = $(51.08\% / 2) = 25.54\%$

Q.3537 In order to have liquid cash at hand, a company always keeps \$200,000 in its bank account. The stated annual interest rate quoted by the bank is 8%. Assuming that compounding is done continuously and there have been no withdrawals and additions, what is the balance in the company's bank account after one year?

- A. \$200,321
- B. \$216,657
- C. \$202,149
- D. \$217,985

The correct answer is **B**.

Using the formula for the future value with continuous compounding (N is the number of years in the expression)

$$FV_N = \$200,000e^{0.08(1)} = \$216,657.41$$

Q.3538 Jose Calzon currently has \$5,040.11 in his bank account. If he plans to buy a car for \$5,500 next year, what is the annual interest rate (compounded monthly), that a bank must pay so that James receives a sum of \$5,500 next year?

- A. 0.76%
- B. 9.12%
- C. 0.73%
- D. 8.76%

The correct answer is **D**.

Interest rate can also be considered as the required rate of return. In the above case, James wants his \$5,000 to grow to \$5,500. The rate required to achieve this return can be calculated as under:
 Amount deposited today \times (1 + Rate of interest) = Amount next year

$$\text{Rate of interest} = \frac{\text{Amount next year}}{\text{Amount deposited}} - 1$$

$$= \left(\frac{\$5,500}{\$5,040.11} \right) - 1 = 0.0912 \text{ or } 9.12\%$$

To turn the annual interest rate into a monthly rate, we use the relationship:

$$\begin{aligned} 1 + i &= \left(1 + \frac{i_m}{m} \right)^m \\ \Rightarrow 1.0912 &= \left(1 + \frac{i_{12}}{12} \right)^{12} \\ \Rightarrow m_{12} &= [1.0912^{\frac{1}{12}} - 1] \times 12 = 0.08759 \end{aligned}$$

Q.3539 An investor received \$100,000 after five years from a certificate of deposit which paid him an interest of 12% with monthly compounding. What is the sum deposited by the investor at the beginning of the 5 years?

- A. \$79,670
- B. \$55,045
- C. \$56,743
- D. \$68,856

The correct answer is **B**.

Given an initial investment of A that earns an annual rate R, compounded m times a year for a total of n years, then we can compute the future value, FV, as follows:

$$FV = A\left[1 + \frac{R}{m}\right]^{m \times n}$$

$$100,000 = A\left[1 + \frac{0.12}{12}\right]^{60}$$

$$A = \$55,045$$

Q.3540 A 3-year bond offers a 7% coupon rate with interests paid annually. Assuming the following sequence of spot rates, the price of the bond is *closest to*:

Time to Maturity	Spot Rate (%)
1	4
2	5
3	5.5

- A. 102.48
- B. 106.74
- C. 103.56
- D. 104.2

The correct answer is **D**.

$$\text{price} = \frac{7}{(1 + 0.04)^1} + \frac{7}{(1 + 0.05)^2} + \frac{107}{(1 + 0.055)^3} = 104.20$$

Q.3541 An analyst has gathered the following estimated series of spot rates for a developing country:

- 0.5-year: 2%
- 1-year: 3%
- 1.5-year: 3.55%
- 2-year: 4%
- 2.5-year: 4.5%
- 3-year: 5%
- 3.5-year: 5.45%

Given that the information is accurate, what is the price of a 3-year, 1,000 face value, 5% annual coupon paying bond?

- A. 1115.3
- B. 995.65
- C. 1001.8
- D. 998.51

The correct answer is **C**.

The general approach to bond valuation is to utilize a series of spot rates to reflect the timing of future cash flows.

$$(50/1.03) + (50/1.04^2) + (1,050/1.05^3) = 1,001.80$$

Q.3542 The 2-period spot rate, S_2 is 9%, and the 1-period spot rate, S_1 is 4%. Calculate the forward rate for one period, one period from now, $f_{1,1}$.

- A. 5%
- B. 4.8%
- C. 14.24%
- D. 8.73%

The correct answer is **C**.

$$(1 + S_2)^2 = (1 + S_1)(1 + f_{1,1})$$

$$f_{1,1} = [(1.09)^2/1.04] - 1 = 14.24\%$$

Alternatively, we can denote this as:

$$F = \frac{V_2}{V_1}$$

Where V_1 is the value to which one dollar grows by time T_1

V_2 is the value to which one dollar grows by time T_2

In this case,

$$F = \frac{V_2}{V_1} = \frac{1.09^2}{1.04} = 1.1424$$

So that $F = 1.1424 - 1 = 14.24\%$

Q.3543 If the current 1-year spot rate is 3%, the 1-year forward rate one year from today ($f_{1,1}$) is 4%, and the 1-year forward rate two years from today ($f_{2,1}$) is 5%, then the 3-year spot rate is *closest to*:

- A. 4%
- B. 12.5%
- C. 4.2%
- D. 8.42%

The correct answer is **A**.

$$S_3 = [(1.03)(1.04)(1.05)]^{1/3} - 1 = 3.997\%$$

Q.3545 A corporate bond has the following characteristics:

- Price: USD 106.50
- Coupon rate: 5%
- Duration: 7.5 years
- Convexity: 101

If the credit spreads narrow by 175 basis points, then what will be the price of the bond?

- A. USD 114.68
- B. USD 122.13
- C. USD 123.78
- D. USD 117.68

The correct answer is **B**.

The change in bond's price resulting from the change in the yield can be estimated using the following formula:

$$\Delta B = -DB\Delta y + \frac{1}{2}CB(\Delta y)^2$$

Where

ΔB = The change in the bond's price resulting from the change in the yield.

Δy = The change in the bond's yield.

B = the price of the bond.

C = the convexity of the bond.

D = the duration of the bond.

From the information given in the question,

$$\Delta B = -7.5 \times 106.50 \times (-0.0175) + \frac{1}{2} \times 101 \times 106.50 \times (-0.0175)^2 = 15.62522$$

The change in bond's price is positive so that the new price of the bond is:

$$15.62522 + 106.50 = 122.12522 \approx 122.13$$

Q.3548 You have been provided the following information on a bond:

Period	PV of cash flow (USD Mn)
1	3.7
2	4.9
3	22.3

If the yield to maturity is 6%, then what is the modified duration of the bond?

- A. 2.45 years
- B. 2.65 years
- C. 2.30 years
- D. 2.25 years

The correct answer is **A**.

Macaulay Duration = $(1 \times 3.7 / 30.9) + (2 \times 4.9 / 30.9) + (3 \times 22.3 / 30.9) = 2.60$ years
Modified Duration = Macaulay Duration / $(1 + \text{YTM}) = 2.60 / 1.06 = 2.45$ years

Q.3549 Calculate the expected percentage price gain (loss) from the following data:

- Reduction in yield-to-maturity: 20bps
- Annual modified duration: 23.657
- Annual convexity: 678.98

- A. 4.86%
- B. 4.59%
- C. -4.6%
- D. -4.9%

The correct answer is **A**.

Percentage change in full price = $[-23.657 \times (-0.002)] + 1/2 \times [678.98 \times (-0.002)^2] = 4.86\%$

Q.3550 A 4-year semiannual corporate bond with a 3.5% coupon is priced at 104.12. This bond's modified duration and convexity are 3.75 and 45, respectively. The bond's credit spread narrows by 75 bps due to a credit upgrade. What is the estimated return impact without convexity adjustment?

- A. 1.42%
- B. 1.59%
- C. 2.95%
- D. 2.81%

The correct answer is **D**.

$$\begin{aligned}\text{Return impact} &= -(\text{Modified duration}) * \text{Change in spread} \\ &= -3.75 * (-0.75\%) = 0.0281 \text{ or } 2.81\%\end{aligned}$$

Q.3551 A 4-year, 5% annual-pay bond has a face value of \$1,000. The interest rate stands at 3% per annum.

Determine the approximate modified duration?

A. 0.97

B. 7.80

C. 3.62

D. 3.73

The correct answer is C.

$$\text{Modified duration} = \frac{\text{Macaulay duration}}{1 + \frac{y}{m}}$$

Where y is the yield and m is the compounding frequency per annum. We first calculate the Macaulay duration:

$$\text{Macaulay duration} = \frac{\sum_{t=1}^n \text{PV}(C_t)T}{\text{Market Price of Bond}}$$

Where $\text{PV}(C_t)$ is the present value of coupon payments at time t, and T is the time to maturity

$$\text{Price of the bond} = \frac{50}{1.03^1} + \frac{50}{1.03^2} + \frac{50}{1.03^3} + \frac{1050}{1.03^4} = 1074.34$$

Thus,

$$\text{Macaulay duration} = \frac{1}{1074.34} \times \frac{50}{1.03^1} + \frac{2}{1074.34} \times \frac{50}{1.03^2} + \frac{3}{1074.34} \times \frac{50}{1.03^3} + \frac{4}{1074.34} \times \frac{1050}{1.03^4} = 3.73412$$

And so the modified duration is given by:

$$\begin{aligned} \text{Modified duration} &= \frac{\text{Macaulay duration}}{1 + \frac{y}{m}} \\ &= \frac{3.73412}{1 + \frac{0.03}{1}} \\ &= 3.62535 \end{aligned}$$

Q.3552 A bond has a duration of 10.62 and a convexity of 91.46. For a 200 bps increase in yield, what is the bond's approximate percentage price change?

- A. -19.41%
- B. -24.90%
- C. -1.62%
- D. -4.51%

The correct answer is **A**.

The estimated price change = $-(\text{Duration}) * (\text{Change in yield}) + (1/2) * (\text{Convexity}) * (\text{Change in yield})^2$
 $= -10.62 * 0.02 + 0.5 * 91.46 * 0.02^2 = -19.41\%$

Q.3553 A 9% bond has a full price of \$905 and a YTM of 10%. Estimate the percentage change in the full price of the bond for a 30 basis point increase in YTM, assuming the bond's modified duration is 9.42, and its convexity is 68.33.

- A. -2.65%
- B. -2.83%
- C. -2.80%
- D. 2.83%

The correct answer is **C**.

Expected change in bond's price = $\Delta P/P = -D_{\text{mod}} * \Delta y + 0.5 * C * \Delta y^2$

Duration effect = $-D_{\text{mod}} * \Delta y = -9.42 * 0.003 = 0.02826 = -2.826\%$

Convexity effect = $0.5 * C * \Delta y^2 = 0.5 * 68.33 * 0.003^2 = 0.000307 = 0.0307\%$

Expected change in bond's price = $(-0.02826 + 0.000307) = -2.79530\%$

Q.3554 A bond valued at \$200,000 has a duration of 8 and a convexity of 20. Assuming that the bond's spread relative to the benchmark curve increases by 25 basis points due to a credit downgrade, then what is the approximate change in the bond's market value?

- A. \$3,988
- B. \$3,960
- C. \$3,970
- D. \$3,368

The correct answer is **A**.

Price Change = (-Duration * Yield change) + (0.5 * Convexity * Yield change²)

Price change = (-8 * 0.0025) + (0.5 * 20 * 0.0025²) = -1.99%

The bond's value will fall by approximately 1.990% * 200,000 = \$3,988.

Q.4821 The expectations hypothesis (theory) states that:

- A. We can forecast future interest rates by looking at the term structure of interest rates since the return on a long-term bond is, in essence, the average return on short-term bonds over the same period.
- B. We can forecast future interest rates by looking at past returns on similar instruments.
- C. We can forecast future interest rates by looking at the behavior of the stock market.
- D. We can forecast future interest rates by looking at the term structure of interest rates since the return on a short-term bond is essentially the average return on long-term bonds over the same period.

The correct answer is **A**.

The Pure-Expectations theory asserts that expected future spot rates of interest are equal to the forward rates that can be calculated today. In other words, the forward rates are **unbiased predictors** for making expectations of future spot rates. We can forecast future interest rates by looking at the term structure of interest rates since the return on a long-term bond is, in essence, the average return on short-term bonds over the same period.

Q.4822 The annual yield of a one-year government bond is 10% and the expected yield on a one-year bond starting one year from now is 11.0%. The expected yield on a one-year bond starting two years from now is 11.5%. According to the expectations hypothesis, what would be the annual yield of a three-year government bond?

- A. 36.14%
- B. 12.04%
- C. 11.04%
- D. 10.83%

The correct answer is **D**.

According to the Expectations Theory, the forward rates are unbiased predictors for making expectations of future spot rates. We can therefore forecast future interest rates by looking at the term structure of interest rates since the return on a long-term bond is in essence the average return on short-term bonds over the same period.

$$\begin{aligned}(1 + r_3)^3 &= (1 + r_1)(1 + f_{1,1})(1 + f_{2,1}) \\(1 + r_3)^3 &= (1 + 0.1)(1 + 0.11)(1 + 0.115) \\1 + r_3 &= 1.1083 \\r_3 &= 10.83\%\end{aligned}$$

Note: We can as well simply find the average of the short-term rates:

$$\text{Three-year rate} = \frac{(10\% + 11\% + 11.5\%)}{3} = 10.83\%$$

Q.4824 Which of the following is correct?

- A. The interest rates on U.S. Treasury securities feature an embedded maturity premium primarily due to the fact that the probability of default is lower on long-term bonds than on short-term goals.
- B. Assuming that the maturity risk premium is zero and the rate of inflation is expected to increase in the future, then the yield curve for U.S. Treasuries, other things held constant, exhibit an upward sloping yield curve.
- C. According to the market segmentation theory, the yield curve should normally have an upward slope.
- D. According to the liquidity preference theory, lenders generally prefer to lend on a long-term term basis in order to lock in a continuous stream of payments for an extended period.

The correct answer is **B**.

If inflation increases, interest rates will increase as lenders will simply pass on the extra loss of the purchasing power of money to borrowers.

A is incorrect: The interest rates on U.S. Treasury securities feature an embedded maturity premium primarily due to the fact that the probability of default is higher on long-term bonds than on short-term goals. The maturity premium is **more** for long term bonds than short term bonds.

C is incorrect: The market segmentation theory states that the bond market is segmented into **different maturity sectors**. As such, the prevailing interest rates for short, intermediate, and long-term bonds should be viewed separately and are akin to items in different bond markets. It propagates the idea that the return offered by a bond with a specific term structure is solely a function of the supply and demand for that bond and is independent of the return offered by bonds with different term structures.

D is incorrect: According to the liquidity preference theory, all other things being equal, investors **prefer liquid investments to illiquid ones**. And that's because investors prefer cash, and barring that, an investment that's as close to cash as possible. To hold a longer-term loan, investors will demand a liquidity premium which will be built into the interest rate demanded.

Q.4825 Four U.S. T-bonds currently on the market have the following characteristics:

Price per \$100 par value	Coupon (paid semiannually)	Maturity (yrs.)	Semiannual period
\$101.50	5.0%	0.5	1
\$102.60	5.25%	1.0	2
\$103.15	5.75%	1.5	3
\$103.95	6.20%	2.0	4

Determine the one-year spot rate via the bootstrapping method, assuming semiannual compounding.

- A. 1.98%
- B. 2.61%
- C. 1.31%
- D. 2.25%

The correct answer is **B**.

Bootstrapping is the process of carving out spot rates from the market prices of a set of coupon-paying bonds. The spot rates are determined in a consequential manner: after obtaining the first spot rate, say, for six months, we use that to obtain the spot rate for one year. Then we can use the six-month and one-year spot rates to obtain the one and a half-year spot rate, and so on.

We know that the price of a bond is the discounted value of all of its future cashflows.

For the six month T-bond, therefore,

$$\begin{aligned}
 \$101.5 &= \frac{(\$100 + \$5/2)}{(1 + \frac{Z_{0.5}}{2})^1} \\
 \$101.5 \left[(1 + \frac{Z_{0.5}}{2})^1 \right] &= \$102.5 \\
 (1 + \frac{Z_{0.5}}{2})^1 &= \frac{\$102.5}{\$101.5} \\
 (1 + \frac{Z_{0.5}}{2})^1 &= 1.0099 \\
 Z_{0.5} &= 0.0099 \times 2 = 1.98\%
 \end{aligned}$$

Thus, the six-month spot rate is 1.98% with semiannual compounding.

For the 1-year T-bond,

$$\begin{aligned} \$102.6 &= \frac{\$5.25/2}{(1 + \frac{z_{0.5}}{2})^1} + \frac{\$100 + \frac{\$5.25}{2}}{(1 + \frac{z_1}{2})^2} \\ \$102.6 &= \frac{\frac{\$5.25}{2}}{(1 + \frac{0.0198}{2})^1} + \frac{\$100 + \frac{\$5.25}{2}}{(1 + \frac{z_1}{2})^2} \\ \$102.6 &= \$2.6 + \frac{\$102.63}{(1 + \frac{z_1}{2})^2} \\ \$100(1 + \frac{z_1}{2})^2 &= \$102.63 \\ (1 + \frac{z_1}{2})^2 &= 1.0263 \\ (1 + \frac{z_1}{2}) &= \sqrt{1.0263} = 1.0131 \\ \frac{z_1}{2} &= 0.0131 \\ z_1 &= 2.61\% \end{aligned}$$

Q.4826 The **main** advantage of the secured overnight financing rate (SOFR) over LIBOR is that:

- A. It's based on the average borrowing rates across a larger collection of banks.
- B. It's easier to compute.
- C. It's based on actual observable transactions, not estimates.
- D. It incorporates a built-in hedge against default risk.

The correct answer is **C**.

The secured overnight financing rate (SOFR) is a one-day interest rate based on the Treasury repurchase market. SOFR is set to phase out the use of LIBOR as a benchmark rate because, whereas the LIBOR is based on estimated borrowing rates, SOFR is based on data from actual observable transactions.

Q.4902 Consider a bond whose current price is USD 150 with a cash flow in one year providing a present value of USD 50 and a cash flow in two years providing a present value of USD 100. Suppose further that a yield of 5% with semi-annual compounding applies on the bond. What is the value of modified duration?

- A. 1.6667
- B. 1.6260
- C. 1.3333
- D. 1.3008

The correct answer is **B**.

We that know that,

$$\text{Modified duration} = \left[\frac{\text{Macaulay duration}}{\left(1 + \frac{y}{n}\right)} \right]$$

We, therefore, start by calculating the Macaulay duration:

$$\begin{aligned} \text{Macaulay duration} &= \sum_{i=1}^n t_i \left[\frac{PV(C_{t_i})}{P} \right] \\ &= \frac{50}{150} \times 1 + \frac{100}{150} \times 2 = 1.6667 \end{aligned}$$

Where $PV(C_{t_i})$ = present value of cash flows at time t_i and P is the price of the bond.

Thus,

$$\text{Modified duration} = \frac{1.6667}{\left(1 + \frac{0.05}{2}\right)} = 1.62604$$

Q.4903 What is the main limitation of duration?

- A. Duration does not provide a good approximation in case the change in the bond yield arises from a non-parallel shift in the interest rate term structure or when the change being considered is large.

- B. Duration does not provide a good approximation of the effect of a small parallel shift in the interest rate term structure.
- C. Duration only applies when the change in interest rates is large.
- D. None of the above.

The correct answer is **A**.

Duration provides a good approximation of the effect of a small parallel shift in the interest rate term structure. However, duration cannot provide a good approximation in case the change in the bond yield arises from a non-parallel shift in the interest rate term structure or the change being considered is large.

Options B is incorrect since it contradicts option A

Option C is incorrect since duration applies whether the change in interest rates is small or large; however, it does not provide a good approximation when the change in interest rates is large.

Note that the approximate duration relationship is given by:

$$\Delta P = -DP \Delta y \dots \dots \dots 1$$

Which is equivalent to,

$$\frac{\Delta P}{P} = -D \Delta y$$

P is the bond's price, D is the bond's duration, ΔP is the change in the bond price, and Δy is the change in the bond's yield.

If we let C be the convexity, then equation 1 above can be refined so that we have

$$\Delta P = -DP \Delta y + \frac{1}{2} CP (\Delta y)^2$$

With convexity, relatively large parallel shifts can now be considered.

Q.4904 Consider a portfolio that has a bond position worth USD 10,000. Suppose the position has a modified duration of 2 years and a convexity of 30. Assume that the term structure is flat. By how much does the value of the position change if interest rates increase by 15 basis points?

- A. The position decreases by \$30.
- B. The position increases by \$60.
- C. The position increases by \$30.
- D. The position does not change.

The correct answer is **A**.

$$\begin{aligned}\text{Change in bond's price} &= \text{Duration effect} + \text{Convexity effect} \\ &= [-\text{Duration} \times \text{Price} \times \text{Change in yield}] \\ &\quad + \left[\frac{1}{2} \times \text{Convexity} \times \text{Price} \times (\text{Change in yield})^2 \right] \\ &= (-2 \times 10,000 \times 0.0015) + \left(\frac{1}{2} \times 30 \times 10,000 \times 0.0015^2 \right) \\ &= -29.665 \approx -30\end{aligned}$$

This means that, with every increase in interest rates of 15 basis points, the bond's price will decrease by \$30

Q.4905 Suppose the zero-coupon interest rates (semi-annually compounded) for maturities of 0.5, 1.0, and 1.5 years are 2.5%, 3.0% and 3.5%, respectively. Consider a USD 1,000 face value, two-year bond that currently trades at USD 1,060 and pays coupons at a rate of 6% per year every six months. If the two-year zero-coupon interest rate is R, what is the value of R?

- A. 11.27%
- B. 2.88%
- C. 6.34%
- D. 1.08%

The correct answer is **B**.

R can be solved using the following equation:

$$\begin{aligned} \frac{30}{1 + \frac{0.025}{2}} + \frac{30}{(1 + \frac{0.030}{2})^2} + \frac{30}{(1 + \frac{0.035}{2})^3} + \frac{1030}{(1 + \frac{R}{2})^4} &= 1,060 \\ \Rightarrow \frac{1030}{(1 + \frac{R}{2})^4} &= 1,060 - 87.22 = 972.78 \\ \Rightarrow (1 + \frac{R}{2}) &= \left(\frac{1,030}{972.78}\right)^{\frac{1}{4}} = 1.0144 \end{aligned}$$

Thus,

$$R = \frac{0.11271}{2} = 0.02878 \approx 2.88\%$$

Q.4908 In an FRA, an annual rate of 2% will be received, in exchange for a 6-month LIBOR to be paid on a principal of USD 2,000 for a six-month period starting in 15 months. If the six-month forward rate in 15 months is 2.5% per annum, what is the settlement on the FRA?

- A. USD 4.94 is paid out
- B. USD 12.35 is received
- C. USD 4.88 is paid out
- D. USD 4.94 is received

The correct answer is **A**.

The settlement in 15 months is given by,

$$\frac{(\text{Fixed rate} - \text{Forward rate}) \times \text{Term of the FRA} \times \text{Principal}}{1 + \frac{\text{forward rate}}{n}} \\ = \frac{(0.02 - 0.025) \times \frac{6}{12} \times 2,000}{1 + \frac{0.025}{2}} = -4.9383$$

Thus, USD 4.94 will be paid.

Q.4909 A three-year bond with a face value of USD 1,000 pays coupons of 8% per annum. The yield on the bond is 6% compounded annually. What is the Macaulay duration?

- A. 1.0000
- B. 2.6312
- C. 2.7891
- D. 2.7206

The correct answer is **C**.

We first calculate the present value of cash flows as follows,

$$P = \frac{80}{1.06^1} + \frac{80}{1.06^2} + \frac{1080}{1.06^3} = 1,053.46$$

Thus, the Macaulay duration is given by,

$$\begin{aligned} \text{Macaulay Duration} &= \sum_{i=1}^n t_i \left[\frac{PV(C_t)}{\sum PV(C_t)} \right] \\ &= \frac{\frac{80}{1.06^1}}{1,053.46} \times 1 + \frac{\frac{80}{1.06^2}}{1,053.46} \times 2 + \frac{\frac{1080}{1.06^3}}{1,053.46} \times 3 \\ &= 2.7891 \end{aligned}$$

Q.4910 A three-year bond with a face value of USD 1,000 pays coupons of 8% per annum. The yield on the bond is 6% compounded annually. What is the Modified duration?

- A. 2.6312
- B. 2.7206
- C. 2.7891
- D. 1.0000

The correct answer is **A**.

We first calculate the present value of cash flows as follows,

$$P = \frac{80}{1.06^1} + \frac{80}{1.06^2} + \frac{1080}{1.06^3} = 1,053.46$$

The Macaulay duration is given by,

$$\begin{aligned} \text{Macaulay Duration} &= \sum_{i=1}^n t_i \left[\frac{PV(C_t)}{\sum PV(C_t)} \right] \\ &= \frac{\frac{80}{1.06^1}}{1,053.46} \times 1 + \frac{\frac{80}{1.06^2}}{1,053.46} \times 2 + \frac{\frac{1080}{1.06^3}}{1,053.46} \times 3 \\ &= 2.7891 \end{aligned}$$

And thus, the modified duration is given by

$$\text{Modified Duration} = \frac{2.7891}{1.06} = 2.6312$$

Q.4911 A three-year bond with a face value of USD 1,000 pays coupons of 8% per annum. The yield on the bond is 6% compounded annually. What is the modified convexity?

- A. 7.6310
- B. 8.0889
- C. 2.7891
- D. 7.1991

The correct answer is **D**.

We first calculate the present value of cash flows as follows,

$$P = \frac{80}{1.06^1} + \frac{80}{1.06^2} + \frac{1080}{1.06^3} = 1,053.46$$

Convexity is given by:

$$\begin{aligned} \text{Convexity} &= \sum_{i=1}^n t_i^2 \left[\frac{PV(C_t)}{\sum PV(C_t)} \right] \\ &= \frac{\frac{80}{1.06^1}}{1,053.46} \times 1^2 + \frac{\frac{80}{1.06^2}}{1,053.46} \times 2^2 + \frac{\frac{1080}{1.06^3}}{1,053.46} \times 3^2 \\ &= 8.0889 \end{aligned}$$

$$\text{Modified Convexity} = \frac{\text{Convexity}}{\left(1 + \frac{y}{m}\right)^2}$$

And thus, the modified convexity is given by:

$$\text{Modified Convexity} = \frac{8.0889}{1.06^2} = 7.1991$$

Reading 41: Corporate Bonds

Q.898 Judy Hamilton is a junior investment analyst in the fixed-income assets unit of Tulip Investments Company. The senior management of TIP has decided to post a free monthly investment recommendation list for the general public. Hamilton will be responsible for updating the monthly list of recommended corporate bonds and potential default bonds. The potential default bonds will have companies, which are considered in default based on specific criteria. Which of the following criteria is/are used to consider if a company is considered in default?

- I. If the company is unable to pay the par value of the bond at maturity
- II. If the company misses on its coupon payment on the bond
- III. If the company is unable to maintain certain required ratios

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

The correct answer is **D**.

It is important for a debt issuer or a bond issuer to meet all three recommendations in order to avoid a default. The par value is the principal value of the bond which a debt issuer is liable to pay at the maturity of the bond. Coupon payment is the certain portion of a bond's par value which a debt issuer has to pay during the life of the debt. All bonds have some required ratios under the bond covenants which the debt issuer is liable to maintain. If the bond issuer does not meet any of these requirements, the issuer is considered in default.

Q.899 Joe George has recently joined the corporate trust department of Maximal Investment Bank based in New Jersey. George is an expert in performing the duties of a trustee. These functions include authenticating the bonds at the time of their issue, keeping track of the bonds sold and bonds outstanding, making sure that the issuer does not exceed the authorized principal, and making sure the issuer is maintaining required ratios. Which of the following parties does Joe George, a trustee, represent?

- A. Bond issuer
- B. Bondholder
- C. Government
- D. Independent rating agency

The correct answer is **B**.

The trustee represents the bondholders. It is difficult in terms of resources for a bondholder to keep track of the bond issuer's activities and to ensure that the issuer is not violating the bond indenture. Therefore, the trustee (i.e., the corporate trust department of banks) act as the representative of the bondholders to perform trustee functions like authenticating the bonds at the time of their issue, keeping track of the bonds sold and bonds outstanding, making sure that the issuer does not exceed the authorized principal, and making sure the issuer is maintaining required ratios.

Q.900 Trustees are the corporate trust units of large banks that are representative of the interest of bondholders. From which of the following parties does the trustee receives fees for its services?

- A. Governments
- B. Bond issuers
- C. Bondholders
- D. They work independently

The correct answer is **B**.

The trustee receives the fees for its trustee serviced from the bond issuer, not the bondholders to whom they have a fiduciary duty. However, the trustee represents the interest of the bondholders and performs trustee functions on behalf of the bondholders. Trustees do not perform any function beyond the scope of the indenture.

Q.901 Christopher Ray is a junior research analyst in the fixed-income unit of a mid-sized investment bank in the U.S. The fixed-income unit categorizes the bonds based on the type of issuers. These categories or issuer types are public utilities, transportations, industrials, banks & finance companies, and Yankees. The analyst is given the task to categorize a bond issued by a German municipal government that has recently issued bonds in the U.S. to raise capital to finance a new kindergarten in the center of Frankfurt. In which category should this bond be classified?

- A. Public utilities
- B. Industrials
- C. Yankees
- D. Banks & Finance

The correct answer is **C**.

Yankees or international issuers is a category of bonds classified by the issuer type that includes the bonds issued in the U.S. by foreign sovereign governments, foreign banks, companies, and foreign government agencies. Option A is incorrect because the public utility category consists of companies in fields such as electricity, gas, telecommunication, and water suppliers. Option B is incorrect because the industrials category includes manufacturing, mining, retailers, etc. Option D is also incorrect because the banks & finance category consists of bonds issued by banks, insurance companies, and other financial institutions.

Q.902 Which of the following statements are correct?

- I. The debt maturity is the date on which the bond issuers satisfy their obligation under the bond indenture
- II. The bond maturity date is the date on which the bond principal and the outstanding coupon are paid
- III. The maturity date of the bond issue cannot be altered

- A. Statements I and II are correct.
- B. Statements II and III are correct.
- C. Statements I and III are correct.
- D. Statements I, II and III are correct.

The correct answer is **A**.

Statements 1 and 2 are correct while statement III is incorrect. Sometimes bonds can be retired before they mature. Statements I and II are correct as the bond maturity is the date on which the bond issuer fully repays the bond principal along with the remaining coupon to satisfy its obligation under the bond indenture.

Q.903 Which of the following should be used to calculate the coupon on a bond?

- A. The coupon or interest is calculated on the price of the bond.
- B. The coupon or interest is calculated on the amortized value of the bond.
- C. The coupon or interest is calculated on the par value of the bond.
- D. The coupon or interest is always fixed in dollar terms.

The correct answer is **C**.

The coupon payments on the bond are calculated on the basis of par (face) value. For example, a 3-year 8% semi-annual coupon bond with the face value or par value of \$1000 will pay a coupon of \$40 every six months.

Q.904 The bonds that are issued in the United States are also classified on the basis of their interest rates. Which of the following types of bonds are always issued at a discount price?

- A. Zero-coupon bonds.
- B. Straight-coupon bonds.
- C. Floating rate bonds.
- D. Premium bonds.

The correct answer is **A**.

Zero-coupon bonds are always issued at a discount price. Since the holder of a zero-coupon bond does not receive any coupon payments or interest payments on the bond, he gains through purchasing the bond at a discounted price and receiving the face value of the bond at the maturity of the bond.

Q.905 Linda Angola is a senior asset investment advisor at Bright Partners Co., an investment advisory firm based in Singapore. Angola is responsible for providing advisory services to a group of small-medium institutional clients. Jaguar Tires Co. is one of the largest clients of Angola and the management of the company intends to invest in a fixed income instrument that pays a fixed coupon at a specific date and also gets a share of the issuer's profit if the issuer earns profits above a certain threshold. Which of the following should Angola recommend to Jaguar Tires?

- A. Differed-interest bonds.
- B. Zero-coupon bonds.
- C. Participating bonds.
- D. Straight bonds.

The correct answer is C.

A participating bond is a sub-type of coupon bond that pays a coupon based on a fixed interest rate and also pays a share of profit to its bondholders. A participating bond pays a share of the profits to its bondholders if the profits are above a certain threshold or if the prices of the company's assets increase beyond a certain level.

Q.906 Muhammad Zubair is a retail bond investor that invests in various types of government and corporate bonds. On June 30, 2016, he purchased a 5-year zero-coupon bond for the price of \$855. The bond was issued on July 1, 2014, at the discount price of \$690 and the face value of the bond is \$1000. Based on the given information, identify which of the following options is consistent with the definition of original issue discount (OID)?

- A. In the given case, the original issue discount (OID) is the difference between \$690 and \$1000.
- B. In the given case, the original issue discount (OID) is the difference between \$690 and \$855.
- C. In the given case, the original issue discount (OID) is the difference between \$855 and \$1000.
- D. In the given case, the original issue discount (OID) is the difference between the current amortized value and \$1000.

The correct answer is **A**.

The original issue discount of a zero-coupon bond is the difference between the original issue price of the bond and the face value of the bond. In the given case, the bond was originally issued at \$690. Two years later, the investor purchased it for \$855. The current amortized value of the bond is not given and the value of the bond at the end of the fifth year will be \$1000 i.e. the face value. The OID, in this case, is $\$1000 - \$690 = \$310$.

Q.907 Sam Denis is a junior fixed-income analyst that is analyzing a number of corporate bonds to recommend to one of his clients. The bonds under analysis are classified by the type of issuers, type of risk, and expected return. Which of the following categories of bonds will have the lowest interests?

- A. Corporate Bonds.
- B. Debenture issues.
- C. Mortgage bonds.
- D. Straight-coupon discount bonds.

The correct answer is C.

Mortgage bonds have the lowest interest rate and the highest price among the four types of bonds. Because of the fact that mortgage bonds are secured by mortgage liens, the interest rate on these bonds is low and the prices are higher. Options A and D are incorrect because Corporate Bonds offer a higher yield relative to a government bond due to the higher risk of insolvency. Straight-coupon discount bonds are sold at discount prices. Thus, the interest rate on such bonds is high. Option B is also incorrect because debenture issues are unsecured bonds. Due to higher risk, the price of the bonds is lower, and the interest is higher.

Q.909 Debentures are unsecured bonds issued by companies that do not have any pledge security or asset as collateral. While investors prefer secured bonds, the larger portion of bonds is dominated by debentures. Analyze and determine which of the following points regarding the rights of debenture holders is incorrect.

- A. Debenture bondholders have a general claim on assets that are not pledged against secured debt.
- B. Debentures are unsecured bonds; therefore, the debenture bondholders have no right over the assets of the issuer.
- C. Debenture bondholders have a right to the pledged assets if the value of the pledge assets exceeds the claims of secured bondholders.
- D. In absences of pledged assets or secured creditors, the claim of debenture bondholders is equal to the claims of other creditors.

The correct answer is **B**.

It is an incorrect statement that the debenture bondholders have no right or claim to the assets of the issuer. If the issuer defaults, the debenture bondholders have a claim on the non-pledged assets and also the pledged assets if the value of the pledged assets exceeds the value of secured claims. In other words, if a default event occurs, the pledged assets are liquidated to settle the claims of secured creditors, and debenture bondholders have a claim on any **excess** proceeds that may arise from such a process.

Q.911 Ohio Automotive Inc. raised capital to finance its expansion into the SUVs market. A year ago, the firm issued a 4-year 6% semi-annual coupon bond. The bond has a special provision that allows the issuer to call its bond before the maturity of the bond. Which of the following options is consistent with the properties of a callable bond?

- A. It is beneficial for the issuer to call the bond in an increasing interest rate environment.
- B. It is beneficial for the issuer to call the bond in a decreasing interest rate environment.
- C. It is beneficial for the bondholder if the bond is called in a decreasing interest rate environment.
- D. It is beneficial for the bondholder if the bond is called in an increasing prices environment.

The correct answer is **B**.

It is beneficial for the bond issuer to have a callable bond, which he can call back or retire early when the interest rate decreases. When the interest rate decreases, the price of the bond increases, so the bond issuer can call back previously issued bonds at higher rates and replace them with new bonds at lower interests.

Option A is incorrect because when interest rates increase, it is inappropriate for the debt issuer to retire the old debt at lower rates and issue new debt at higher rates. Options C and D are virtually the same; it is not beneficial for the bondholder to return the higher interest paying bonds for lower interest paying bonds.

Q.912 Hauser Corp., a German portable house construction firm, is raising \$500 million through 7-year 9% semi-annual coupon bonds. Classico Investment Company is interested in purchasing 33% of Hauser's total bond issue, but it has put forward a condition that requires the issuer to retire a portion of the principal of the debt each year until maturity rather than paying the whole capital at maturity. This condition is most likely associated with the:

- A. Fixed-price call provision.
- B. Make-whole call provision.
- C. Sinking fund provision.
- D. Tender offer provision.

The correct answer is **C**.

Under the sinking fund provision, the issuer is required to pay back a certain portion of the principal amount of the debt or bonds to the bondholders along with the coupons. This pays back the principal in portion and decreases the firm's burden to pay the whole principal at the maturity of the bond.

Q.913 Matthias Schmidt is the Chief Financial Officer of Caribbean Shipping & Logistics Company. Three years ago, the company raised \$600 million through 5-years 5% coupon bonds to finance its two new vessels that will sail in the Arabian Sea. Due to abrupt growth in emerging economies like Pakistan, Bangladesh, and India, the company grew exponentially in the last three years. The firm's senior management informed the CFO that they should retire the debt before maturity as the firm now has enough funds to pay for further expansions. If the indenture of the bond did not include any mechanism for early retirement in its indenture, then determine which of the following mechanisms could be used.

- A. Fixed-price call provision.
- B. Sinking fund provision.
- C. Tender offer provision.
- D. Replacement fund provision.

The correct answer is **C**.

A tender offer is a mechanism for the early retirement of debt (bond) that isn't necessarily included in the indenture of the bond. In a tender offer, the issuer of the bond sends the offering circular to the bondholders of record that present the price the issuer is willing to pay to buy back the bond and the window of time during which bondholders can sell their bonds to the issuer.

Q.914 Pamela Simpson is the fixed-income investment manager at the Nordend Investment Bank. During a seminar on the risks attached to the fixed income assets, which was organized to train junior analysts, Simpson made the following statements about the credit default risk of bonds:

- I. Credit default risk is the risk of financial loss, or the underperformance of a portfolio, that arises due to movements in the credit spreads used in the marking to market of bonds
- II. Investors rely on rating agencies to evaluate the credit default risk of the issuer
- III. According to one of the rating agencies, a bond rated below B is a junk bond

Which of these statements is/are correct?

- A. Statement I is correct only.
- B. Statement II is correct only.
- C. Statements I & III are correct.
- D. Statements II & III are correct.

The correct answer is **B**.

Statement II is the only correct statement as the bondholders and investors rely on the rating of the issue and the issuer, which is provided by rating agencies.

Statement I is incorrect because the credit spread risk, not the credit default risk, is the risk of financial loss, or the underperformance of a portfolio, that arises due to movements in the credit spreads used in the marking to market of bonds.

Statement III is also incorrect because the bonds rated below BBB are considered junk bonds.

Q.915 Investors use default rates and recovery rates to forecast the non-investment grade bonds that have the potential to default or upgrade to investment grade. Which of the following options are least consistent with the properties of recovery rates?

- A. Recovery rates are lower in an economic downturn.
- B. Recovery rates are not based on the size of the bond issue.
- C. Recovery rates are inversely correlated with default rates.
- D. Recovery rates are lower in asset-intensive industries.

The correct answer is **D**.

Option D is least consistent with the properties of recovery rates because the recovery rate is higher in asset-intensive industries as compared to other industries.

Option A is a correct statement because, during economic downturns, the recovery rate is lower and the default rate is higher. Option B is consistent because the size of the bond issue is not considered in the estimation of the recovery rate. Option C is consistent because the recovery rate is inversely correlated with the default rate.

Q.916 Iron Partners Co. is a private equity firm that invests in distressed firms through various investment vehicles. Recently, the company acquired a mid-size paper manufacturing company through a leveraged buy-out (LBO). Initially, the equity firm acquired loans from commercial and investment banks to purchase the company. However, the company now issues bonds to pay off the debt of these banks. This activity of issuing debt to retire initial debt is called:

- A. Payment-in-kind (PIKs).
- B. Multi-term notes.
- C. Bridge financing.
- D. Rolling stock certificates.

The correct answer is **C**.

Bridge financing is the financing activity in which the new owners or the acquirers of a company, through LBOs or MBOs, issues new debt or bonds in order to generate funds to retire the initial financing or debt acquired to finance the buyout. It bridges the gap between the LBO and the permanent financing.

Q.917 McMillan Electronics Company issued four types of debt to raise the capital of \$730 million. The debt includes \$400 million raised through secured bonds, \$110 million through subordinate bonds, \$40 million through unsecured loans, and \$180 million through debenture bonds. If the company defaults, the total value of the assets to be distributed is \$670 million. Determine the total claim that the debenture bondholders will receive.

- A. \$180 million
- B. \$160 million
- C. \$120 million
- D. \$0

The correct answer is **A**.

The debenture bondholders have the claim over the issuer's assets after the claim of secured bondholders is satisfied. Though debenture bonds do not have pledged assets or collaterals, the residual funds after satisfying the secured debt (and before satisfying the claims of creditors) are distributed among debenture bondholders.

Since the total value of the firm's asset is \$670 million:

The secured bondholders will receive \$400 million;

The debenture bondholders will receive \$180 million;

The banks will receive \$40 million; and

The subordinate bondholders will receive \$50 million.

Q.3582 The coupon reinvestment risk is directly correlated with which of the following?

- A. Coupon rate
- B. Reinvestment horizon
- C. Both A and B
- D. None of the above

The correct answer is **C**.

The coupon reinvestment risk increases with a higher coupon rate and a longer reinvestment time period.

Q.3583 Which of the following statements about reinvestment risk is INCORRECT?

- A. A fixed coupon bond investor can eliminate reinvestment risk by holding a coupon bond until maturity
- B. A bond's yield calculation assumes that the coupons and the principal can be reinvested at the yield to maturity
- C. An investor concerned about reinvestment risk is most concerned about a decrease in interest rates
- D. Zero-coupon bonds have zero reinvestment risk

The correct answer is **A**.

While an investor in a zero-coupon bond can eliminate reinvestment risk by holding the bond until maturity, the same is not true for a fixed coupon bond. The receipt of periodic coupons exposes the investor to the risk that he will have to reinvest these coupons at a lower rate. Zero-coupon bonds have zero reinvestment risk.

Q.3584 A callable bond is a bond that:

- A. Gives the issuer the right to redeem all or part of the bond before the maturity date
- B. Gives the bondholder the right to sell the bond back to the issuer at a predetermined price before maturity
- C. Gives the bondholder the right to exchange the bond for a specific number of common shares
- D. None of the above

The correct answer is **A**.

A callable bond gives the issuer the right to redeem all or part of the bond before the maturity date. Note: Option B) is a putable bond and option C) is a hybrid bond.

Reading 42: Mortgages and Mortgage-Backed Securities

Q.918 Mortgage-backed loans played a significant role in the 2007-2009 financial crisis. After the crisis, the importance of securitization of these loans increased furthermore. In the United States, there are multiple entities that securitize mortgage loans. Which of the following types of loans is securitized through the Federal National Mortgage Association?

- A. Adjustable-rate mortgage loans.
- B. Non-agency loans.
- C. Jumbos.
- D. Agency loans.

The correct answer is **D**.

Agency loans or conforming loans, which are typically residential loans, are securitized through entities like the Federal National Mortgage Association (FNMA), Government National Mortgage Association (GNMA) and Federal Home Loan Mortgage Corporation (FHLMC) while non-agency or non-conforming loans like Jumbos, Alt-A and adjustable-rate mortgage (ARMs) are securitized through private-label securitization.

Q.919 Mohan Singh, a sales manager at a retail chain, has recently moved to Minnesota with his wife. He purchased a studio apartment with a mortgage loan of \$140,000 at 5% for 20 years. Which of the following is the most appropriate estimation of the monthly installments on this loan?

- A. \$1,004.61
- B. \$923.94
- C. \$763.84
- D. \$340.60

The correct answer is **B**.

The monthly installments of \$923.93 for the monthly periods of 20 years (12x20=240) at the rate of 5% results in the present value of the loan that is \$140,000.

The easiest way to solve this problem is with the help of the financial calculator:

$N=20 \times 12=240$; $I/Y=5/12=0.4167$; $PV=140,000$; $FV=0$; $CPT \Rightarrow PMT=-923.94$

This installment can also be calculated with the simple annuity formula as follows:

$$PV = \text{installment} \frac{[1 - (1 + r)^{-n}]}{r}$$

Since the annual rate of interest is 5%, the monthly rate can be approximated as $5\%/12 = 0.004167$ or 0.4167%

$$\text{Thus, } 140,000 = \text{installment} \frac{[1 - 1.004167^{-240}]}{0.004167}$$

$$\text{Installment} = \frac{140,000}{\left\{ \frac{[1 - 1.004167^{-240}]}{0.004167} \right\}} = \$923.94$$

Q.920 Which of the following is the accurate explanation of a mortgage loan with a prepayment option?

- A. It allows the lender to demand the repayment before the maturity of the loan.
- B. It restricts the borrower from repaying the mortgage before the maturity date.
- C. It allows the borrower to demand the disbursement of the mortgage loan before the agreed disbursement date.
- D. It allows the borrower to repay the mortgage loan before the maturity date of the loan.

The correct answer is **D**.

A prepayment options mortgage loan allows the borrower of the mortgage loan to make a prepayment or repay the mortgage before its predefined maturity date. In a flexible rate mortgage, a borrower can benefit from the prepayment option if the interest rates decline. If the interest rates decline, the present value of future payments will be higher. Hence he can retire the mortgage early.

Q.921 Alison Garry works in a small audit firm in Costa Rica. She and her boyfriend, Peter, recently obtained a mortgage to purchase a condo in a small beach town. The condo was purchased for \$40,000 with the mortgage at 3.25% for 10 years. The mortgage also has a prepayment option. Which of the following statements is the most accurate?

- A. The use of the prepayment option is appropriate if the mortgage rate increases to 3.75%.
- B. The use of the prepayment option is appropriate if the mortgage rate remains at 3.25%.
- C. The use of the prepayment option is appropriate if the mortgage decreases to 3.0%.
- D. None of the above; prepayment is not a function of interest rates.

The correct answer is **C**.

A prepayment option mortgage loan allows the mortgage borrower to pay back the outstanding principal before its predefined maturity date. A mortgage borrower can benefit from the prepayment option if the interest rates decline. The prepayment option is valuable for the borrower when the mortgage rates decline. As the rates will decline, the present value of the remaining monthly payments will be greater than the principal outstanding. Hence, the borrower can gain by paying the principal outstanding in exchange for not having to make further mortgage payments.

Think of this along the lines of refinancing. If rates fall, you can pay off the existing mortgage and take on a new one that will come with lower coupon payments.

Q.922 Ahmed Saeed has recently graduated from the Frankfurt Finance School with a Bachelor's degree. He was invited by a small-size audit firm that provides audit services to small-medium companies and startups to take a test in order to join the firm as a junior risk analyst. In the test, he was asked to identify the definition of securitization. Which of the following is the appropriate definition of securitization?

- A. Securitization is the process of securing the mortgage with a security or collateral, which the lender can use in case of default.
- B. Securitization is the process of setting a bankruptcy-remote entity with the sole purpose issuing bank loans to individual borrowers.
- C. Securitization is the process of setting a bankruptcy-remote entity with the sole purpose of acquiring asset-backed securities (ABSs).
- D. Securitization is the process of converting a group of nonmarketable assets, or expected future cash flows on the assets, into units of marketable securities.

The correct answer is **D**.

Securitization is the process of converting a group of nonmarketable assets, or expected future cash flows on the assets, into units of marketable securities in order to sell the underlying assets in the capital market to generate money for a business. Banks often carry out this process to transfer the risk to the market.

Q.924 Billy Clark is an investment manager at the Sachsenhausen Investment Bank based in Dusseldorf. Clark manages a pool of mortgages and the assets constructed with the pool. If the pool prepaid 1.1% of its principal above its amortizing principal as the percentage of total outstanding principal in the month of February, then which of the following is the appropriate annualized constant prepayment rate he can come up with?

- A. 0.0302
- B. 0.1243
- C. 0.132
- D. 0.1402

The correct answer is **B**.

If the pool prepaid 1.1% of its principal above its amortizing principal as the percentage of total outstanding principal in the month, then its single monthly mortality rate or SMM is 1.1%.

$$\begin{aligned}\text{Constant prepayment rate or CPR} &= 1 - (1 - \text{SMM})^{12} \\ \text{CPR} &= 1 - (1 - 0.011)^{12} = 0.1243\end{aligned}$$

Q.925 The superior of an investment analyst made the following statements to differentiate between prime and sub-prime mortgages. In prime mortgages:

- I. The mortgage borrower has a lower front income ratio
- II. The mortgage borrower has a higher back-end income ratio
- III. Loan-to-value ratios are lower

Which of these statements is/are incorrect?

- A. Statement I only.
- B. Statement II only.
- C. Statement III only.
- D. None of the statement is incorrect.

The correct answer is **B**.

Prime mortgages consist of mortgage borrowers with lower back-end income ratios, lower front-end income ratios, and lower loan-to-value ratios. The back-end income ratio calculates the total monthly debt expenses including debt payment, credit card payments, interest expenses, and insurance expenses, as the percentage of total income. The lower these ratios, the lower the probability of default of the mortgage.

Q.926 Pooja Rao has recently joined Green Oceans Hedge Fund that invests in non-conventional investment assets and securities. Rao was instructed by the fund manager to evaluate four mortgage-backed securities of four different banks, and identify the riskiest MBS. Identify for Rao which of these MBSs has the highest risk.

- A. Prime fixed-rate MBS.
- B. Subprime fixed-rate MBS.
- C. Prime adjustable-rate mortgage.
- D. Subprime adjustable-rate mortgage.

The correct answer is **D**.

Subprime adjustable-rate mortgages are highly risky. Subprime mortgages consist of mortgage loans from mortgage borrowers who have poor creditworthiness and higher loan-to-value and debt-to-income ratios. Therefore, subprime mortgages are riskier than prime mortgages. The adjustable-rate mortgages put the borrower at the risk of higher mortgage payments in case mortgage rates increase. Thus, subprime adjustable-rate mortgages or subprime ARMs are the riskiest MBSs.

Q.927 Adam Levy teaches the finance and investment courses at the Mumbai College of Economics. During one of his lectures on the subject of mortgages and mortgage-backed securities, he mentioned the following four features of a fixed rate level payment mortgage:

- I. The amount of interest payment in a fixed-rate mortgage decreases as the maturity date of the mortgage approaches
- II. The amount of principal payment on a fixed-rate mortgage decreases as time passes
- III. Service fees in a fixed-rate mortgage decline as time passes
- IV. The prepayment risk to the lender of the mortgage increases as the mortgage rates decrease

Which of the above-mentioned features is/are inconsistent with the features of fixed-rate level payment mortgages?

- A. I only.
- B. II only.
- C. I and III.
- D. All of the above features are consistent with fixed-rate mortgages.

The correct answer is **B**.

The amount of principal payment on a fixed rate level payment mortgage increases as time passes. On the other hand, the interest payment and servicing fee decline as the mortgage approaches maturity.

Prepayment risk to the lender of the mortgage increases as the mortgage rates decrease.

Q.928 Boris Arkarov is a Russian real estate investor based in California. He has been investing in the real estate sector of California for the past 20 years and is famous for selling some luxurious villas to well-known Hollywood celebrities. In a magazine interview, Mr. Arkarov expressed that he wants to borrow to finance his personal residential estate in the suburbs of L.A that costs \$10.5 million. If the loan-to-value ratio is 78%, calculate the amount of monthly payment that Mr. Arkarov has to pay on a 20-year mortgage at the rate of 9%.

- A. \$94,471.22
- B. \$73,687.55
- C. \$45,750
- D. \$34,890.74

The correct answer is **B**.

Since the loan-to-value ratio (LTV) is 78%, we can derive the amount of the mortgage.

$LTV = \text{Mortgage amount} / \text{Appraised Value of property}$

$0.78 = \text{Mortgage amount} / 10,500,000$

$\text{Mortgage amount} = 0.78 * 10,500,000 = 8,190,000$

Since we derived the amount of mortgage, we can calculate the mortgage payment using the financial calculator:

$PV = -8,190,000, I/Y = 0.75, N = 240, FV = 0, CPT \rightarrow PMT = 73,687.55$

Q.929 Karen Jacobs, a final year undergraduate student made the following points regarding mortgage pass-through securities. Which of Jacobs' statements is incorrect?

- A. Mortgage pass-through securities represent investors' claim against a pool of mortgages.
- B. All investors in one pool receive the same return.
- C. The cash flows forwarded to those that have invested in a pass-through security exactly match the cash flows generated by the underlying mortgage pool.
- D. Pass-through securities have prepayment risk.

The correct answer is C.

Cash flows to investors of pass-through security do not have to match the cash flows generated by the underlying pool of mortgages. This is due to timing differences. Mortgage providers may not pass the revenue stream received from customers to holders of mortgage pass-through securities immediately after receipt.

A, B, and D are all correct.

All investors have a claim on the underlying pool of mortgages and receive the same return on a pro-rata basis. Specifically, investors get their share of the cash flows from the mortgages in the pool minus the agency's fees for guaranteeing and servicing the mortgages.

Pass-throughs are different from other risk-free investments in that they have prepayment risk. Prepayment behavior depends upon several factors, including interest rates and mortgage balances.

Q.930 An analyst is analyzing the speed of the prepayments of mortgages in a specific city that are pooled into a mortgage-backed security. Suppose that the Public Securities Association (PSA) prepayment benchmark in the city is 100%, and the monthly conditional prepayment rate (CPR) of 20-year mortgages is expected to increase at the rate of 0.5% from the origination until the end of the 12th year. Then, the CPR is expected to increase at the rate of 0.7% until the maturity of the mortgage. Which of the following is the appropriate estimation of a single monthly mortality rate (SMM) for the 40th month?

- A. 0.0004
- B. 0.9313
- C. 1.248
- D. 0.01842

The correct answer is **D**.

Conditional prepayment rate (CPR) of the 40th month with 100% PSA benchmark = $40 * 0.5\% * 1 = 0.2$

$$\begin{aligned}\text{Single monthly mortality rate (SMM)} &= 1 - (1 - \text{CPR})^{\frac{1}{12}} \\ \text{SMM} &= 1 - (1 - 0.2)^{\frac{1}{12}} = 0.01842\end{aligned}$$

Q.931 Fixed-rate mortgage pass-through securities or the fixed-rate mortgage pool can trade in both specified pool markets and to-be-announced (TBA) markets. Which of the following differences between specified pool markets and to-be-announced markets of pass-through securities is/are incorrect?

- I. Specified pool markets identify the number and the balance of the pool prior to the trade, whereas, in TBA markets, the number and the balance are not revealed until the settlement
- II. TBA markets of pass-through securities are more liquid than specified pool markets
- III. Specified pools with high loan balances trade for lower prices

- A. Statement I is incorrect.
- B. Statement II is incorrect.
- C. Statement III is incorrect.
- D. None of the statements are incorrect.

The correct answer is **D**.

None of the statements is incorrect.

Statement I is correct. Specified pool markets identify the number and the balance of the pool prior to the trade, whereas, in TBA markets, numbers and balances are not revealed until the settlement.

Statement II is correct. TBA markets of pass-through securities are more liquid than specified pool markets.

Statement III is correct. Specified pools with high loan balances trade for lower prices.

Further information:

Agency mortgage-backed securities trade simultaneously in a market for specified pools (SPs) and in the to-be-announced (TBA) forward market. TBA trading creates liquidity by allowing thousands of different MBS to be traded in a handful of TBA contracts.

For more information on this:
https://pdfs.semanticscholar.org/caec/42ff06ae1d8e94a805cdd21d64361da52423.pdf?_ga=2.193127597.1227051726.1592487151-929289204.1592487151

Q.932 A dollar roll transaction takes place when an investor purchases an MBS for a specific settlement month and simultaneously sells the MBS for a different settlement month. Dollar rolls are trading “special” when the implied financing rate is below current market rates, which means the implied repo rate is lower than the rate of the repurchase market. Which of the following is NOT a factor that causes dollar rolls to trade “special”?

- A. An increase in the number of settlement transactions for the back-month date by the originators of the MBS.
- B. An increase in the price of the MBS for the front-month settlement.
- C. An increase in the supply of the front-month settlement MBS.
- D. A shortage of MBSs in the market for delivery in the front-month.

The correct answer is C.

Option C is not a factor that causes dollar rolls to trade “special.” A trade special in dollar roll occurs due to the difference in the purchasing rate for the back-month settlement MBS. In other words, it occurs when an investor can purchase the back-month settlement MBS at an implied repo rate lower than that of the repurchase market. Therefore, all the factors that increase the front-month settlement price and decrease the back-month settlement price are factors causing it to trade special. The increase in the supply of the front-month settlement MBS will decrease the price of the front-month settlement MBS. Option C is not a factor that causes dollar rolls to trade “special.”

Q.933 Anna Henderson is a high net-worth individual investor with Galaxy Investments Inc. Anna has recently learned about the investments and returns of mortgage-backed securities. Jacob Glen, a dedicated investment manager, briefed Henderson that she does not need to concern about the contraction risk of mortgage pool as their investment products are designed to mitigate risk. Which of the following is the most appropriate explanation for the contraction risk?

- A. Contraction risk is the risk related to the increase in the expected life of a mortgage pool due to falling interest rates and higher prepayment rates.
- B. Contraction risk is the risk related to the increase in the expected life of a mortgage pool due to increasing interest rates and lower prepayment rates.
- C. Contraction risk is the risk related to the decrease in the expected life of a mortgage pool due to falling interest rates and higher prepayment rates.
- D. Contraction risk is the risk related to the decrease in the expected life of a mortgage pool due to increasing interest rates and lower prepayment rates.

The correct answer is C.

Contraction risk in mortgage-backed securities is the risk that is concerned with the decrease in the expected life of a mortgage pool due to higher prepayment rates caused by falling interest rates. Option B is incorrect because the extension risk, not the contraction risk, is the risk related to the increase in the expected life of a mortgage pool due to increasing interest rates and lower prepayment rates. Options A and D are irrelevant.

Q.934 Adam and Jack are participants in the Green Investment Bank university challenge. The program consists of presentations and strategies related to the complex investment instruments of the bank. The winning team is offered a 6-month internship at the bank. Adam and Jack presented an explanatory presentation on the features of collateralized mortgage obligations (CMOs). Which of the following features from the presentation are incorrect?

- A. Collateralized mortgage obligations (CMOs) are securities issued against mortgage pools.
- B. The cash flows of the CMOs are allocated to a number of different tranches.
- C. Each tranche has an equal claim against the cash flows of the mortgage pools.
- D. Each tranche of CMO has different extension risks and contraction risks.

The correct answer is **C**.

Each tranche of the CMO has a different claim on the cash flows of the mortgage pools. Options A, B, and C are correct features of the CMOs. A CMO is a security securitized by another security i.e. mortgage pool. Each tranche of a CMO has different allocations and claims on cash flows of the mortgage pools.

Note that, pass-through securities are a pool of securities that are backed by a pool of assets. And infact, mortgage-backed security(MBS) is the most common type of pass-through securities.

Q.935 The Planned Amortization Class (PAC) is the most common and most widely traded tranche of collateralized mortgage obligations (CMOs). Which of the following features is the most inconsistent feature of a PAC tranche?

- I. The amortization of a PAC tranche is based on the sinking fund schedule that must prepay the tranche within initial PAC collars
- II. A PAC tranche is available with a support tranche, which is created from the original mortgage pool
- III. If prepayment rates are higher than the upper repayment rate of PAC collars, then the support tranche absorbs the excess principal, and the PAC tranche receives the scheduled principal

- A. Feature I is inconsistent.
- B. Feature II is inconsistent.
- C. Feature III is inconsistent.
- D. None of the features are inconsistent.

The correct answer is **D**.

Option D is correct because none of the mentioned features are inconsistent with the actual features of the Planned Amortization Class (PAC) tranche of collateralized mortgage obligation (CMOs). The principal repayment of the PAC is based on a sinking fund amortization schedule, which comes along with the initial PAC collars that set the prepayment rates. Every PAC tranche comes with a support tranche which absorbs the excess principal if the actual prepayment rate of the principal is greater than the defined prepayment rate of the PAC tranche collar and vice versa.

Q.936 GrossHaus Investment Bank is one of the largest German investment banks that has more than 38% market share in financing residential and commercial properties. GrossHaus is not only involved in the mortgage business, but it also issues securities to its investors against mortgage pools. Robin Frazer has recently purchased a security from a bank that gives him a claim to the principal portion of a mortgage payment on a mortgage pool. Which of the following securities has Frazer has purchased from the bank?

- A. A planned amortization class tranche (PAC).
- B. A collateralized mortgage obligation (CMO).
- C. A strip.
- D. A mortgage back security (MBS).

The correct answer is C.

Unlike traditional CMOs, MBSs, and PACs, strips enable the investor to separately purchase the principal portion and interest portion of the mortgage payments on the mortgage pool. The principal-only strips (PO) are conventionally sold at a discount. The PO strips increase in size with the passage of time as the principal component of the mortgage grows, while the interest-only (IO) strips grow smaller with the passage of time as the principal due on the mortgage decreases.

Q.937 Since the mortgage borrowers have the option to prepay the underlying securities at any time, the valuation of the mortgage securities with this embedded options is not possible with the traditional valuation model. One of the mortgage securities valuation model uses probability distributions to value securities. In other words, it values the securities by allocating different probabilities to the multiple variables like future interest rate, shape of the yield curve, default rate, prepayment rate, etc. Which of the following models uses this approach?

- A. Binomial model approach.
- B. Best guess approach.
- C. Monte Carlo simulation.
- D. Black-Scholes Model.

The correct answer is C.

The Monte Carlo simulation is widely used to value mortgage securities with a traditional embedded option of prepaying the mortgage before its scheduled date. The Monte Carlo simulation uses probability distribution of the values of an MBS. It values the securities by allocating different probabilities to the multiple variables like future interest rate, shape of the yield curve, default rate, prepayment rate, recovery rate, and interest rate volatility. The Monte Carlo simulation provides a number of outcomes based on their probabilities, and the average of these outcomes is taken as the value of the MBS.

Q.1144 Consider the following risks:

- I. Interest rate risk
- II. Pre-payment risk
- III. Default risk
- IV. Credit risk

Mortgage-Backed Securities (MBS) are exposed to which of these risks?

- A. I
- B. I, II & III
- C. I, II, III & IV
- D. II, III & IV

The correct answer is C.

The risks to which MBS is exposed are:

1. Interest rate risk: An increase in interest rate increases the probability of default as the interest burden on the borrower increases
 2. Prepayment risk: If the interest rate decreases, the borrower may refinance its mortgage and prepay the existing mortgage
 3. Default risk: The borrower may not repay for various reasons
 4. Credit risk: The borrower may default on the debt
-

Q.3456 Suppose that an investor owns a pass-through security with an initial principal of \$500 million. The remaining mortgage balance at the beginning of a certain month is \$400 million. Assuming that the SMM is 0.4125% and the scheduled principal payment is \$5 million, the estimated *prepayment for the month* is:

- A. \$1.65 million
- B. \$1.25 million
- C. \$2.04 million
- D. \$1.63 million

The correct answer is **D**.

Note: We only take into account the remaining mortgage balance, not the initial amount of principal.

$$\begin{aligned}\text{Prepayment for month } i(\text{in } \$) &= \text{SMM}(\text{beginning balance} - \text{scheduled principal repayment } i) \\ &= 0.4125\%(\$400\text{m} - \$5\text{m}) = \$1,629,375\end{aligned}$$

Q.3457 A fund holds \$10 million nominal of the GNMA 5.5% 30-year bond. It enters into a one-month dollar roll with a repo dealer bank in which it sells the security at a price of 100-08 and buys it back at a forward price of par. Assuming that the security experiences a 2% paydown (scheduled principal plus prepayments) during the term of the trade, estimate the value of the drop.

- A. \$225,000
- B. \$22,500,000
- C. \$800,000
- D. \$250,000

The correct answer is **A**.

Drop is the price difference between the front month, i.e., month of sale, and the back month, i.e., the month of purchase.

The bonds are sold for 100-08, hence proceeds = $\$10\text{m}(100 + 8/32)/100 = \$10,025,000$

Purchasing the security at par in the back month, bearing in mind that the security has experienced a 2% paydown, will cost:

$$\$10\text{m} \times (1 - 2\%) \times (100/100) = \$9,800,000$$

$$\text{Drop} = \$10,025,000 - \$9,800,000 = \$225,000$$

Q.3458 Consider a pool of mortgages that were issued exactly 16 months ago at an effective interest rate of 6% p.a.(they are beginning the 17th month). What is the CPR and what is the SMM assuming 150 PSA?

- A. CPR = 0.2141%; SMM = 0.01786%
- B. CPR = 4.8%; SMM = 0.409%
- C. CPR = 5.1%; SMM = 0.4353%
- D. CPR = 3.4%; SMM = 0.2878%

The correct answer is **B**.

Assuming 100 PSA

$$\text{CPR}(\text{month } t \mid t \leq 30) = 6\% \times t/30$$

$$\text{CPR}(\text{month } 17) = 6\% \times 16/30 = 3.2\%$$

$$150 \text{ PSA implies that } \text{CPR}(\text{at the beginning of month } 17) = 1.5 \times 3.2\% = 4.8\%$$

$$\text{SMM} = 1 - (1 - \text{CPR})^{1/12} = 1 - (1 - 0.048)^{1/12} = 0.409\%$$

Note: The Public Securities Association model prepayment benchmark is one of the models used to estimate the monthly rate of prepayment. It is based on the assumption that rather than remaining constant, the monthly repayment rate gradually increases as a mortgage pool ages. The model assumes that:

(I) CPR = 0.2% for the first month after origination, increasing by 0.2% every month up to 30 months

(II) CPR = 6% for months 30 to 360

Q.3459 TBA prices of the Freddie Mac 5% for June 10 and July settlements are \$104.20 and \$103.00, respectively. The accrued interest to be added to each of these prices is \$0.160. The expected total principal paydown (scheduled principal plus prepayments) is 2% of the outstanding balance and the prevailing short-term rate is 1.5%. Also, assume that the actual/360-day convention is applied. An investor wishes to roll a balance of \$10 million. Determine the value of the role.

- A. \$436,000
- B. \$13,045
- C. \$109,680
- D. \$97,698

The correct answer is **D**.

Proceeds from selling the June 10 TBA are: $\$10\text{m} \times (104.20 + 0.160)/100 = \$10,436,000$

Investing these proceeds to July 10 at 1.5% interest earns interest of: $\$10,436,000 \times 30/360 \times 1.5$

Purchasing the July 10 TBA, which has experienced a 2% paydown, will cost: $\$10\text{m} \times (1 - 2\%) \times (103.0 + 0.160)/100 = \$10,109,680$

Net proceeds from the roll therefore are: $\$10,436,000 + \$13,045 - \$10,109,680 = \$339,365$

If the investor does not roll, the net proceeds are the coupon plus principal paydown: $\$10\text{m} \times (5\%/12 + 2\%) = \$241,667$

Value of the roll = net proceeds from the roll - net proceeds without roll: $= \$339,365 - \$241,667 = \$97,698$

Q.3460 A mortgage-backed portfolio includes four mortgage investments as follows:

- Mortgage 1: \$140,000 in current value, 5% interest rate, 5 years remaining duration
- Mortgage 2: \$100,000 in current value, 4% interest rate, 6 years remaining duration
- Mortgage 3: \$50,000 in current value, 6% interest rate, 3 years remaining duration
- Mortgage 4: \$60,000 in current value, 3% interest rate, 2 years remaining duration

What is the weighted average coupon of the portfolio?

- A. 4.5%
- B. 5.1%

C. 4.9%

D. 4.0%

The correct answer is **A**.

The weighted average coupon (WAC) is the weighted-average interest rate of mortgages that underlie a mortgage-backed security (MBS) at the time the securities were issued. It represents the **average interest rate** of a pool of mortgages with varying interest rates.

Total value of portfolio = \$140,000 + \$100,000 + \$50,000 + \$60,000 = \$350,000

We then compute the percentage value of each mortgage:

- Mortgage 1 %value = $\$140,000 / \$350,000 = 40\%$
- Mortgage 2 %value = $\$100,000 / \$350,000 = 28.6\%$
- Mortgage 3 %value = $\$50,000 / \$350,000 = 14.3\%$
- Mortgage 4 %value = $\$60,000 / \$350,000 = 17.1\%$

The percentage values of each mortgage are then multiplied by their respective interest rates:

- $40\% * 5\% = 2\%$
- $28.6\% * 4\% = 1.1\%$
- $14.3\% * 6\% = 0.9\%$
- $17.1\% * 3\% = 0.5\%$

The resulting figures are then totaled to produce a WAC of approx. 4.5%.

Q.3461 A mortgage-backed portfolio includes four mortgage investments as follows:

- Mortgage 1: \$150,000 in current value, 5% interest rate, 5 years remaining duration
- Mortgage 2: \$100,000 in current value, 6% interest rate, 6 years remaining duration
- Mortgage 3: \$50,000 in current value, 4% interest rate, 3 years remaining duration
- Mortgage 4: \$80,000 in current value, 7% interest rate, 2 years remaining duration

What is the weighted average maturity (n years) of the portfolio?

- A. 4.4
- B. 5.1
- C. 4.9
- D. 4.0

The correct answer is **A**.

Weighted average maturity (WAM) is the weighted average amount of time until the maturities on mortgages in an MBS.

Total value of portfolio = \$150,000 + \$100,000 + \$50,000 + \$80,000 = \$380,000

We then compute the percentage value of each mortgage:

- Mortgage 1 %value = $\$150,000 / \$380,000 = 39.5\%$
- Mortgage 2 %value = $\$100,000 / \$380,000 = 26.3\%$
- Mortgage 3 %value = $\$50,000 / \$380,000 = 13.2\%$
- Mortgage 4 %value = $\$80,000 / \$380,000 = 21\%$

The percentage values of each mortgage are then multiplied by the remaining duration until maturity:

- $39.5\% * 5 \text{ years} = 1.975 \text{ years}$
- $26.3\% * 6 \text{ years} = 1.578 \text{ years}$
- $13.2\% * 3 \text{ years} = 0.396 \text{ years}$
- $21\% * 2 \text{ years} = 0.42 \text{ years}$

The resulting figures are then totaled to produce a WAM of approx. 4.4 years

Q.3462 A mortgage-backed security has the amortization schedule:

Month	Month 1	Month 2	Month 3
Total payment	\$2, 590.96	\$2, 590.96	\$2, 590.96
Principal	\$1, 653.46	\$1, 663.18	\$1, 672.89
Interest	\$937.50	\$927.78	\$918.07
Loan balance	\$247, 409.04	\$244, 818.08	\$242, 227.12

Given that the conditional prepayment rate (CPR) is 4%, determine the anticipated prepayment for month 2 in dollars.

- A. \$831.40
- B. \$825.75
- C. \$834.55
- D. \$840.20

The correct answer is C.

Prepayment for Month i (in \$) = SMM(Beginning Balance - Scheduled Principal Repayment in Month i)

Where SMM is the single monthly mortality rate, i.e., CPR expressed monthly

$$\text{SMM} = 1 - (1 - \text{CPR})^{\frac{1}{12}} = 1 - (1 - 0.04)^{\frac{1}{12}} = 0.3396\%$$

$$\text{Prepayment for Month 2} = 0.3396\%(247, 409.04 - 1, 663.18) = \$834.55$$

Note:

(I) CPR is always expressed as a percentage, compounded **annually**.

(II) The beginning balance in the second month is also the ending balance in month 1, i.e., \$247,409.04. In the same vein, \$244,818.08 is the ending balance in month 2 (or the beginning balance in month 3).

Note also that

Total Payments = Principal Payments + Interest Payments.

Q.3463 Consider the following residential mortgage:

- Loan amount: \$500,000

- Annual rate of interest: 5.5% (fixed)
- Term: 10 years
- Start date: 01/01/2019

If payments are made monthly, what is the amortized amount for the 10-year loan?

- A. \$5,520.00
- B. \$5,426.21
- C. \$5,225.50
- D. 4,834.55

The correct answer is **B**.

A fixed-rate mortgage is a mortgage loan that has a fixed interest rate for the entire term of the loan. Equal payments are made over the life of the mortgage.

$$PMT = \frac{\text{Principal}}{\left(\frac{1-(1+r)^{-n}}{r}\right)}$$

Where:

PMT = amortized amount for each month

r = monthly interest rate (annual rate/12)

n = total number of months

r = 0.055/12 = 0.004583, n = 10 * 12 = 120

$$PMT = \frac{500,000}{\left(\frac{1-(1+0.004583)^{-120}}{0.004583}\right)} = \$5,426.21$$

On a financial calculator,

n = 120;

I/Y = 0.4583 (5.5/12);

PV = -500,000;

$$FV = 0;$$

$$CPT \Rightarrow PMT = \$5,426.21$$

Q.3464 A 30-year \$150,000 mortgage has a fixed mortgage rate of 6 percent compounded monthly. What portion of the first payment is the principal?

- A. \$150
- B. \$149.33
- C. \$500
- D. \$750

The correct answer is **B**.

A fixed-rate mortgage is a mortgage loan that has a fixed interest rate for the entire term of the loan. Equal payments are made over the life of the mortgage.

$$PMT = \frac{\text{Principal}}{\left(\frac{1-(1+r)^{-n}}{r}\right)}$$

Where:

PMT = amortized amount for each month

r = monthly interest rate (annual rate/12)

n = total number of months

$$r = 0.06/12 = 0.005, n = 30 * 12 = 360$$

$$PMT = \frac{150,000}{\left(\frac{1-(1+0.005)^{-160}}{0.005}\right)} = \$899.33$$

On a financial calculator,

$$N = 360;$$

$$I/Y = 0.005 (0.06/12);$$

$$PV = -150,000;$$

$$FV = 0;$$

$$CPT \Rightarrow PMT = \$899.33$$

The interest portion for a month is equal to the mortgage balance at the beginning of the month (\$150,000 in this case) multiplied by the interest rate per month.

$$\text{Interest portion} = 0.005 * 150,000 = \$750$$

The remaining portion of the payment, $\$899.33 - \$750 = \$149.33$, goes to reduce the principal balance.

Q.3465 Consider a 15-year \$500,000 mortgage with a 6 percent interest rate. After 10 years, the borrower (the mortgage issuer) pays it off. How much will the lender receive?

- A. \$180,000
- B. \$220,000
- C. \$6,313
- D. \$218,245

The correct answer is **D**.

We first need to know the monthly payment, PMT.

$$PMT = \frac{\text{Principal}}{\left(\frac{1-(1+r)^{-n}}{r}\right)}$$

Where:

PMT = amortized amount for each month

r = monthly interest rate (annual rate/12)

n = total number of months

$$r = 0.06/12 = 0.005, n = 15 * 12 = 180$$

$$PMT = \frac{500,000}{\left(\frac{1-(1+0.005)^{-180}}{0.005}\right)} = \$4,219.28$$

On a financial calculator,

$n = 180$;

$I/Y = 0.5$ (6/12); (when using the financial calculator, we input the rates in percentage form. In this case, $0.005 = 0.5\%$)

$PV = -500,000$;

$FV = 0$;

$CPT \Rightarrow PMT = \$4,219.28$

From this point, there are two ways to go: First. We could construct an amortization table for the mortgage, but this would consume a lot of time. But there's a simpler approach. After 10 years, we can treat this mortgage as though it were a 5-year mortgage with payments of \$4,219.28 and an interest rate of 6 percent. We can then solve for the mortgage balance using the same formula.

$$4,219.28 = \frac{\text{Principal}}{\left(\frac{1 - (1 + 0.005)^{-60}}{0.005} \right)}$$

Solving for the principal gets us \$218,245

Q.3466 Which of the following statements about fixed-rate mortgages is false, from the investor's perspective?

- A. 30-year mortgages have lower monthly payments than 15-year mortgages
- B. Scheduled monthly payments are constant over the life of the mortgage
- C. Actual monthly payments may vary over the life of the mortgage
- D. Absent of defaults, the actual monthly payments are never higher than scheduled monthly payments

The correct answer is **D**.

Apart from defaults, prepayment is undoubtedly one of the key issues an investor in MBSs would want to keep an eye on. Prepayments speed up principal repayments and also reduce the amount of interest paid over the life of the mortgage. Thus, they can adversely affect the amount and timing of cash flows. Thus, D is incorrect, but C is correct.

A is correct. Given a specified principal amount X, the longer the maturity, the lower the scheduled monthly payments.

B is also correct. A fixed-rate mortgage is a mortgage loan that has a fixed interest rate for the entire term of the loan. However, with each payment that passes, the proportion of interest decreases while that of principal increases.

Q.3467 Consider a 15-year \$500,000 mortgage with a rate of 6 percent. Ten years into the mortgage, rates have fallen to 5 percent. What would be the monthly saving to a homeowner from refinancing the outstanding mortgage balance at the lower rate? (Round your answer to the nearest unit.)

- A. \$265
- B. \$101
- C. \$0
- D. \$111

The correct answer is **B**.

We first need to know the monthly payment, PMT.

$$PMT = \frac{\text{Principal}}{\left(\frac{1 - (1+r)^{-n}}{r}\right)}$$

Where:

PMT = amortized amount for each month

r = monthly interest rate (annual rate/12)

n = total number of months

$r = 0.06/12 = 0.005$, $n = 15 * 12 = 180$

$$PMT = \frac{500,000}{\left(\frac{1-(1+0.005)^{-180}}{0.005}\right)} = \$4,219.28$$

On a financial calculator,

n = 180;

I/Y = 0.5 (6/12); ; (not 0.005, because it's already in percentage format)

PV = -500,000;

FV = 0;

CPT = PMT = \$4,219.28

From this point, there are two ways to go: First. We could construct an amortization table for the mortgage, but this would consume a lot of time. But there's a simpler approach. After 10 years, we can treat this mortgage as though it were a 5-year mortgage with payments of \$4,219.28 and an interest rate of 6 percent. We can then solve for the mortgage balance using the same formula.

$$4,219.28 = \frac{\text{Principal}}{\left(\frac{1-(1+0.005)^{-60}}{0.005}\right)}$$

Solving for the principal gets us \$218,245

For comparability, we calculate the new payments assuming a loan of \$218,245, a 5-year life, and a rate of 5 percent.

$$\text{PMT} = \frac{218,245}{\left(\frac{1-(1+0.004167)^{-60}}{0.004167}\right)} = \$4,118.59$$

Thus, the saving is approx.

\$101 per month (\$4,219.28 – \$4,118.59 = \$100.69).

Note: it would be misleading to compare the payments on the old loan to a new, 15-year loan.

Q.3585 The Public Securities Association (PSA) prepayment benchmark assumes that the monthly prepayment rate for a mortgage pool:

- A. Remains constant for the first 30 months and then increases by 0.2% for months 30 to 360
- B. Increases by 0.2% every month up to 30 months
- C. Decreases by 0.2% every month up to 30 months
- D. Remains constant for the first 30 months and then decreases by 0.2% for months 30 to 360

The correct answer is **B**.

The Public Securities Association (PSA) prepayment benchmark assumes that the monthly prepayment rate for a mortgage pool increases as it ages (becomes seasoned). The PSA is expressed as a monthly series of Conditional Prepayment Rates (CPRs). The model assumes that:

- CPR = 0.2% for the first month after origination, increasing by 0.2% every month up to 30 months; and
- CPR = 6% for months 30 to 360

A mortgage pool whose prepayment speed (experience) is in line with the assumptions of the PSA model is said to be 100% PSA. Similarly, a pool whose prepayment experience is two times the CPR under the PSA model is said to be 200% PSA (or 200 PSA).

Q.3586 During periods of falling interest rates, the refinancing of mortgage loans will:

- A. Accelerate prepayments and reduce the average life of the MBS
- B. Decelerate prepayments and increase the average life of the MBS
- C. Accelerate prepayments and increase the average life of the MBS
- D. Decelerate prepayments, but and decreases the average life of the MBS

The correct answer is **A**.

During periods of falling interest rates, the refinancing of mortgage loans will accelerate prepayments and reduce the average life of the MBS.

Q.3587 Which of the following are considered as weights while determining the weighted average maturity of a mortgage pass-through security?

- A. Time to maturity as a percentage of the total life of the security
- B. Remaining principal of the i^{th} mortgage to the total principal
- C. Absolute value of coupon payments due
- D. Remaining number of months to maturity for each mortgage loan

The correct answer is **B**.

Generally,

$$WAL = w_i L_i$$

Where:

L_i = remaining life of the i^{th} mortgage

w_i = weight and is given by:

$$w_i = \frac{P_i}{\sum_{i=1}^n P_i}$$

Where P_i is the remaining principal of the i^{th} mortgage

Reading 43: Interest Rate Futures

Q.685 Tony Ingram is a junior portfolio analyst at BBV Pension Fund Inc. The pension fund invests in assets such as Treasury bonds, municipal bonds, and other less risky assets. BBV's portfolio contains a Treasury bond of the U.S. government that pays semiannual interest of 7% on January 1st and July 1st. If Ingram wants to calculate the interest earned on the Treasury bond between July 1st and October 11th, then which of the following day count convention is most suitable?

- A. 100 days / 184 days
- B. 100 days / 180 days
- C. 102 days / 180 days
- D. 102 days / 184 days

The correct answer is **D**.

To measure the interest earned/accrued on Treasury bonds, we use the actual number of days between the dates/actual number of days between reference periods.

Actual days between July 1st and October 11th = 102 days

Actual days between July 1st and January 1st = 184 days

Note: For measuring the interest earned on municipal bonds and corporate bonds, we use the 30 days per month convention or the 30/360 convention. For measuring the interest earned on money market instruments, we use the actual days divided by 360 days per year convention, and, in some countries, we also use 365 days in a year.

Q.686 An investment manager at Galaxy Investments Co. is analyzing the interest earned on the corporate bond of Aero Supermarts, a chain of grocery stores. The bond pays semiannual interest of 13% on March 1st and September 1st. Using the appropriate day count convention, determine the interest earned on the bond between September 1st and February 12th.

- A. 6.5%
- B. 5.92%
- C. 5.81%
- D. 5.87%

The correct answer is C.

For measuring the interest earned on municipal bonds and corporate bonds, we use the 30 days per month convention or 30/360 convention.

Days between September 1st and February 12th (30 days convention) = 161 days

Days between September 1st and March 1st (30 days convention) = 180 days

Therefore, the interest earned is:

$$6.5\% * \frac{161}{180} = 5.81\%$$

To measure the interest earned/accrued on Treasury bonds, we use the actual number of days between the dates/actual number of days between reference periods. For measuring interests earned on money market instruments, we use the actual days divided by 360 days per year convention and, in some countries, 365 days per year is also used.

In all-day count conventions, the last day is always excluded. In this case, we are interested in the number of days between September 1st and February 12th.

Therefore, we will assume that the months of Sept, Oct, Nov, Dec, and Jan have 30 days each and then add 11 days in Feb. That gives a total of 161 days.

Q.687 Fahim Zakaria, a fund manager based in Qatar, manages a sovereign fund for the Qatari government. The fund has more than \$12.6 billion in assets under management. The fund invests only in the shares of blue-chip firms and the sovereign bonds/bills of different countries. If the manager wants to include a 164-days U.S. Treasury bill which is quoted as 9, then what is the cash price of the bill?

- A. \$96
- B. \$95.9
- C. \$93.7
- D. \$91

The correct answer is **B**.

The cash price of the bill can be calculated with the following formula:

$$\text{Discount} = \left(\frac{\text{No. of days to maturity}}{360 \text{ days}} \right) * \text{Quoted price}$$

$$\text{Discount} = \left(\frac{164}{360} \right) * 9 = \$4.1$$

$$\text{Cash price} = \text{Face Value} - \text{Discount} = 100 - 4.1 = \$95.9$$

Note that,

$$Q = \frac{360}{n}(100 - C)$$

and we can thus make C the subject,

$$C = 100 - \frac{n}{360}Q$$

So, following the last formula, Discount = $\frac{n}{360}Q$

Where

C=Cash price

Q= Quoted price

Q.688 Silvia Hank is the head of the fixed-income investment unit of a large investment bank in Malaysia. The human resources department has recently hired a junior analyst under supervision. The junior analyst has no experience in the investment industry, but he is a skilled statistician, which can be useful for conducting quantitative research. Hank instructed the analyst to calculate the cash prices of Treasury bills based on their quoted prices. However, she believes that the cash price and the quoted price that the junior analyst provided may be incorrect. Which of the following prices and quotes is/are incorrect?

- I. The price of the 136-day Treasury bill which is quoted as 8 is \$98
- II. The price of a 90-day Treasury bill which is quoted as 13 is \$96.75

- A. The price of the 136-day Treasury bill is incorrectly calculated
- B. The price of the 90-day Treasury bill is incorrectly calculated
- C. The price of both the 136-day and the 90-day Treasury bills are incorrectly calculated
- D. The price of both the 136-day and the 90-day Treasury bills are correctly calculated

The correct answer is **A**.

The price of 136-day Treasury bills is incorrectly calculated. The following is the formula used to calculate the cash price of Treasury bills:

$$\text{Discount} = \left(\frac{\text{No. of days to maturity}}{360 \text{ days}} \right) * \text{Quoted price}$$

$$\text{Discount} = \left(\frac{136}{360} \right) * 8 = \$3.02$$

$$\text{Cash price} = \text{Face Value} - \text{Discount} = \$100 - \$3.02 = \$96.97$$

The relationship between cash prices and quoted prices can be verified through the following formula:

$$\text{Quoted price} = \frac{(360)}{\text{no. of days to maturity} * (100 - \text{Cash price})}$$

$$\text{Quoted price} = \frac{360}{136 * (100 - 96.97)} = 8$$

Q.689 Lucy Anderson is working for one of Canada's largest investment banks, where she is responsible for the training of a new batch of fixed-income investment analysts. During the training session on the subject of Treasury bills and Treasury bonds, she made the following two statements regarding the price of Treasury bonds:

I. The clean price of the bond includes the quoted price plus the accrued interest on that bond, which is why sellers of the bond prefer clean price quotes.

II. The dirty price of the bond is equal to the clean price minus accrued interests. The dirty price is also considered as equal to the quoted price. Since it doesn't pay accrued interest to the seller of the bond, it is regarded as a dirty price.

Which of Anderson's statements is/are inconsistent with the definition of clean price and dirty price?

- A. The definition of the clean price is incorrect.
- B. The definition of the dirty price is incorrect.
- C. Both clean and dirty price definitions are incorrect.
- D. None of the definitions are incorrect.

The correct answer is **C**.

Both definitions provided by Anderson are incorrect.

The clean price of a Treasury bond is equal to the quoted price. It can also be written as the dirty price minus accrued interests.

Clean price = Quoted price

OR

Clean price = Dirty price - Accrued interest since last coupon date

The dirty price of a Treasury bond includes the quoted price plus the accrued interest on that bond.

Dirty price = Quoted price (clean price) + Accrued interest

Q.690 An analyst wishes to estimate the dirty price of a \$100,000 face value Treasury bond with an annual coupon of 8% paid semiannually on December 10th and on June 10th. The bond was purchased on April 8, 2017, when the quoted price was 93-8. If the Treasury bond's maturity date is December 10th, 2020, what is the bond's dirty price?

- A. \$93,250
- B. \$94,865
- C. \$95,125
- D. \$95,865

The correct answer is **D**.

We will calculate the dirty price of the bond using the following steps:

Let's assume the face value of the bond is \$100, and an 8% coupon bond will pay \$4 on June 10th and December 10th.

Since the bond was purchased on April 8th, 2017, the last coupon was paid on December 10th, 2016.

The number of actual days from December 10th to April 8th is 119 days.

The number of actual days between December 10th and June 10th is 182 days.

$$\text{Accrued interest} = 119 / 182 * \$4 = \$2.615$$

The quoted price of 93-8 is equal to $\$93 + 8/32$, as the Treasury bond prices are quoted in dollars and thirty-seconds of a dollar.

$$\text{Dirty price} = \text{Quoted price} + \text{Accrued interest} = \$93.25 + \$2.615 = \$95.865$$

or \$95,865 with the face value of \$100,000

Q.691 Futures contracts on Treasury bonds are well-known investment instruments for large investment banks and sovereign funds. Such futures include a large variety of Treasury bonds with maturities ranging from 15 to 25 years. Since the deliverable bonds under the futures contracts have different market values, the exchanges have taken a measure for adjusting the price received by the short position holder in the futures contracts according to the specific Treasury bond or note delivered.

Which of the following is that measure?

- A. Dirty price
- B. Convexity adjustment
- C. Conversion factor
- D. Clean price

The correct answer is C.

The conversion factor is that measure that the exchanges have taken for adjusting the prices of Treasury bond futures as the deliverable bonds under the futures contracts have different market values. The conversion factor is used to estimate the price received by the short party of the bond. The applicable quote price for the bond delivered is the product of the conversion factor and the futures contract's most recent settlement price.

The cash received by the short party = (Most recent settlement price * Conversion factor) + Accrued interest

Option A is incorrect: The dirty price of a bond – also known as the cash price – is the price that includes the present value of all of the bond's cash flows, including the interest accruing on the next coupon payment date. It's the price the issuer of the bond must be paid by the investor in order to dispense with the bond. The dirty price comprises the quoted price and accrued interest.

Option B is incorrect: While interest rate payments are made at the end of the contract in forward rate agreements, interest rate payments are made at the beginning of the contract in a Eurodollar futures contract. Convexity adjustments are therefore made when estimating the forward rate from Eurodollar futures quotes. The issue with timing is solved using convexity adjustment.

Option D is incorrect: The clean price of a bond is the price that excludes the interest that has accrued since the most recent coupon payment. It's also known as the quoted price.

Q.692 Amy Jackson, a fixed investment manager at Flaxes Investment Company headquartered in Toronto, has a short position in 15-year Treasury bond contracts with a \$100,000 face value for each contract. The last quoted price of the contract is 91-28, while the accrued interest on the bond is \$3.29 (for \$100 face value). If the conversion factor for the deliverable bond under the contract is 1.471, then which of the following is true?

- A. The cash received by the short-position party is \$138,438.
- B. The cash paid by the short-position party is \$138,438.
- C. The cash paid by the short-position party is \$139,987.
- D. The cash received by the short-position party is \$139,987.

The correct answer is **A**.

Amy has a short position in the contract. Therefore,

$$\begin{aligned}\text{Cash received by the short-position party} &= (\text{Most recent settlement price} * \text{Conversion factor}) + \text{Ac} \\ &= (91 + \frac{28}{32}) * 1.471 + \$3.29 = \$138,438\end{aligned}$$

or \$138,438 for a \$100,000 face value contract

Q.693 An investor with a short position is about to deliver a bond and has four bonds to choose from which as listed in the following table. The last settlement price (quoted futures price) is \$96.25. Determine which bond is the cheapest-to-deliver.

Bond	Quoted bond price	Conversion factor
1	99	1.02
2	122	1.22
3	107	1.1
4	112	1.15

- A. Bond 1
- B. Bond 2
- C. Bond 3
- D. Bond 4

The correct answer is **A**.

The CTD bond minimizes the following:

$$\text{quoted bond price} - (\text{QFP} \times \text{CF})$$

Where:

QFP = quoted futures price (most recent settlement price)

CF = conversion factor for the bond delivered

The expression above calculates the cost of delivering the bond.

Thus, we can compute the cost of delivery of each bond as follows:

Bond 1: $99 - (96.25 \times 1.02) = \0.83

Bond 2: $122 - (96.25 \times 1.22) = \4.58

Bond 3: $107 - (96.25 \times 1.1) = \1.13

Bond 4: $112 - (96.25 \times 1.15) = \1.31

Bond 1 is the cheapest to deliver with a cost of delivery of \$0.83.

Q.694 Matias Agrov runs an independent investment advisory and investment education services business in Moscow. His investment advisory services are focused on fixed-income investments and interest rate futures, which he renders to high net worth individuals and small corporations. He also conducts weekly free webinars to educate beginner investors on interest rates futures and derivatives. In one of his weekly webinars, he made the following statements in order to get rid of any confusion about prices of Treasury bond derivatives:

I. The cash price of a Treasury bond is also the dirty price of the same bond

II. The quoted price of a Treasury bond is also the clean price of the same bond

Which of his statements is/are correct?

A. Only statement I is correct.

B. Only statement II is correct.

C. Both statements are correct.

D. None of the statements is correct.

The correct answer is C.

Both statements are correct. The cash price of a Treasury bond is also the dirty price of the same Treasury bond, and the quoted price of a Treasury bond is also the clean price of the same bond.

Q.695 Since there is a large universe of Treasury bonds and futures contracts on those bonds, there is a large number of Treasury bonds available to be delivered at any point in a month. However, due to the imperfection of conversion factors used by exchanges, at times it is cheaper to deliver one bond as compared to another bond. Which of the following options truly defines the cheapest-to-deliver option?

- A. The cheapest-to-deliver option allows the long position holder of the futures contract on a Treasury bond to choose which is the cheapest bond to receive.
- B. The cheapest-to-deliver option allows the long position holder of the futures contract on a Treasury bond to choose which is the cheapest bond to deliver.
- C. The cheapest-to-deliver option allows the short position holder of the futures contract on a Treasury bond to choose which is the cheapest bond to receive.
- D. The cheapest-to-deliver option allows the short position holder of the futures contract on a Treasury bond to choose which is the cheapest bond to deliver.

The correct answer is **D**.

The cheapest-to-deliver option allows the short position holder of the futures contract on a Treasury bond to choose which is the cheapest bond to deliver. This is due to the imperfection of conversion factors used by exchanges, which at times make it cheaper to deliver one bond as compared to another bond.

Option A is incorrect since it contradicts option D

Option B is incorrect; the short position holder (not the long position holder) chooses the cheapest bond to deliver.

Option C is incorrect; the short position holder chooses the cheapest bond to deliver(not to receive).

Q.696 Henry Louis is a derivative investment manager at the Global First Investment Bank in Singapore. He manages a portfolio of fixed income assets and interest rate futures. He currently has a short position in a futures contract on GILTS (U.K. equivalent to U.S. Treasury securities). As the delivery month is approaching, the manager has to choose the cheapest-to-deliver bond from the four available bonds. If the last settlement price is 95-16, which of the following bond is the cheapest to deliver?

Bond	Quoted bond price	Conversion factor
A	\$99	1.011
B	\$97	1.001
C	\$103	1.069
D	\$107	1.072

A. Bond A

B. Bond B

C. Bond C

D. Bond D

The correct answer is C.

The cheapest-to-deliver bond among the four available bonds is Bond C. To find out cheapest-to-deliver bond, we will use the following formula:

$$\text{Cost of delivery} = \text{Quoted bond price} - (\text{Last settlement price} \times \text{Conversion factor})$$

Bond	Quoted bond price	Conversion factor	Cost of delivery
A	\$99	1.011	$\$99 - (95.5 \times 1.011) = \2.45
B	\$97	1.001	$\$97 - (95.5 \times 1.001) = \1.40
C	\$103	1.069	$\$103 - (95.5 \times 1.069) = \0.91
D	\$107	1.072	$\$107 - (95.5 \times 1.072) = \4.62

Q.697 Paula Sigel is the head of the interest rate futures unit of Thomson Investment Company. Thomson has traditionally only invested in equities and currencies, but it has recently set up a new division that only focuses on the investments in futures contracts on Treasury bonds. It has come to Paulina's attention that due to a lack of familiarity with derivatives trading, her team is having difficulty determining the cheapest to deliver bonds. To overcome this difficulty, Sigel came up with the following guidelines to better identify the cheapest-to-deliver bonds:

- I. When the yield is greater than 6%, the cheapest-to-deliver bonds tend to be low-coupon with shorter maturities
- II. When the yield is less than 6%, the cheapest-to-deliver bonds tend to be high-coupon with longer maturities
- III. When the yield curve is upward sloping, the cheapest-to-deliver bonds tend to have shorter maturities

Determine which of Paulina's statements is/are incorrect.

- A. Only statement III is incorrect.
- B. Only statements I and II are incorrect.
- C. Only statements II and III are incorrect.
- D. Statements I, II, and III are all incorrect.

The correct answer is **D**.

All three guidelines/statements are incorrect to identify the cheapest-to-deliver bonds.

The correct rules for identifying cheapest-to-deliver bonds are the following:

- I. When the yield is greater than 6%, the cheapest-to-deliver bonds tend to be low-coupon with longer maturities.
 - II. When the yield is less than 6%, the cheapest-to-deliver bonds tend to be high-coupon with shorter maturities.
 - III. When the yield curve is upward sloping, the cheapest-to-deliver bonds tend to have longer maturities.
 - IV. When the yield curve is downward sloping, the cheapest-to-deliver bonds tend to have shorter maturities.
-

Q.698 According to recent data, the most frequently traded futures contract in the United States is the 3-month Eurodollar futures contract that is traded on the Chicago Mercantile Exchange (CME). Which of the following is the appropriate and complete definition of a Eurodollar futures contract?

- A. It is the foreign currencies futures contract on euros/dollars. The underlying interest rate of the contract is the 3-month forward LIBOR.
- B. It is the foreign currencies futures contract on euros/dollars. The underlying interest rate of the contract is the 3-month forward LIBOR and the 3-month U.S. risk-free rate.
- C. It is the interest rate futures contract on Eurodollars or on the U.S. dollars deposited outside of the U.S. The underlying interest rate of the contract is the 3-month U.S. risk-free rate.
- D. It is the interest rate futures contract on Eurodollars or on the U.S. dollars deposited outside of U.S. The underlying interest rate of the contract is the 3-month forward LIBOR.

The correct answer is **D**.

The Eurodollar futures contract is the interest rate futures contract on Eurodollars or on the U.S. dollars deposited outside of the U.S. The face value of the contract is \$1 million, and the price change in the futures contract is a minimum of \$25, which is equal to the change of one tick or one basis point. The underlying interest rate of the contract is the 3-month forward LIBOR.

Options A and B are incorrect because a Eurodollar contract is an interest rate futures contract, not a foreign currency contract.

Q.699 Alina Escobar is a junior derivatives analyst at the derivatives investment unit of a financial institution. The company holds a mid-day meeting where managers discuss investment strategies according to recent trends in the market. Escobar's manager asked her to estimate the price of a March Eurodollar futures contract that is quoted as 94.25. Estimate the effective dollar price that the firm will have to pay if the firm ultimately decides to invest in the March Eurodollar futures contract.

- A. \$942,500
- B. \$985,625
- C. \$991,750
- D. \$1,050,870

The correct answer is **B**.

The (%) price of EDF contracts is quoted as $100 - R$, where R is the annualized LIBOR rate. This is also known as the index price. For example, an EDF with a quoted price of 94.25 implies that R , the annualized LIBOR rate at expiry, is expected to be 5.75%.

However, the curriculum requires us to concentrate on the 3-month EDF.

It follows that that to get the actual or effective dollar price of the contract given the index price, we have to divide the yield by four so as to reflect the three-month rate.

So if the quoted (index) price is 94.25, here's how we get the effective price:

Step 1: Convert the annual rate into a three-month rate

Annual rate = 5.75%, so three-month rate = $5.75\%/4 = 1.4375\%$

Thus, the effective percentage price is $100 - 1.4375 = 98.5625$

Step 2: Convert into an effective dollar price

Each EDF contract has a face amount of \$1 million.

Thus, effective price = $98.5625/100 * \$1,000,000 = \$985,625$

Note: the quoted price is initially in percentages, but the effective price is in dollars.

Note also that, any Eurodollar futures contract consists of a eurodollar time deposit, whose principal is \$1 million with a maturity period of three months.

This information need not necessarily be provided in the question, so there is a need to memorize this.

Q.700 Cristiano Christopher is a portfolio manager at Blue Waters Hedge Fund. During a networking event held for all the junior and senior hedge fund and mutual funds manager, Christopher argued with one of his colleagues that there are significant differences between Eurodollar futures contracts and forward rate agreements (FRAs). Here are the two differences that Christopher mentioned:

- I. The Eurodollar futures contract is similar to a forward rate agreement (FRA). However, Eurodollar futures contracts are settled daily whereas FRAs are not settled daily.
- II. Eurodollar futures contracts are traded on major exchanges, while FRAs are OTC derivatives.

Nevertheless, his colleagues refuse to agree with him as they believed these differences are incorrect. Determine which of his statement(s) is/are correct?

- A. Statement I is correct.
- B. Statement II is correct.
- C. Both statements are correct.
- D. None of the statements is correct.

The correct answer is C.

Statement I is accurate. A Eurodollar futures contract is similar to a forward rate agreement (FRA). However, Eurodollar futures contracts are settled daily whereas FRAs are not settled daily.

Statement II is also accurate. The Eurodollar is traded on major exchanges, such as the Chicago Mercantile Exchange (CME), while FRAs are OTC derivatives. The final settlement price of Eurodollar futures is determined by the three-month London Interbank Offered Rate (LIBOR) on the last trading day. Eurodollar futures were the first futures contract to be settled in cash, rather than physically delivered.

Q.701 As the Eurodollar futures contracts are marked to market on a daily basis, the Eurodollar futures contract can result in differences between actual forward rates and those implied by futures contracts. Generally, in the longer maturities Eurodollar futures contracts, the implied forward rates (futures interest rates) are greater than the actual forward rates. Which of the following is useful in reducing the mentioned above difference between the implied forward rates and the actual forward rates?

- A. Convexity adjustment.
- B. Conversion factor.
- C. Duration adjustment.
- D. Dirty price.

The correct answer is **A**.

Analysts and managers use the convexity adjustment to adjust/reduce the difference between the implied forward rates by the Futures and the actual forward rates. Due to a daily settlement feature of Eurodollar futures contracts, the longer maturities Eurodollar futures contracts have the implied forward rates that are greater than the actual forward rates. The convexity adjustment reduces this difference.

Option B is incorrect: The conversion factor is that measure that the exchanges have taken for adjusting the prices of Treasury bond futures as the deliverable bonds under the futures contracts have different market values. The conversion factor is used to estimate the price received by the short party of the bond. The applicable quote price for the bond delivered is the product of the conversion factor and the futures contract's most recent settlement price.

Option C is incorrect since we don't have duration adjustment

The cash received by the short party = (Most recent settlement price * Conversion factor) +
Accrued interest

Option D is incorrect: The dirty price of a bond - also known as the cash price - is the price that includes the present value of all of the bond's cash flows, including the interest accruing on the next coupon payment date. It's the price the issuer of the bond must be paid by the investor in order to dispense with the bond. The dirty price comprises the quoted price and accrued interest.

Q.702 Xiaoping Yu is an investment manager at Shanghai Derivatives Investors Lounge, an investment company that solely invests in derivatives. At the beginning of the current fiscal year, Yu and her team constructed a hedge with interest rates futures contracts by taking long positions in futures contracts. Yu believes that the interest rates will start to increase in the foreseeable future. Which of the following actions should Yu take in order to protect her position?

- A. As the prices of interest rate futures contract will increase, Yu should take a long position in interest futures contracts.
- B. As the prices of interest rate futures contract will decrease, Yu should take a long position in interest futures contracts.
- C. As the prices of interest rate futures contract will increase, Yu should take a short position in interest futures contracts.
- D. As the prices of interest rate futures contract will decrease, Yu should take a short position in interest futures contracts.

The correct answer is **D**.

As the interest rates go up, the prices of the interest rate futures contract go down, and the investor with a long position in futures contracts will lose money with the increase in interest rates. Therefore, investors with long positions in interest rate futures contracts should take a short position to hedge their portfolios.

Additional explanation:

An interest rate future (IRF) is a contract with an underlying instrument that pays interest; a contract between the buyer and seller agreeing to the future delivery of any interest-bearing asset. The interest rate future allows the buyer and seller to lock in the price of the interest-bearing asset for a future date. This asset can be a T-bill or T-bond.

Like bonds, interest rate futures have an inverse relationship with interest rates. When interest rates rise, the price of IRFs fall (because the price is linked to the underlying asset's price), and vice versa.

Why exactly do bonds have an inverse relationship with interest rates? An increase in interest rates makes bonds already floated less attractive because new bonds pay the higher rate. (And the opposite is true).

Q.703 Anil Kumar has recently joined Axe Investment Bank as a junior analyst through a global analyst recruitment program. In order to impress the management of the asset management unit of the bank, Kumar decides to create a combined position in interest rate futures contracts that does not change in value with small changes in yield. Which of the following can help him create such a position?

- A. Convexity-hedging.
- B. Duration-based hedging.
- C. Hedging with FRAs.
- D. DV01 hedging.

The correct answer is **B**.

Duration-based hedging helps to create a combined position of a portfolio and futures contract that has zero duration. When the position has zero duration, the value of the position does not change due to small changes in yield.

Option A is incorrect: Convexity hedging protects against large parallel shifts

Option C is incorrect: FRAs can be used to hedge against a future rise in interest rates.

Option D is incorrect: DV01 hedging is used to hedge against small parallel shifts in the term structure

Q.704 Anil Kumar has recently joined Axe Investment Bank as a junior analyst through a global analyst recruitment program. In order to impress the management of the asset management unit of the bank, he decided to create a combined position in interest rate futures contracts that does not change in value with small changes in yield. With the help of a duration-based hedging strategy, he created a combined position of a portfolio and interest rate futures contracts that has zero duration, which means the value of the position will not change with the small changes in yield. However, his manager did not like the idea of using duration-based hedging or duration as a single risk measurement tool because of its limitation. His manager mentioned the following limitations of duration:

I. Since duration only measures the linear approximation of the relationship between two variables, it is inappropriate to use duration since the price/yield relationship of a bond is convex.

II. Duration implies that the yields are non-correlated. However, in the long run, when the changes in interest rates are non-parallel or non-correlated, the use of duration is limited.

Which of these limitations is/are accurate?

- A. Only limitation I is accurate.
- B. Only limitation II is accurate.
- C. Both the limitations are accurate.
- D. None of the limitations are accurate.

The correct answer is **A**.

Only the first limitation is accurately defined. The use of duration as a single risk measure tool is limited because duration only measures the linear approximation of the relationship between two variables. Therefore, it is inappropriate to use duration since the price/yield relationship of a bond is convex.

Limitation II is incorrect because the duration implies that the yields are correlated, not non-correlated. Thus, in the long run, when the changes in interest rates are non-parallel or non-correlated, the use of duration is limited.

Q.3555 A 3.125% government bond is priced for settlement on April 12, 2016. The bond makes quarterly coupon payments on June 30th, September 30th, December 31st, and March 31st. What is the bond's accrued interest per 100 of par value?

- A. 0.672
- B. 0.1030
- C. 0.4121
- D. 0.1713

The correct answer is **B**.

Government/Treasury bonds make use of the actual/actual day count convention. In other words, we compare the actual number of days that have elapsed since the last coupon payment date and the actual number of days between the coupon dates.

Here, the coupon dates of interest are 31 March and 30th June; we have 91 days (30 days on April, 31 in May, and 30 in June)

The number of days that have elapsed since 31st March is 12.

Thus, the accrued interest = $12/91 * 3.125/4 = 0.1030\%$

Per \$100 face value, that's \$0.1030

Note: 3.125% is an annual rate, that's why we have to divide by 4 to get the quarterly (3-month) rate

Note: Another approximate approach to the calculations would be:

Accrued interest = $(12/365) * (0.03125) = 0.1027$

Q.4916 Suppose that the forward rate for the period between year 2 and year 4 is 2.5%. Suppose further that the interest rate of the two-year zero-coupon is 5.5%. What is the 4-year zero-coupon interest rate?

- A. 8%
- B. 4%
- C. 2.625%
- D. 3.375%

The correct answer is **B**.

The 4-year zero-coupon interest rate is calculated by making R_2 the subject of the formula in the forward rate formula as follows:

$$\begin{aligned} R_2 &= \frac{F(T_2 - T_1) + R_1 T_1}{T_2} \\ &= \frac{0.025(4 - 2) + 0.055 \times 2}{4} = 0.04 = 4\% \end{aligned}$$

Q.4918 Suppose a firm has a \$20,000,000 portfolio of Treasury bonds with a portfolio duration of 5. Suppose further that the cheapest to deliver bond has a duration of 3 and that the six-month treasury bond futures price is \$200,000. What is the number of futures contracts to fully hedge the portfolio?

- A. 60 contracts should be shorted.
- B. 166 contracts should be shorted.
- C. 166 contracts should be bought.
- D. 500 contracts should be shorted.

The correct answer is **B**.

The number of futures contracts to fully hedge the portfolio is given by

$$N = -\frac{P \times DP}{FC \times DF}$$

Where:

P = forward value of the fixed-income portfolio being hedged

DP = duration of the portfolio at the maturity date of the hedge

FC = futures contract price

DF = duration of the asset underlying the futures

Thus,

$$N = \frac{\$20,000,000 \times 5}{\$200,000 \times 3} = -166.6667 \approx -166$$

Thus, 166 contracts should be shorted

The negative sign implies that the number of contracts taken up must be the opposite of the original position. If the investor is **short** a portfolio, for example, they must **long** N contracts to produce a position with zero duration.

Q.4919 A Treasury bond pays coupons at the rate of 12% per year on March 1 and September 1. What is the accrued interest between March 1 and April 30 per USD 100 of face value?

A. 1.9891

B. 0.9783

C. 1.9565

D. 0.9946

The correct answer is **C**.

12% coupon rate per year implies a coupon of \$6 on each of these dates. If we want to compute the accrued interest as of April 30, we will have to determine the actual number of days between April 30 and the last coupon date, i.e., March 1. We have 60 days (= 30 + 30, in March and April, respectively).

The reference period, March 1 to September 1, has 184 actual days.

Thus,

$$\text{Accrued interest} = \frac{60}{184} \times 6 = 1.9565$$

Q.4920 A corporate bond pays coupons at the rate of 12% per year on March 1 and September 1. What is the accrued interest between March 1 and April 30 per USD 100 of face value?

A. 0.9833

B. 0.9779

C. 1.0000

D. 1.9667

The correct answer is **D**.

In the case of a corporate bond, we use the 30/360-day count convention. 12% coupon rate per year implies a coupon of \$6 on each of these dates.

Based on the 30/360 convention, the number of days between March 1 and April 30

That's 59 days (= 29 + 30, in March and April, respectively).

The reference period, March 1 to September 1, has 180 days(= 29 + 30+ 30+ 30+ 30+ 30+ 1, in March, April, May, June, July, August, and September, respectively).

Thus,

$$\text{Accrued interest} = \frac{59}{180} \times 6 = 1.9667$$

Q.4921 Suppose a Treasury bill lasts for 230 days and has a quoted price of 5.5 What is the cash price of the Treasury bill?

A. 91.2717

B. 96.4861

C. 96.5342

D. 91.3913

The correct answer is **B**.

We know that,

$$P = \frac{360}{n}(100 - Y)$$

Where P is the quoted price, and Y is the corresponding cash price per USD 100 of face value.

We can make Y the subject of the formula so that:

$$\begin{aligned} Y &= 100 - \frac{Pn}{360} \\ &= 100 - \frac{5.5 \times 230}{360} = 96.4861 \end{aligned}$$

Q.4922 A Treasury bond pays coupons at the rate of 10% per year on June 1 and December 1. What is the accrued interest between June 1 and July 31 per USD 100 of face value (rounded to two decimal places)?

A. \$1.64

B. \$1.5

C. \$1.62

D. \$1.66

The correct answer is **A**.

The number of days between June 1 and December 1 is 183 (29, 31, 31, 30, 31, 30, 1 in June, July, August, September, October, November, and December, respectively).

The number of days between June 1 and July 31 is 60 (29, 31 in June and July, respectively). The accrued interest is therefore:

$$\frac{60}{183} \times 5 = 1.639$$

Q.4923 Suppose that the bond that will be cheapest to deliver in a Treasury bond futures contract pays annual coupons of 6% per annum on March 1 and September 1 and will be delivered on July 1. Suppose further that the bond's quoted price on June 1 is 120.00, and its conversion factor is 1.2424. If all interest rates are 5 % continuously compounded, what is the clean futures price on July 1?

A. 121.50

B. 121.48

C. 120.01

D. 123.51

The correct answer is C.

We have 92 days(=30+30+31+1 in March, April, May, and June respectively) between March 1 and June 1 and 184 days(=30+30+31+30+31+31 +1 in March, April, May, June, July, August, and September, respectively)

We know that,

$$\begin{aligned}\text{Dirty price} &= \text{Quoted price} + \text{Accrued interest} \\ &= 120 + \frac{92}{184} \times 3 = 121.50\end{aligned}$$

There are no coupon payments for the 30-day period between June 1 and July 1.

The dirty futures price is therefore

$$121.50e^{\frac{30}{365} \times 0.05} = 122.00$$

We have 122 days(=30+30+31+30 and 1 in March, April, May, June, and July respectively) between March 1 and July 1

The accrued interest on July 1 is, therefore,

$$3 \times \frac{122}{184} = 1.9891$$

The clean futures price is, therefore: $122.00 - 1.9891 = 120.0109$

Q.4924 Suppose that the bond that will be cheapest to deliver in a Treasury bond futures contract pays annual coupons of 6% per annum on March 1 and September 1 and will be delivered on July 1. Suppose further that the bond's quoted price on June 1 is 120.00, and its conversion factor is 1.2424. If all interest rates are 5 % continuously compounded, what is the estimated futures price on July 1?

- A. 98.78
- B. 120.00
- C. 96.60
- D. 122.00

The correct answer is C.

We have 92 days(=30+30+31+1 in March, April, May, and June respectively) between March 1 and June 1 and 184 days(=30+30+31+30+31+31 +1 in March, April, May, June, July, August, and September, respectively)

We know that,

$$\begin{aligned}\text{Dirty price} &= \text{Quoted price} + \text{Accrued interest} \\ &= 120 + \frac{92}{184} \times 3 = 121.50\end{aligned}$$

There are no coupon payments for the 30-day period between June 1 and July 1.

The dirty futures price is therefore

$$121.50e^{\frac{30}{365} \times 0.05} = 122.00$$

We have 122 days(=30+30+31+30 and 1 in March, April, May, June, and July respectively) between March 1 and July 1

The accrued interest on July 1 is, therefore,

$$3 \times \frac{122}{184} = 1.9891$$

The clean futures price is, therefore: 122.00-1.9891=120.0109

Thus, the futures price can be estimated by

$$\frac{\text{Clean futures price}}{\text{Conversion factor}} = \frac{120.0109}{1.2424} = 96.5960$$

Q.4925 Suppose the price of a four-year Eurodollar futures contract is 95. Suppose further that the standard deviation of the change in the short rate in one year is 0.25%. What is the continuously compounded forward rate between 4.0 and 4.25 years?

- A. 5.032
- B. 5.069
- C. 5.000
- D. 5.038

The correct answer is **A**.

The futures rate using actual/360 with quarterly compounding is $100 - 95 = 5\%$

This should be converted into an actual/actual basis which gives

$$5 \times \frac{365}{360} = 5.06944\%$$

The rate is then converted into continuous compounding to give,

$$4 \times \ln\left(1 + \frac{0.0506944}{4}\right) = 0.0503758 = 5.03758\%$$

To find the forward rate with continuous compounding, we should use the convexity adjustment, which is given by:

$$\begin{aligned} & 0.5 \times \sigma^2 \times T (T + 0.25) \\ &= 0.5 \times 0.0025^2 \times 4 \times 4.25 = 0.00005625 \end{aligned}$$

Where σ is the standard deviation of changes in the short-term interest rate over one year and T is the maturity of the Eurodollar futures.

The continuously compounded forward rate is therefore estimated as

$$0.0503758 - 0.00005625 = 0.05031955 \approx 5.032\%$$

Q.4926 Suppose that a nine-month interest is expected to be paid on a USD 30,000,000 bond. Suppose further that three-month Eurodollar futures contracts are used to hedge the nine-month interest and that the nine-month period starts at the maturity of the futures contract that will be used. How many three-month Eurodollar futures contracts are necessary to hedge the nine-month interest? (Ignore the differences between Eurodollar futures and FRAs)

- A. 30
- B. 45
- C. 90
- D. 60

The correct answer is **C**.

The change in the value of the instrument for a 1-basis point parallel shift in the interest rate is

$$\text{USD } 30,000,000 \times \frac{9}{12} \times 0.0001 = \text{USD } 2250$$

We know that the interest rate per three months changes 0.0025%, which is equivalent to USD 25 on a principal of USD 1 million.

Thus, the number of three-month Eurodollar futures contracts necessary to hedge the nine-month interest is

$$\frac{2250}{25} = 90$$

Q.4927 Suppose that a bond portfolio of USD 100,000,000 has a duration of 5. Suppose further that the current Treasury bond futures price is USD 104 and that the cheapest to deliver bond has a duration of 5 at maturity. What is the number of contracts that should be traded to fully hedge the portfolio?

- A. 52
- B. 96
- C. 10
- D. 100

The correct answer is **C**.

Note that, futures contract involves the delivery of bonds with a face value of USD 100,000.

Thus, the value of one futures contract is

$$104 \times 100,000 = \text{USD } 10,400,000$$

The number of contracts that should be traded (with a negative number indicating a short position) for a hedge should be

$$-\frac{E_V}{E_F}$$

E_F is the increase in value of one futures contract for a 1-basis point downward parallel shift in the zero curve, and

E_V is the increase in value of a trader's position for a 1-basis point downward parallel shift in the zero curve.

Thus, the increase in value of a trader's position for a 1-basis point downward parallel shift in the zero curve is given by:

$$E_V = 100,000,000 \times 5 \times 0.0001 = 50,000$$

Similarly, the increase in value of one futures contract for a 1-basis point downward parallel shift in the zero curve is given by:

$$E_F = 10,400,000 \times 5 \times 0.0001 = 5,200$$

Thus, the number of contracts required is

$$= -\frac{50,000}{5,200} = -9.615 \approx -10$$

Thus, 10 contracts should be shorted.

Q.4928 Paul Shawn, an FRM candidate, made the following comments regarding SOFR.

- I. SOFR is the overnight repo rate.
- II. An investment is rolled forward day-by-day at the SOFR rate to calculate the rate that would have been earned over the past three months.

Which of the above statement(s) is/are true?

- A. I only
- B. I and II
- C. II only
- D. None of the above

The correct answer is **B**.

Statement I is correct: SOFR stands for secure overnight financing rate. SOFR is actually the overnight repo rate for loans and derivatives denominated in the US dollar.

Statement II is correct: To settle the three-month futures, the rate that would have been earned over the past three months is calculated by rolling an investment forward day-by-day at the SOFR rate.

Q.4929 Suppose that the bond that will be cheapest to deliver in a Treasury bond futures contract pays annual coupons of 6% per annum on March 1 and September 1 and will be delivered on July 1. Suppose further that the bond's clean futures price is 121.4848 on June 1 and its conversion factor is 1.2424. If all interest rates are 5% continuously compounded, what is the dirty price on June 1?

A. 121.99

B. 119.46

C. 123.00

D. 123.51

The correct answer is C.

We have 184 days(=30+30+31+30+31+31 +1 in March, April, May, June, July, August, and September, respectively)

We have 92 days between March 1 and June 1(= 30 + 30 + 31 + 1 in March, April, May, and June, respectively)

The accrued interest on June 1 is, therefore,

$$3 \times \frac{92}{184} = 1.5$$

We know that,

$$\text{Clean Futures Price} = \text{Dirty Futures Price} - \text{Accrued Interest}$$

Thus,

$$\text{Dirty Futures Price} = \text{Clean Futures Price} + \text{Accrued Interest} = 121.4848 + 1.5 = 122.9848$$

Q.4930 Three bonds, A, B, and C, all eligible for delivery, have quoted prices of 90-115, 105-120, and 110-230, respectively. The conversion factors of the bonds are 0.7174, 0.7381, and 0.9576, respectively. Assume that the last settlement price for each of these bonds is \$96.50. Which is the cheapest to deliver?

- A. Bond A
- B. Bond B
- C. Bond C
- D. None of the above

The correct answer is C.

We first express the quoted bond prices in decimal form:

$$\begin{aligned}\text{Bond A: } 90 + \frac{11.5}{32} &= \$90.3594 \\ \text{Bond B: } 105 + \frac{12}{32} &= \$105.375 \\ \text{Bond C: } 110 + \frac{23}{32} &= \$110.7188\end{aligned}$$

The CTD (cheapest to deliver) bond minimizes the following: $Q - SF$ where:

Q is the quoted bond price

S is the most recent settlement price in the futures contract

and F is the conversion factor

The above expression calculates the cost of delivering the bond.

Thus, the costs of delivering each of the bonds we've got is as follows:

$$\begin{aligned}\text{Bond A: } 90.3594 - 96.5(0.7174) &= \$21.1303 \\ \text{Bond B: } 105.375 - 96.5(0.7381) &= \$34.1484 \\ \text{Bond C: } 110.7188 - 96.5(0.9576) &= \$18.3104\end{aligned}$$

Thus, the last bond bond (Bond C) is the cheapest to deliver.

Q.4931 Suppose that under the terms of a futures contract, a treasury bond will be delivered in 210 days. Suppose further that the last coupon of the bond was paid 35 days ago, and the next coupon will be paid in 130 days. If the risk-free rate is 4% with continuous compounding and the bond pays a coupon of 10% compounded semi-annually, what is the futures price of the bond if the clean price is USD 102.00?

- A. 103.06
- B. 105.46
- C. 101.50
- D. 100.42

The correct answer is **D**.

The futures price for a Treasury bond futures, F_0 , is given by:

$$F_0 = (S_0 - I)e^{rT}$$

Where S_0 is the spot price of the bond, I is the present value of cash flows, i.e., coupons, R is the risk-free rate of interest and T is the time to maturity

The spot price of the bond is given by:

$$S_0 = 102 + \frac{35}{165} \times 5 = 103.0606$$

A coupon will be received in 130 days and the present value of the coupon is given by:

$$I = 5e^{-0.04 \times \frac{130}{365}} = 4.9293$$

Thus,

$$F_0 = (103.0606 - 4.9293)e^{0.04 \times \frac{210}{365}} = 100.4158 \approx 100.42$$

Note that the current price S_0 used is the dirty cash price of the bond. Hence, the calculated futures price is also a dirty price.

Q.4934 What undesirable trading behavior involves using market developments after 4 pm to cancel or carry out a trade?

- A. Late Trading.
- B. Market Timing.
- C. Directed Brokerage.
- D. Front Running.

The correct answer is **A**.

Late trading involves using market developments that occur after 4 pm to cancel or to carry out trade. An offense that is punishable by the law.

Option B is incorrect: Market timing is brought about by the existence of stale prices (prices that do not reflect recent information or those that differ as a result of time zone

Option C is incorrect: Direct Brokerage involves a contract between a mutual fund and a brokerage house. The mutual fund agrees to carry its trades through the brokerage house, which agrees to recommend the fund to its clients. It is legal but frowned upon by regulators.

Option D is incorrect: Front Running is where traders use acquired information to trade for themselves before trading for their firm/clients. Front running is illegal in fund management.

Reading 44: Swaps

Q.705 Which of the following options is a correct differentiating feature between swaps and forward contracts?

- A. Forward contracts trade on over-the-counter markets, while swaps trade on exchanges.
- B. Forward contract holders have an obligation, while swap holders have the right to buy or sell the underlying security in the future.
- C. Forward contracts can be customized, but swaps are standardized.
- D. There is only one exchange of cash flow at a future date in a forward contract, whereas there are many exchanges of cash flows on multiple future dates in a swap.

The correct answer is **D**.

In a forward contract, the exchange of cash flows only occurs at one future date, while in a swap, the exchange of cash flows takes place at multiple future dates. Option A is incorrect because both forward contracts and swaps trade on over-the-counter markets. Option B is wrong because both forward contracts and swaps require the parties to perform the contract. Option C is incorrect because both forward contracts and swaps are customizable.

Q.706 Susanne Milson is a chief investment manager at Dornbusch Electric Co. A year ago, her company entered into a 5-year derivative contract with the Allied French Bank to pay quarterly cash flows equal to the fixed interest rate of 2.7% on a notional principal of €250 million. In return, Allied French Bank agreed to pay the quarterly cash flow equal to the 3-months LIBOR on the same notional principal. Accurately identify the derivative instrument that is being used by Milson's company.

- A. Futures contract
- B. Forward contract
- C. Call option
- D. Swaps

The correct answer is **D**.

Milson's company, Dornbusch Electric Co., and Allied French Bank have entered into a (Plain Vanilla) interest rate swap agreement. The company agreed to pay quarterly cash flows equal to the fixed interest rate of 2.7% on a notional principal of €250 million. In return for receiving the quarterly cash flow equal to the 3-months LIBOR from the bank. It is not a futures contract as the contract/agreement is fully customized and between no parties (no clearinghouse involved). The contract is not a forward contract, as there are multiple or quarterly exchanges of cash flows in the contract. It is not a call option as it is binding on both parties to honor the contract.

Q.707 Leipzig Auto Company is one of the largest auto interior maker firms in Germany. On April 1st, 2017, the company entered into a 3-year swaps contract with the Allied-Swiss Bank to pay quarterly cash flows equal to the fixed interest rate of 5.7% on a notional principal of €30 million. In return, Allied-Swiss Bank agreed to pay the quarterly cash flow equal to the 3-months LIBOR on the same notional principal. After reviewing the terms of the contract, determine Allied-Swiss Bank's position in the swap contract.

- A. Fixed-rate-payer
- B. Libor-receiver
- C. Floating-rate-payer
- D. Floating-rate-receiver

The correct answer is **C**.

The LIBOR is a floating interest rate that is reset on a daily basis. Since the bank has agreed to pay the LIBOR (floating rate) in exchange for receiving a fixed rate from the company, the bank has the "floating-rate-payer" or fixed-rate receiver position in the swap contract. Conversely, the company has the position of the fixed rate payer or floating (LIBOR) receiver in the swap contract.

Q.708 Swaps are customizable derivative contracts between two parties that trade in the over-the-counter (OTC) markets around the world. Financial intermediaries and companies have used swaps for multiple purposes. The most popular and basic swap agreement, which is used worldwide, is called the plain vanilla swap. Which of the following is the underlying variable of plain vanilla swaps?

- A. Currency exchange rates
- B. Interest rates
- C. Volatility
- D. Equities

The correct answer is **B**.

The most common and most popular swap is the plain vanilla swap or interest rate swap. Plain vanilla swaps are similar to forward rate agreements (FRAs) where one party agrees to pay cash flow equal to the fixed interest rate set at a predetermined time in exchange for the floating interest rate. However, the swaps differ from FRAs as there are multiple exchanges of cash flows in swaps.

Q.709 Kevin Bernard, the head of the derivatives trading department at Savers Bank, entered into a 3-year swap agreement on September 30, 2015, with Moon Traders. In the agreement, Savers Bank agreed to pay Moon Traders an interest rate of 5% compounded semiannually on the principal of \$100 million. In return, Moon Traders agreed to pay Savers the LIBOR rate on the same principal. If the LIBOR prevailing on March 30, 2016, is 4.95% compounded semiannually, which of the following statements is true?

- A. Savers Bank will pay \$25,000 to Moon Traders on March 30, 2016.
- B. Savers Bank will receive \$25,000 from Moon Traders on March 30, 2016.
- C. Savers Bank will pay \$25,000 to Moon Traders on September 30, 2016.
- D. Savers Bank will receive \$25,000 from Moon Traders on September 30, 2016.

The correct answer is C.

Savers Bank will pay \$25,000 to Moon Traders on September 30, 2016.

On the other hand, Moon Traders will pay \$2.475 million to Savers Bank.

$$\text{Savers Bank's cash outflow} = \frac{5\%}{2} * 100 \text{ million} = -\$2.5 \text{ million}$$

$$\text{Savers Bank's cash inflow} = \frac{4.95\%}{2} * 100 \text{ million} = \$2.475 \text{ million}$$

$$\text{Net cash flow on September 30, 2016} = 2,475,000 - 2,500,000 = -25,000$$

Q.710 Muhammad Ali is a credit risk manager at Green Flag Investment Company. Recently, Green Flag Investment Company borrowed \$50 million from another investment bank at the rate of the 6-month LIBOR plus 50 basis points. Ali worries that the LIBOR can significantly increase due to the current economic situation of the country, which can increase the investment company's liability. If Ali intends to change the floating rate liability into a fixed rate liability, which of the following positions can transform the floating rate liability into a fixed rate liability?

- A. A fixed-rate payer position in a swap.
- B. A short position in interest futures.
- C. A long position in a forward rate agreement.
- D. A short position in call options.

The correct answer is **A**.

Ali is borrowing \$50 million from another investment bank at the rate of the 6-month LIBOR plus 50 basis points. This means he has to pay a floating rate (LIBOR + 50 bps each month).

By entering into a fixed-rate payer position in a swap contract, an investor can transform the floating rate liability into a fixed rate liability.

Ali would pay the floating on the initial loan, would receive the floating rate from the swap (these two transactions would cancel each other out), and then he would pay the fixed rate from the fixed-rate payer position in the swap contract. In the end, Ali would just be paying the fixed rate.

Q.711 Assume that you are a swap dealer and have just acted as a counterparty in an interest rate swap. The notional principal for the swap was \$7.5 million and you are now obligated to make five annual payments of 8 percent interest. The floating rate that you will receive is 8.2 percent, and the floating payments to you are annual as well.

If the floating rate remains unchanged for the first two years and then falls by 1.5 percent for the remainder of the contract, what will be your net payments for the five years?

- A. \$62,000
- B. \$30,500
- C. \$203,500
- D. \$262,500

The correct answer is **D**.

You will receive a total of \$30,000 for the first two years [$\$7,500,000 * (0.082 - 0.080) * 2$].

The new floating rate afterward that you will receive is $8.2\% - 1.5\% = 6.7\%$.

You will pay a total of \$292,500 for the last three years [$\$7,500,000 * (0.067 - 0.08) * 3$ years].

Thus, your net payment over the five years will be \$262,500 ($\$30,000 - \$292,500 = -\$262,500$).

Q.712 Hygiene Foods Inc. is one of the largest fast-moving consumer goods (FMCG) company in Malaysia. Last year, it entered into a 3-years swap agreement to pay semiannual cash flows equal to the 6-months LIBOR plus 20 basis point on the notional principal of \$400 million. Which of the following parties is most likely the counterparty of the given swap agreement?

- A. The exchange
- B. A clearinghouse
- C. Financial intermediaries
- D. The central bank

The correct answer is **C**.

In every swap agreement, financial intermediaries are the counterparty to the swap agreement. Swap agreements are a lot like forward contracts, as they are customizable, unregulated, and OTC instruments. However, in swap agreements, financial intermediaries like brokerage houses or banks are the counterparties. Financial intermediaries earn the spread of 3 to 5 basis points in the transaction between the two parties. In return, financial intermediaries ensure to honor the agreement even if the opposite party of the swap agreement defaults.

Q.713 Sunil Kumar is a professor on the subject of financial derivatives and hedging mechanics at the Delhi School of Finance (DSF). During one of his lectures that emphasized the roles and responsibilities of financial intermediaries in swaps, he mentioned the following:

- I. Financial intermediaries ensure that the obligation of swap agreements is honored even when the opposite party of the swaps defaults
- II. Financial intermediaries can enter into two offsetting transactions in a swap agreement without letting know the two parties of the swap
- III. Financial intermediaries can also act as market makers

Which of the following mentioned roles of financial intermediaries are appropriately described?

- A. Roles I and II are appropriate.
- B. Roles II and III are appropriate.
- C. Roles I and III are appropriate.
- D. Roles I, II, and III are appropriate.

The correct answer is **D**.

All three roles and responsibilities of financial intermediaries in a swap agreement are accurately defined. Usually, it is hard for swap investors to find a counterparty in a swap agreement that wants to enter a swap contract on similar terms and notional principal. Therefore, these investors, which are large corporations, go to financial intermediaries for every swap contract. If two parties are found, financial intermediaries take offsetting positions with both parties in exchange for a spread of 3 to 4 basis points. In return, financial intermediaries ensure to honor the obligation of the swap even if the counterparty defaults. Sometimes counterparties for a specific swap agreement over a specific notional principal are not available, so financial intermediaries act as the counterparty to this agreement. This process is called market making.

Q.714 Faheem Salami has recently joined a large investment bank that acts as a financial intermediary in a number of swaps agreements. The bank also acts as the market maker when the counterparties to swaps are unavailable. Salami's boss asked him to calculate the swap rate of the 6-month interest rate swap when the 6-month LIBOR is 4.3%.

Salami also knows that the 6-month risk-free rate is 3.9%, and the bid and offer rates for the swap are 4.02 and 4.08, respectively.

Which of the following rates is the accurate swap rate for the specific swap agreement?

- A. 3.90%
- B. 4.05%
- C. 4.10%
- D. 4.30%

The correct answer is **B**.

A swap rate is the average of the bid-and-offer rates (4.02 and 4.08) of the swap agreement. Financial intermediaries post these bid and offer rates when making the market for these swaps. Due to the versatility of swap agreements, it is difficult to find two counterparties with uniform terms. Therefore, financial intermediaries take the position of the counterparty in all swaps agreement.

Q.715 Otto Cornell is the head of the finance department of Easy Home Appliances Inc. The firm intends to enter into a swap agreement to convert its outstanding floating-rate liability into a fixed rate liability. Therefore, the firms decided to enter into a fixed-rate payer position in a 2-year swap rate agreement to pay the quarterly cash flow equal to a 6% fixed rate to the Great Spanish Bank (GSB). In return, GSB agreed to pay quarterly cash flow equal to 3-month LIBOR to the firm. Since, it is the first transaction of this nature, the head of the financial department does not know that who has to facilitate the preparation of the confirmation of swap or the master agreement. Which of the following is most likely to facilitate the confirmation?

- A. Great Spanish Bank.
- B. Financial intermediaries.
- C. The International Swaps and Derivatives Association.
- D. The Securities and Exchange Commission (SEC).

The correct answer is **C**.

The International Swaps and Derivatives Association or ISDA has been facilitating the preparation of the confirmation or the master agreement for swap agreements. The confirmation of the swap agreement consists of the definition of clauses and terminologies, consequences in case of default, notional principals, day counts convention, rates, etc.

Q.717 Fabian Fabio is a former currency trader at Global FX Corp. He recently joined Baltic Investments Company as the head of currency derivatives. After joining Baltic, he circulated an informative email regarding terms and terminologies of currency swaps to his team. His email contained the following details regarding currency swaps:

- I. Unlike other derivatives, the value of currency swaps is non-zero at the initiation of currency swaps
- II. Each periodic exchange of interest rate in a currency swap is equal to a forward foreign exchange contract
- III. Currency swaps are used to transform debt denominated in one currency into debt denominated in another currency

Which of the mentioned attributes of currency swaps are correctly defined in the email?

- A. Attributes I & II
- B. Attributes II & III
- C. Attributes I & III
- D. Attributes I, II & III

The correct answer is **B**.

Attribute I is incorrect. The value of any derivative including currency swaps agreements is zero at the inception of the contract. A non-zero initial value can give rise to arbitrage profit.

Attribute II is correct because although, swap contracts generally require the exchange of principal amount, in some swap contracts, however, only the transfer of interest is required. In such cases, every interest payment under currency swap agreements is similar to a forward foreign currency contract.

Attribute III is also correct because currency swaps are used to transform liabilities and assets.

Q.718 Cherry Inc. and Sang Wang are the two market leaders in the tablet PC market. Cherry Inc. is an American company while Sang Wang is headquartered in Japan. Both companies are considering taking on debt in either USD or Yen. The following table shows the borrowing rates for both companies.

	USD	Yen
Cherry Inc.	3.5%	9%
Sang Wang	5.5%	10.4%

Considering the comparative advantage argument, estimate the total gain both companies can have if they enter into a currency swaps contract.

- A. 4.7%
- B. 2.2%
- C. 1.4%
- D. 0.6%

The correct answer is **D**.

The table suggests that the interest rate in the Japanese Yen is higher than the U.S dollar. As per the comparative argument, Cherry has an absolute advantage in both USD and Yen.

The total gain as per the comparative advantage is equal to the difference of the difference:

Difference in USD = $(5.5\% - 3.5\%) = 2.0\%$

Difference in Yen = $10.4\% - 9\% = 1.4\%$

Total gain for both companies = $(5.5\% - 3.5\%) - (10.4\% - 9\%) = 0.6\%$

Q.719 Black Corporation and UK Fabrics have entered into a 3-year currency swap agreement with periodic annual payments, where Black agreed to pay 5% in British pound (GBP) on the principal amount of GBP 100 million to UK Fabrics. In addition, UK Fabrics agreed to pay 7% to Black on the principal of \$120 million. The currency exchange rate at the initiation of the swap was USD 1.26 per GBP. If the interest rate in the United States and Great Britain are flat at 5.5% and 6.8%, respectively, but the dollar has appreciated in value against the GBP, then determine which of the following is true.

- A. The value of the swap to Black Corporation will increase.
- B. The value of the swap to UK Fabrics will increase.
- C. The value of the swap to both the companies will increase.
- D. The value of the swap will be unaffected by subsequent changes in exchange rates.

The correct answer is **A**.

The value of the swap to Black Corporation will increase as it will have to pay fewer dollars to purchase pounds in order to pay the interest rate in GBP. With the increase in the value of the dollar and the value of the swap to Black, the risk of default on behalf of UK Fabric will increase.

Q.721 Green Grass Co. intends to enter into a 5-year fixed for floating interest rate swap with MNG Bank. Green agrees to pay annual cash flow equal to a fixed interest rate of 5% on the principal of €140 million to the bank in exchange for receiving the annual cash flow equal to 1-year LIBOR plus 50 basis points on the same notional principal from the bank. However, Green Grass does not want to exchange the notional principal at the inception of the swap. Instead, it wants to decrease the principal in a predetermined manner. Which of the following swaps is most suitable for this transaction?

- A. Basis swap
- B. Amortizing swap
- C. Deferred swap
- D. Step up swap

The correct answer is **B**.

In amortizing interest rate swaps, the parties have the option not to exchange the principal at the initiation of the swap, but instead, decrease the principal over a predetermined time. They can also agree to exchange the principal in a predetermined manner at a specific date.

Q.722 Heidelberg Brewery wants to enter into a 3-year swap agreement with Everest Investment Co. Heidelberg intends to pay semiannual cash flows equal to the 10-year swap rate on the principal of €100 million to the Everest Investment in exchange for receiving semiannual cash flows from the investment company equal to the 6-month LIBOR on the same notional principal. Which of the following swaps is most suitable for this transaction?

- A. LIBOR-to-floating swap
- B. Step-up swap
- C. Constant maturity swap
- D. LIBOR in arrears swap

The correct answer is C.

In a constant maturity swap, a firm can enter into a swap agreement with another firm where the firm can agree to pay (receive) cash flow equal to the LIBOR on a specific notional principal in exchange for receiving (paying) cash flow equal to the swap rate on the same notional principal.

Q.723 Henry Coelho, the Chief Financial Officer of Imperial Hotels & Resorts, intends to enter into a 4-year interest rate swap with a financial institution. Imperial agrees to pay quarterly cash flow equal to the 3-month LIBOR rate on the notional principal of \$200 million to the financial institution in exchange for receiving the annual cash flow equal to 550 basis points on the same notional principal from the financial institution. However, Coelho does not want to enter into a swap at the moment, but he wants to purchase an instrument that allows him to enter into the swap agreement on specified terms at a predetermined date. Which of the following instruments is most suitable for Coelho?

- A. Extendable Swap
- B. Callable Swap
- C. Swaption
- D. Constant Maturity Swap

The correct answer is C.

A swaption is an option that gives the holder the right to enter into a swap agreement with a predetermined fixed rate in exchange for a floating rate at a future time. Option A is incorrect because extendable swaps give an option to the swap parties to extend the life of the swap agreement. Option D is incorrect because, in a constant maturity swap, a firm can enter into a swap agreement with another firm where the firm can agree to pay (receive) cash flow equal to the LIBOR on a specific notional principal in exchange for receiving (paying) the cash flow equal to the swap rate on the same notional principal.

Q.3556 What is the difference between a fixed-for-floating swap and a forward contract?

- A. The payment date would be unlikely to match in a fixed-for-floating swap while the exact expiration date is known as a forward contract.
- B. All the fixed-rate payments in a swap are equal, while in a forward contract, only one fixed payment is made on the settlement date.
- C. The floating-rate payments in a swap are known at the start of the contract while future payments in a forward contract unknown at the contract initiation.
- D. None of the above.

The correct answer is **B**.

The difference between a fixed-for-floating swap and an equivalent series of a forward contract is that in a fixed-for-floating swap, there are multiple settlement periods at which equal, fixed-rate payments are made while on the other hand, a forward contract contains only a settlement period at which single payment (agreed upon at the contract initiation) is made.

Q.3557 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, what is the amount that TIEN would receive on the current settlement date?

- A. \$250,000
- B. \$625,000
- C. \$465,000
- D. \$375,000

The correct answer is **D**.

TIEN's payment: $(\$50 \text{ million})(180/360)(12\%) = \$3,000,000$

Counterparty's payment: $(\$50 \text{ million})(180/360)(0.135) = \$3,375,000$

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

Q.3558 Company X seeks a 4-year fixed-rate US dollar funding while Company Y seeks a 4-year fixed-rate Japanese yen funding. Company X's direct borrowing all-in-cost is 10.50% in dollars and 8% in Japanese yen. Company Y's direct borrowing all-in-cost is 9.30% in dollars and 9% in Japanese yen. What is the maximum gain for all parties involved through this swap?

- A. 2.2%
- B. 1%
- C. 1.2%
- D. 0.2%

The correct answer is **A**.

	X	Y	Difference
Dollar	10.5%	9.3%	1.2%
Yen	8%	9%	-1%

X has a comparative advantage in Yen borrowing;

Y has a comparative advantage in Dollar borrowing;

When a comparative advantage exists, the implication is that the parties involved can reduce their borrowing costs by entering into a swap agreement. The net borrowing savings (maximum gain) by entering into a swap is the difference between the differences;

$$\begin{aligned} &\Delta\text{Dollar} - \Delta\text{Yen} \\ &= 1.2\% - -1\% = 2.2\% \end{aligned}$$

Q.3559 Consider the following statement: "A currency swap exposes parties to two sources of risk – interest rate and currency risk – while provides protection against default risk."

The statement is INCORRECT with respect to:

- A. Default risk
- B. Currency risk
- C. Interest rate risk
- D. None of the above

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.

Q.3560 If Core Bank sells a swaption, it has:

- A. The obligation to enter into a swap if the swaption is exercised
- B. The right, but not the obligation to enter into a swap if the swaption is exercised
- C. The obligation to make a payment to the counterparty if the swaption is exercised
- D. The right, but not the obligation to make a payment to the counterparty if the swaption is exercised

The correct answer is **A**.

Selling a swaption, just like an option, makes the seller obliged to enter into a swap.

Buying a swaption would make Core bank obliged to enter into a swap if the swaption is exercised by the buyer. The buyer would have the right but not an obligation to enter into a specified swap agreement with the bank.
