

1. A risk manager is analyzing several portfolios, all with the same current market value. Which of the portfolios would likely have the highest potential level of unexpected loss during a sharp broad-based downturn in financial markets?
 - A. A portfolio of US Treasury notes with 2 to 5 years to maturity.
 - B. A portfolio of long stock positions in an international large cap stock index combined with long put options on the index.
 - C. A portfolio of mezzanine tranche MBS structured by a large regional bank.
 - D. A short position in futures for industrial commodities such as copper and steel.

2. An insurance company has hired a risk consultant to advise the firm on its implementation of a risk appetite framework (RAF) across the firm. Which recommendation would most closely reflect best practices in implementing an effective firm-wide RAF?
 - A. Structure the RAF to include a large number of granular limits covering a wide array of risk exposures at the firm.
 - B. Encourage information technology staff to develop and implement an RAF for individual business units.
 - C. Focus the RAF on the interaction between the CRO and risk management staff.
 - D. Institute a training program to educate staff on the benefits of adhering to the RAF.

3. A risk analyst is stress testing a stock's return sensitivity to shocks in macroeconomic factors using a multifactor model. The analyst derives the following estimates for the factor betas:

Scenario	GDP Growth (%)	Interest Rate (%)
A	-6.0	-1.0
B	-4.0	1.5
C	0.0	5.0
D	6.0	7.5

$$\beta(\text{GDP})=1.00 \quad \beta(\text{Interest Rate})=-1.50$$

Under baseline expectations for GDP growth of 3.5% and an interest rate of 3.0%, the expected return for the stock is estimated to be 6.0%. Under which of the following scenarios will the stock have the highest expected return?

- A. Scenario A
- B. Scenario B
- C. Scenario C
- D. Scenario D

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4. Which of the following statements most accurately describe enterprise risk management (ERM)? ERM:
- A. decisions are made on an overall basis.
 - B. separately manages individual risks within an organization.
 - C. monitors risks from all sources for the purpose of increasing the organization's long-term value.
 - D. takes an integrated approach to the total return process.
5. An equity analyst is preparing an analysis of a Belgian bank and has concluded that there is a 70% chance the bank will make a major acquisition at some point in the future which could lead rating agencies to downgrade the bank's credit rating. The analyst writes and distributes a report to institutional clients analyzing the bank using an internally developed valuation model. If included in the report, which of the following would be a violation of the GARP Code of Conduct?
- A. A discussion of recent trading patterns in the bank's stock by its senior executives.
 - B. A valuation matrix projecting several potential valuations and credit ratings for the bank given four hypothetical acquisitions.
 - C. A statement that there is a 70% chance that the bank will be downgraded within the next month.
 - D. A discussion of a possible trade in the stocks of several firms viewed as potential acquisition candidates.
6. The CRO of an international bank is instructing direct reports on best practices for conducting country risk analysis and presenting the findings to senior executives. Which of the following recommendations would be considered the most questionable?
- A. Risk analysis should be open-ended, presenting several scenarios without assigning probabilities to them so as not to bias decision-makers.
 - B. Risk Reports should be informative, providing the end user the rationale behind any assessment without any "black boxes" that are difficult to understand.
 - C. Risk reports should be concise, with easy to understand conclusions that have sufficient detail to make them meaningful.
 - D. Risk analysis should be consistent, using rigorous frameworks that allow for valid cross-country comparison.
7. Match the following events to the corresponding risk type.
- I . A rogue trader within an institution.
 - II . Stock XYZ decreases in price due to a market crisis.
 - III. Using a put option to hedge an equity exposure.
 - IV. Counterparty sues bank to avoid meeting its obligations.
- A. I : legal risk; II : credit risk; III: model risk; IV: credit risk.

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- B.** I : operational risk; II : market risk; III: market risk; IV: settlement risk.
- C.** I : people risk; II : market risk; III: basis risk; IV: legal risk.
- D.** I : operational risk; II : basis risk; III: credit risk; IV: legal risk.
8. An effective risk governance strategy at a large global bank requires strong participation by the board of directors. Which of the following duties should be the responsibility of the board of directors?
- A.** Establishing strong ethical standards and ensuring that senior management follows them.
- B.** Developing quantitative formulas for management to use to determine whether a risk should be hedged.
- C.** Defining and running stress tests and scenarios to assess the bank's vulnerability to a severe financial downturn.
- D.** Managing a division that implements hedging strategies for the bank's key risk exposures.
9. To improve its corporate governance, the board of a local bank has established an audit committee. Which of the following would be an appropriate role for the audit committee?
- A.** To define the firm's risk management strategy.
- B.** To evaluate the quality of the risk management process.
- C.** To undertake risk management functions on a day to day basis.
- D.** To ensure that a firm minimizes its exposure to risks.
10. The CRO of a small bank would like to estimate the loss frequency and severity distributions of the bank's operational risk but is concerned that bank's internal data may not have enough data points to develop a comprehensive analysis. Therefore, the CRO obtains additional external data from a consortium. What should the CRO do prior to merging the external data with the bank's internal data?
- A.** Merge the data as is because doing otherwise would violate Basel III anti- tampering regulation.
- B.** Scale the bank's internal data so that it corresponds to the overall size of the banks whose data is included in the external data.
- C.** Scale the external data so that it corresponds to the data expected from a bank of similar size and scope as the small bank.
- D.** Scale both internal and external data so that the frequency and severity distributions fit the bank board's expectation.
11. Consider three assets with the following factor betas to Risk Factor 1 and Risk Factor 2 defined as β_1 and β_2 , respectively:

Risk Factor	Asset A	Asset B	Asset C
β_1	1.5	0.8	-1.2
β_2	1.4	-0.6	0.2

You are holding CHF 1,000,000 of Asset A, which of the following strategies will maintain your exposure to Risk Factor 1 while fully hedging your exposure to Risk Factor 2?

- A. Long CHF 3,000,000 of Asset B and long CHF 2,000,000 of Asset C
- B. Short CHF 3,000,000 of Asset B and short CHF 2,000,000 of Asset C
- C. Long CHF 3,000,000 of Asset B
- D. Short CHF 7,000,000 of Asset C

12. In October 1994, General Electric sold Kidder Peabody to Paine Webber, which eventually dismantled the firm. Which of the following led up to the sale?

- A. Kidder Peabody had its primary dealer status revoked by the Federal Reserve after it was found to have submitted fraudulent bids at US Treasury auctions.
- B. Kidder Peabody reported a large quarterly loss from highly leveraged positions, which left the company insolvent and on the verge of bankruptcy.
- C. Kidder Peabody suffered a large loss when counterparties to its CDS portfolio could not honor their contracts, which left the company with little equity.
- D. Kidder Peabody reported a sudden large accounting loss to correct an error in the firm's accounting system, which called into question the management team's competence.

13. The board of directors at a large bank is considering creating a CRO position. Which of the following would be an appropriate description of a function of the CRO position?

- A. Develop risk management policies and communicate the company's risk profile to key stakeholders.
- B. Perform back tests and scenario analyses to test assumptions in the bank's risk models.
- C. Independently approve changes in the bank's risk tolerance and its risk appetite framework.
- D. Establish and execute risk transfer strategies on a day-to-day basis.

14. Which of the following methods will generally be effective in reducing the likelihood that your firm is exposed to "hidden risks"?

- I. Reducing the flexibility traders have to respond to market events.
 II. Creating a culture of risk awareness throughout the organization.
 III. Structuring compensation to be aligned with the risk appetite of the firm.
 IV. Investing heavily in quantitative risk models.
- A. I only
 B. IV only
 C. II and III only
 D. I, II and III only

15. An equity analyst is estimating the return of a stock using the CAPM. The analyst compiles the following information and correctly calculates the expected return for

Risk-free rate	3.0%
Beta of stock	1.4
Correlation between the stock return and market return	0.7
Standard deviation of stock return	5.0%

stock as 7.2%.

The risk team reviews the analyst's work and discovers that analyst has input an incorrect correlation estimate; the proper correlation is 0.6. Assuming all other input are unchanged and correct, what is the correct expected return for stock using the CAPM?

- A. 6.2%
 B. 6.6%
 C. 7.9%
 D. 8.4%
16. A pension fund manager is reviewing the 4-year performance of an equity fund benchmarked to a market index. Over this time period, the fund's active investment decisions have resulted in a different beta relative to the index for each 1-year period. The manager has the following information about the fund and the market portfolio: If the risk-free rate remained constant at 1.5% over the entire 4-year period, for which year did the fund have the highest Jensen's alpha?

Year	Estimated Beta	Equity Fund Return (%)	Market Portfolio Return (%)
1	0.8	6.00	4.50
2	1.1	10.50	9.50
3	1.3	-2.50	-3.50
4	0.7	4.00	3.50

- A. Year 1
 B. Year 2
 C. Year 3
 D. Year 4

17. Which of the following is an example of a risk management failure?
- A. When constructing a model to generate portfolio VaR, a risk manager assumes a normal distribution of return when the actual portfolio returns are known to have large negative skew.
 - B. A risk manager calculates a 1-day portfolio VaR of USD 25 million with a 95% confidence level using a successfully back-tested model. The next day, the portfolio incurs a loss of USD 51 million.
 - C. In preparing a stress test scenario, a risk manager assumes a high correlation of returns between three high-beta stocks in three different industries.
 - D. A risk manager is evaluating three different emerging market investment funds to diversify a portfolio. The risk manager suggests adding the fund with the highest volatility because it has the highest information ratio.
18. Société Générale and Kidder Peabody both experienced significant risk management failures, which of the following statements is correct regarding these events?
- A. Both occurred when a liquidity event resulted in huge cash losses.
 - B. Both involved trading in fictitious customer accounts.
 - C. Both took place during times of financial market crisis.
 - D. Both involved exploiting weaknesses in trading systems.
19. Which of the following are examples of model risk illustrated in the Long-Term Capital Management case?
- I. Poor management oversight.
 - II. Financial reporting standards.
 - III. Ignoring autocorrelation of economic shocks.
 - IV. Underestimating correlations among asset classes during economic crises.
- A. II, III, and IV only
 - B. B.III and IV only
 - C. I, II, III, and IV
 - D. D.I only
20. Which of the following is a common attribute of the collapse at both Metallgesellschaft and Long-Term Capital Management (LTCM)?
- A. Cash flow problems caused by large mark to market losses.
 - B. High leverage.
 - C. Fraud.
 - D. There are no similarities between the causes of the collapse at Metallgesellschaft and LTCM

21. A risk consultant is reviewing the role of securitization in the 2007 credit crisis to better understand the lessons learned as a result of the crisis. Which of the following least describe the mortgage securitization market?
- A. The originator will typically have an information advantage over the arranger, which can create an incentive for the originator to collaborate with the borrower in filing false loan applications.
 - B. Banks can avoid risk through securitization.
 - C. Regulatory and ratings arbitrage force leading to the popularity of structured investment vehicles.
 - D. Securitization enabled the originate-to-distribute model of banking to replace the traditional model of banking.
22. If risk managers do not identify all risks faced by the firm:
- A. The firm will fail.
 - B. This can be a source that lead to risk management failure, but not in all cases
 - C. This is a source of risk management failure and cannot be avoided by full research.
 - D. This is a source of risk management failure and can always be avoided by full research.
23. Which of the following statements concerning the capital asset pricing model (CAPM) and the capital market line (CML) is correct?
- A. Beta identifies the appropriate level of risk for which an investor should be compensated.
 - B. Unsystematic risk is not diversifiable, so there is no reward for taking on such risk.
 - C. Assets with equivalent betas will always earn different returns.
 - D. The market risk premium is calculated by multiplying beta by the difference between the expected return on the market and the risk-free rate of return.
24. Two portfolios that have the same expected return are benchmarked to the same market index. In comparing these two portfolios, which of the following statements about performance measures is correct?
- A. The portfolio with the higher beta will have the higher Treynor ratio.
 - B. Jensen's alpha is particularly well-suited for comparing portfolios with different levels of risk.
 - C. The portfolio with the higher volatility will have the higher Sharpe ratio but the lower Treynor ratio.
 - D. There is an exact linear relationship between the Treynor ratio and Jensen's alpha for each portfolio.

25. A bank's investment analyst is preparing to value several equities in the bank's portfolio and is comparing different theories related to the discount rate that should be applied to equity cash flows. Which of the following statements is correct with respect to the arbitrage pricing theory (APT)?
- A. When an APT factor beta is positive, an increase in the risk premium will lead to a decrease in the asset's expected return.
 - B. The APT assumes all company specific risks can be completely diversified away in a portfolio.
 - C. In an APT model, the factor betas for the market portfolio are typically equal to 1.
 - D. The APT assumes that all investors hold mean-variance efficient portfolios and will make small portfolio changes when a mispriced security exists.
26. A portfolio manager returns 10% with a volatility of 20%. The benchmark returns 8% with a volatility of 14%. The correlation between the two is 0.98. The risk-free rate is 3%. Which of the following statements is correct?
- A. The portfolio has higher SR than the benchmark
 - B. The portfolio has negative IR
 - C. The IR is 0.35
 - D. The IR is 0.29
27. A bank's risk committee is reviewing the bank's most significant loss events and categorizing each event into specific risk categories. In one case, a model operator input the wrong price for a security into an algorithm used for trading, which then caused the algorithm to buy instead of sell the security. This situation would be an example of:
- A. Market risk.
 - B. Operational risk.
 - C. Strategic risk.
 - D. Liquidity risk.
28. About the Fama-French (FF) three-factor model, each of the following is true, EXCEPT which is false?
- A. One factor is High Minus Low (HML); i.e., the excess relative return of so-called "value" stocks with a low price-to-book (P/B) ratio
 - B. One factor is Industrial Production (IP); i.e., the real output in manufacturing, mining, and electric, and gas utilities
 - C. As a possible type of arbitrage pricing theory (APT) model, Fama-French may contain a firm-specific risk term
 - D. Fama-French is an empirical model where the firm-specific are meant to be proxies for exposure to extra market or systemic risks

which are not themselves identified

29. Peter Parker is comparing the single-factor capital asset pricing model (CAPM) to the arbitrage pricing theory (APT) model. Which statement is true?
- A. Both CAPM and APT require a mean-variance efficient market portfolio
 - B. Both CAPM and APT assume normally distributed security returns
 - C. Both CAPM and APT recognize multiple systemic risk factors
 - D. Both CAPM and APT predict a security market line (SML)
30. Which of the following is LEAST likely to be a key function of members of the board of directors?
- A. Build risk-adjusted valuations for each business unit in order to verify management's models
 - B. Review corporate strategy and oversee major capital transactions, including expenditures, acquisitions and divestitures.
 - C. Align key executive and board compensation (remuneration) with the longer-term interests of the company and its shareholders
 - D. Ensure integrity of financial (and accounting) reporting systems and monitor risk management systems
31. Each of the following is true about the traditional risk-adjusted performance measures (i.e., Treynor, Sharpe, Jensen's alpha, information ratio and Sortino) EXCEPT which statement is false?
- A. Unlike the Treynor and Jensen measures, the Sharpe ratio is not subject to Roll's criticism
 - B. While Jensen's alpha is useful for ranking portfolios with the same beta, the Sharpe ratio is better for ranking portfolios with different levels of risk
 - C. If a portfolio's excess returns are regressed against its benchmark's excess returns, and the regression intercept is assumed to be the portfolio's alpha, then the correct denominator for its information ratio is the residual risk
 - D. If the minimum acceptable return (MAR) is set to equal the risk-free rate, then the Sortino ratio is equal to the Sharpe ratio
32. In regard to Conflicts of Interest, which is true in principle about the responsibility of members:
- A. Members will not knowingly perform risk management services directly or indirectly involving an actual (but not potential) conflict of interest, under any conditions
 - B. Members will not knowingly perform risk management services directly or indirectly involving an actual or potential conflict of interest, under any conditions
 - C. Members will not knowingly perform risk management services directly or

- indirectly involving an actual or potential conflict of interest, unless full disclosure has been provided to GARP
- D.** Members will not knowingly perform risk management services directly or indirectly involving an actual or potential conflict of interest, unless full disclosure has been provided to all affected parties of any actual or apparent conflict of interest
33. Which of the following are potential consequence of violating the GARP Code of Conduct once a formal determination that such a violation has occurred is made?
- I. Suspension of the GARP Member from GARP's Membership role.
 - II. Suspension of the GARP Member's right to work in the risk management profession.
 - III. Removal of the GARP Member's right to use the FRM designation or any other GARP granted designation.
 - IV. Required participation in ethical training.
- A.** I and II only
 - B.** I and III only
 - C.** II and IV only
 - D.** III and IV only
34. An analyst at an asset management firm wants to evaluate the performance of several portfolios, all of which are benchmarked to the same index. Assuming that these portfolios have different levels of risk, which performance measure would be most appropriate in comparing the performance of these portfolios relative to their level of systematic risk?
- A.** Treynor ratio
 - B.** Sharpe ratio
 - C.** Jensen's alpha
 - D.** Sortino ratio
35. A bank's risk manager has been asked by the firm's CFO to describe the Basel Committee's principles for effective risk data aggregation and reporting. In particular, the CFO wants to know the key benefits and costs of adhering to these principles. Which of the following most accurately describes the effects of implementing the Basel recommendations on data aggregation and risk reporting?
- A.** Increased expected long-term profitability, but significant initial investments for banks.
 - B.** Faster decision making for banks, but increased potential to generate systemic risk.
 - C.** Efficiently gains for banks, but reduced ability to find a suitable merge partner.
 - D.** Reduced probability of losses, but increased magnitude of losses when they occur.

36. An audit committee at a regional bank has identified weaknesses in the bank's data aggregation and risk reporting practices and has suggested that the bank upgrade its capabilities in order to comply with the Basel guidelines. What is one of the key functionalities the bank should be expected to achieve?
- A. Develop an independent data warehouse for each business division to meet its specific risk reporting needs.
 - B. Enhance the reporting function to provide early notifications about potential breaches of risk limits.
 - C. Internalize the bank's risk data collection process by eliminating the use of outsourced data service providers.
 - D. Develop a fully quantitative risk report which is delivered regularly to the board of directors.
37. The chief risk officer is in the process of identifying risks as part of implementing an enterprise risk management (ERM) approach at a financial services firm. Which of the following techniques would be appropriate at this stage of the ERM process?
- A. Surveys and questionnaires
 - B. Risk scorecard
 - C. Probability impact matrix
 - D. Monte Carlo simulation
38. A bank credit analyst concludes that, if specific pending legislation is enacted this year, defaults in the banking sector are likely to increase. After publishing these findings, the analyst attends an industry networking event and tells several colleagues that the banking sector will soon experience rising defaults. Which aspect of the GARP Code of Conduct has been violated?
- A. GARP members shall be diligent about not overstating the accuracy or certainty of results or conclusions.
 - B. GARP members must disclose any actual or potential conflict of interest to all potential parties.
 - C. GARP members must not use confidential information to benefit personally.
 - D. GARP members shall be familiar with current generally accepted risk management practices.
39. A risk analyst analyzing the historical performance of three equity funds benchmarked against the DAX 30 index, as shown below, which fund has the best information ratio?

	Fund A	Fund B	Fund C	Fund D	DAX 30
Average monthly returns	0.265%	0.397%	0.187%	0.216%	0.175%
Average monthly excess returns over DAX 30	0.090%	0.222%	0.012%	0.041%	-
Standard deviation of monthly returns	6.884%	7.019%	7.024%	7.775%	6.824%
Monthly tracking error	0.254%	0.492%	0.143%	0.077%	-

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- A. Fund A
 - B. Fund B
 - C. Fund C
 - D. Fund D

40. In 1995, Barings was forced to declare bankruptcy after reporting over USD 1 billion in unauthorized trading losses by a single trader, Nick Leeson. Which of the following statements concerning the collapse of Barings is correct?

- A. The effectiveness of the firm's risk oversight was improved by allowing one individual to serve both as the head of trading as well as of the division's back office.
- B. Most of Leeson's trades were over-the-counter trades on long-term futures contracts, which allowed Barings to delay cash payments on losing trades until the contracts matured.
- C. Initial streams of large profits were not investigated by management despite the fact that they were associated with a low-risk trading strategy.
- D. The loss at Barings was detected when several customers complained of losses on trades that were booked to their accounts.

41. A chief risk officer is educating the board of his bank on how to use a variety of risk metrics to gauge the risk exposure of the bank's loan portfolio. Afterwards, he asks the board members to write down one thing they have learned during the session about VaR. Which of the following four statements made by the board members demonstrates that the board could use another session because it did not understand VaR?

- A. Two positions that have the same VaR can have very different risk exposures.
- B. For a given confidence level and holding period, VaR is an estimate of the most we can lose if a tail event occurs during the corresponding holding period.
- C. A good holding period to use for VaR measurement in any given market is the length of time required to ensure orderly liquidation of positions in that market.
- D. The VaR confidence level should be set high when used for firm-wide capital requirements but set low when used for back testing the model.

42. A portfolio composed of two funds has the following characteristics:

If the correlation between the returns of Fund A and Fund B is -0.23, what is the

volatility of the expected return of the portfolio?

Asset	Position	Expected Return	Volatility
Fund A	USD7,500	5.70%	7.2%
Fund B	USD5,000	11.3%	15.5%
Total	USD 12,500	7.94%	

- A. 6.7%
- B. 7.6%
- C. 8.3%
- D. 10.5%

43. A risk manager at an asset management firm changes the firm's risk measurement framework to gauge portfolio risk. The methodology underlying the new framework is not consistent with a recent major change in generally accepted practices in the industry. No one at the firm is aware of the changes to the industry best practices. As a long-time GARP member, has the risk manager violated the GARP Code of Conduct?

- A. No. this is not a violation of the GARP Code of Conduct because the risk manager was not aware of the changes to risk measurement best practices at the time the firm's framework was changed.
- B. Yes. This is a violation of the GARP Code of Conduct. This is a violation of the GARP Code of Conduct only if the methodology was not considered industry best practice at the time the risk manager started implementing the new framework.
- C. This is a violation of the GARP Code of Conduct only if investment decisions
- D. are made based on the risk manager's risk reports.

44. Which measure to assess portfolio performance can be calculated without having to select a benchmark portfolio or market index?

- A. Information ratio
- B. Sharpe ratio
- C. Treynor ratio
- D. Jensen's Alpha

45. A portfolio manager is analyzing an equity portfolio and has been given the following information from the management group: According to the capital asset pricing model, what is the expected annual return of the portfolio?

Annual standard deviation of portfolio returns	16.0%
Correlation of portfolio returns to market returns	0.825
Expected annual market return	7.0%
Annual standard deviation of market returns	12.0%
Annual risk free rate	1.8%

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- A. 5.0%
 - B. 7.5%
 - C. 8.7%
 - D. 9.5%

46. The collapse of Long Term Capital Management (LTCM) is a classic risk management case study. Which of the following statements about LTCM is correct?
- A. While LTCM had a sophisticated risk reporting system in place, LTCM failed to measure portfolio VaR on a regular basis.
 - B. The stress testing conducted by LTCM's risk management group had little influence on the firm's strategy.
 - C. The "siloeing" or lack of sharing, of information within LTCM contributed to its rapid failure when seemingly unrelated positions declined in value at the same time.
 - D. LTCM's stress test scenarios failed to include the impact of competitors holding similar positions exiting the market.
47. Past financial disasters have resulted when a firm allows a trader to have dual roles as both the head of trading and the head of the back-office support function. Which of the following case studies did not involve this particular operational risk oversight?
- I. Allied Irish Bank.
 - II. Barings.
- A. I only.
 - B. II only.
 - C. Both I. and II.
 - D. Neither I. nor II.
48. Based on the risk assessment of the CRO, Bank United's CEO decided to make a large investment in a levered portfolio of CDOs. The CRO had estimated that the portfolio had a 1% chance of losing \$1 billion or more over one year, a loss that would make the bank insolvent. At the end of the first year the portfolio has lost \$2 billion and the bank was closed by regulators. Which of the following statements is correct?
- A. The outcome demonstrates a risk management failure because the bank did not eliminate the possibility of financial distress.
 - B. The outcome demonstrates a risk management failure because the fact that an extremely unlikely outcome occurred.
 - C. The outcome demonstrates a risk management failure because the CRO failed to go to regulators to stop the shutdown.
 - D. Based on the information provided, one cannot determine whether it was a risk management failure.

49. Suppose the following information for Portfolio X:

Treasury Bills rate	3 %
Industry Prosperity Index Factor Beta	1.50
CPI Factor Beta	0.50
Industry Prosperity Index Risk Premium	5%
CPI Risk Premium	4%

What is the expected return for Portfolio X based on a 2-factor APT model?

- A. 11.5%.
- B. 12.0%.
- C. 12.5%.
- D. 13.5%.

50. Mary, FRM, has estimated the returns for a risky asset as follows, conditional on the performance of the overall economy.

Return	Probability	Economy performance
3%	20%	Poor
8%	40%	Average
12%	40%	Good

If the risk-free rate is 3%, the expected return of market portfolio is 8.4% and the beta of the risk asset is 1.1 According to the CAPM, the analyst should:

- A. sell (or sell short) the risky asset because its expected return is less than equilibrium expected return of the market portfolio.
- B. buy the risky asset because its expected return is higher than its required return in equilibrium.
- C. sell (or sell short) the risky asset because its expected return is lower than the required return to compensate for its systematic risk
- D. buy the risky asset because its expected return is lower than its required return in equilibrium.

51. The capital asset pricing model (CAPM) is based on several limiting assumptions.

Which of the following statements is correct regarding the CAPM? The CAPM:

- A. does not assume that the expected excess returns for the market are known.
- B. assumes that the market portfolio should be the one with the highest Sharpe ratio of all possible portfolios.
- C. does not assume that investors have access to the same information.
- D. assumes that investors' expectations regarding risk and return are not identical but normally distributed.

52. Which of the following statements is correct regarding the factors that led to the financial crisis at Metallgesellschaft Refining and Marketing?
- A. There was a cash flow problem that constrained the company's ability to fully execute the hedge already in place.
 - B. The maturity mismatch between its short and long positions is widely believed to have contributed to the problems.
 - C. The shifting of prices so that the petroleum spot prices were greater than petroleum futures prices created a significant cash flow problem.
 - D. Gains and losses on customer contracts were realized when customers entered into the contracts.
53. In order to strengthen trading controls, a firm's risk manager is studying cases of large trading losses at financial institutions. In particular, the manager considers the lessons learned from the Allied Irish Bank and Barings trading losses. Which of the following describes a lesson that can be drawn from these cases applied to risk management and trading controls?
- A. Algorithmic trading models should be reviewed before implementation, so that trading losses from model errors do not occur.
 - B. Trading assistants should report directly to the traders they work with, to ensure alignment of incentives and the smooth flow of information.
 - C. Net positions rather than gross positions should be monitored for each trader, to ensure the impact on the institution is fully measured.
 - D. Cash and collateral requirements should be compared to a trader's reported position size, since fictitious transactions do not result in cash or collateral movements.
54. The efficient frontier is defined by the set of portfolios that, for each volatility level, maximizes the expected return. According to the capital asset pricing model (CAPM), which of the following statements are correct with respect to the efficient frontier?
- I. The capital market line is the straight line connecting the risk-free asset with the zero beta minimum variance portfolio.
 - II. The capital market line always has a positive slope and its steepness depends on the market risk premium and the volatility of the market portfolio.
 - III. The complete efficient frontier without a risk-free asset can be obtained by combining the minimum variance portfolio and the market portfolio.
 - IV. The efficient frontier allows different individuals to have different portfolios of risky assets based upon their own risk aversion and forecast for asset returns.
 - V. The efficient frontier assumes no transaction costs, no taxes, a common investment horizon for all investors, and that the return distribution has no skewness.
- A. II, III and V

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

55. Consider the expected returns and standard deviations for the following portfolios:

Portfolio	Expected Return	Standard Deviation
1	4%	2%
2	6%	14%
3	4%	4%
4	10%	14%

If these are the only portfolio available, which portfolios are not efficient?

- A. 2 and 4.
 - B. 1 and 3.
 - C. 2 and 3.
 - D. 3 and 4.
56. The efficient frontier is defined by the set of portfolios that, for each volatility level, maximizes the expected return. According to the capital asset pricing model (CAPM), which of the following statements are correct with respect to the efficient frontier?
- A. The capital market line always has a positive slope and its steepness depends on the market risk premium and the volatility of the market portfolio.
 - B. The capital market line is the straight line connecting the risk-free asset with the zero-beta minimum variance portfolio.
 - C. Investors with the lowest risk aversion will typically hold the portfolio of risky assets that has the lowest standard deviation on the efficient frontier.
 - D. The efficient frontier allows different individuals to have different portfolios of risky assets based upon their individual forecasts for asset returns.
57. A risk analyst is analyzing several indicators for a group of countries. If he specifically considers the Gini coefficient in his analysis, in which of the following factors is he most interested?
- A. Standard of living
 - B. Peacefulness
 - C. Perceived corruption
 - D. Income inequality

58. The enterprise risk management process includes several stages. Which of the following procedures would take place during the risk assessment stage?
- Developing the following year's budget for the risk management function.
 - Using simulation analysis to estimate VaR.
 - Purchasing insurance to mitigate a specific risk factor.
 - Selecting a risk strategy compatible with the firm's risk appetite.
59. At large financial institutions, the board of directors plays a key role in the process of creating a culture of risk management. As part of this role, one function that should be fulfilled by the board of directors is to:
- Establish a policy to address individual risk factors by reducing, hedging, or avoiding exposure to each risk.
 - Develop risk reports and communicate them to organizational division leaders to conform with best practices.
 - Address issues that could potentially represent a conflict of interest by creating committees composed exclusively of executive board members.
 - Monitor the effectiveness of the company's governance practices and make any necessary changes to ensure proper compliance.
60. An investor holds a portfolio of stocks A and B. The current value, estimated annual expected return and estimated annual standard deviation of returns are summarized in the table below:

	Stock A	Stock B
current value	40,000	60,000
expected return	8%	9%
standard deviation	16%	20%

If the correlation coefficient of the returns on stocks A and B is 0.3, then the expected value of the portfolio at the end of this year, within two standard deviations, will be between:

- USD 69,00 and USD 134,400
 - USD 71,800 and USD 145,400
 - USD 78,200 and USD 139,000
 - USD 81,400 and USD 135,800
61. Bond A and Bond B have the same rating and the same probability of default. It is also estimated that: The probability that both Bond A and Bond B will default during the next year is 5%; If Bond A defaults next year, there is a 50% probability that Bond B will also default. What is the probability that neither Bond A nor Bond B will default over the next year?

- A. 75%
- B. 80%
- C. 85%
- D. 95%

62. A firm is concerned about potential increases in the federal funds rate and their impact on the S&P 500. For a 3-month forecast period, the firm's economics team estimates the following:

- ✓ 60% probability that the Federal Reserve will not raise the federal funds rate.
- ✓ 32% probability that the return on the S&P 500 will be between -10% and +10%.
- ✓ 38% chance that the return on the S&P 500 will be less than -10%.
- ✓ 24% joint probability that the return on the S&P 500 will be greater than 10% and that the Federal Reserve will not raise the federal funds rate.

Based on the estimates above, given that the Federal Reserve raises the federal funds rate, what is the probability that the return on the S&P 500 is greater than 10%?

- A. 10%
- B. 15%
- C. 20%
- D. 40%

63. To estimate the price of a call option, an analyst performs a simulation with 100 scenarios and estimates the 95% confidence interval for the call option price as [4.55; 5.15]. In order to increase the accuracy of the pricing results, a second simulation with 400 scenarios is performed. Assuming that the second simulation generated the same sample, mean of 4.85 and the same sample standard deviation of 1.50, given one tailed critical values of the t-distribution of $t(97.5\%, 99) = 1.98$ and $t(97.5\%, 399) = 1.97$, what is the new 95% confidence interval?

- A. [4.63; 5.07]
- B. [4.70; 5.00]
- C. [4.82; 4.88]
- D. [4.84; 4.86]

64. A junior analyst on a foreign exchange trading desk has been analyzing the relationship between the Swiss franc and the US dollar since the recent removal by the Swiss central bank of a cap on the franc's movement against the euro. The analyst randomly selected the following five daily CHF/USD exchange rates from the past 5 months:

Day	CHF/USD
1	1.12
2	1.08
3	1.13
4	1.07
5	1.15

Based on the data above, what is the unbiased estimate of the daily CHF/USD exchange rate mean and standard deviation?

- A. Mean = 1.12; Standard deviation = 0.030
- B. Mean = 1.12; Standard deviation = 0.034
- C. Mean = 1.11; Standard deviation = 0.030
- D. Mean = 1.11; Standard deviation = 0.034

65. The level of the FTSE 100 index at close of trading yesterday was 6,480 and the daily volatility of the index return was estimated as 1.5%. Today, the level of the FTSE 100 at close of trading is 6,400. A risk manager models the distribution of the daily returns on the FTSE 100 index assuming a mean of 0% and a variance given by the following GARCH (1,1) model:

$$\sigma_t^2 = 0.000014 + 0.07u_{t-1}^2 + 0.85\sigma_{t-1}^2$$

Which of the following is closest to the risk manager's forecast of the next trading day's 1-standard deviation confidence interval around the expected value of the FTSE 100 index level?

- A. [6,200;6600]
- B. [6,250;6450]
- C. [6,300;6500]
- D. [6,359;6450]

66. An analyst runs three separate regressions using the returns on stock XYZ (STOCK), changes in the price of oil (OIL), and changes in the yield on the 3-month T-bill (BILL). The regression equations and summary results, including estimated parameters, are given in the table below:

		b_0	b_1
Regression 1	STOCK = $b_0 + b_1 \times \text{OIL}$	-0.0002	0.67
	Standard Error	0.0004	0.039
	t-statistic	-0.4	17.18
	R^2	0.45	
Regression 2	STOCK = $b_0 + b_1 \times \text{BILL}$	-0.0006	1.38
	Standard Error	0.0004	0.033
	t-statistic	-1.5	41.82

	R^2	0.67	
Regression 3	OIL = $b_0 + b_1 \times \text{BILL}$	0.00025	0.063
	Standard Error	0.0003	0.024
	t-statistic	0.83	2.63
	R^2	0.35	

Based on the information above, which of the following statements is correct?

- A. The coefficient on BILL in Regression 2 likely has upward bias because changes in interest rates are homoscedastic.
- B. The coefficient on OIL in Regression 1 likely has upward bias due to omitted variable bias.
- C. The R^2 in Regression 2 is high due to multicollinearity.
- D. The estimated intercept in Regression 3 indicates that OIL should have a significantly positive average return.

67. A risk analyst is examining the autocorrelation function of a covariance stationary series of 400 data points. The risk analyst estimates the mean of the first 100 autocorrelations of the series as 0.0002 with a standard deviation of 0.0225. To test if the series was generated by a white noise process, the analyst calculates the Box-Pierce Q-statistic, which approximately follows a(n):

- A. F-distribution.
- B. Chi-squared distribution.
- C. Student's t distribution.
- D. Standard normal distribution.

68. When conducting an ordinary least squares multiple regression using the model $Y_i = a + b_1 X_{1i} + b_2 X_{2i} + \epsilon_i$, which of the following conditions would most likely

indicate that there is heteroskedasticity?

- A. The R^2 of the regression is low.
- B. The correlation coefficient between X_1 and X_2 is greater than 0.6.
- C. The conditional variance, $\text{var}(\epsilon_i|X_{1i}, X_{2i})$, is not constant.
- D. The conditional mean, $E(\epsilon_i|X_{1i}, X_{2i})$, is not zero.

69. A risk analyst is working on creating a regression model to forecast defaults within a portfolio of residential mortgages. After estimating a regression with a single regressor, a second regressor was added and the R^2 for the model increased. The increase in R^2 indicates that:

- A. The new regressor is a statistically significant predictor variable.
- B. The new regressor is a better indicator of variance in mortgage defaults than the first regressor.
- C. The estimated coefficient on the second regressor is different from zero.
- D. There is no omitted variable bias in this model when including the second regressor.

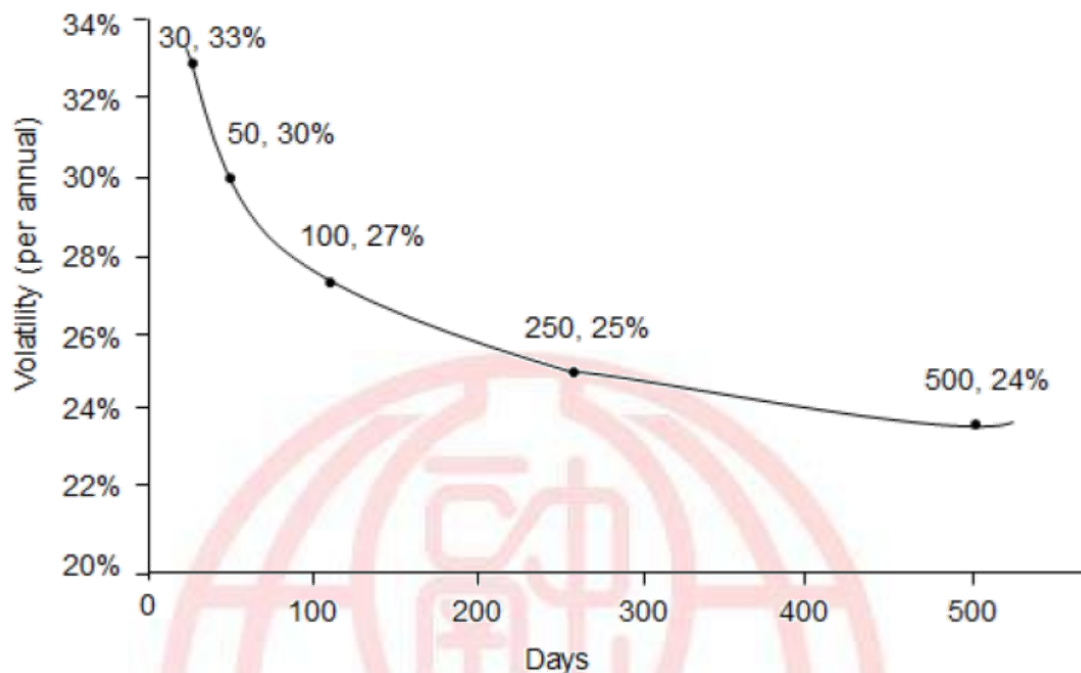
70. A portfolio manager estimates the following GARCH (1,1) model based on the daily returns of a stock:

$$\sigma_t^2 = 0.000175 + 0.025\mu_{t-1}^2 + 0.82\sigma_{t-1}^2$$

The annualized rate of return of the stock is 15% and the annual risk-free rate is 5%. Assuming that there are 250 trading days in a year and using the long-term daily volatility from the GARCH (1,1) model, which of the following is closest to the annualized Sharpe ratio of the stock?

- A. 0.19
- B. 0.28
- C. 0.48
- D. 0.72

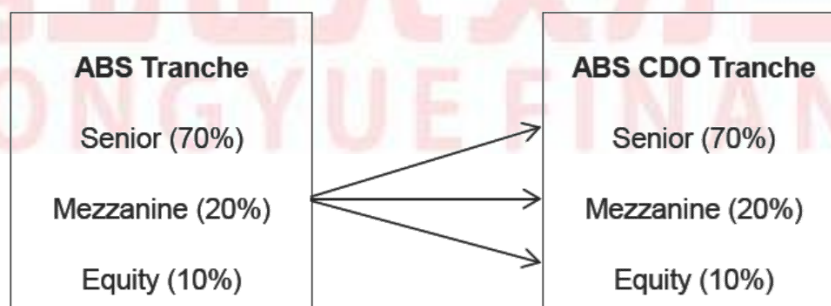
71. The following chart shows the predicted annualized volatility term structure of a stock estimated from a GARCH (1,1) model.



With specific predicted volatility values market on the chart, assuming that there are 252 trading days in a year, which of the following statements is correct?

- A. The best estimate of the implied volatility is 0.24.
- B. The GARCH (1,1) model estimates a downward-sloping implied volatility term structure.
- C. Long-term options on the stock are undervalued while short-term options on the stock is overvalued.
- D. The current daily variance is greater than 0.00023.

72. A risk manager is seeking to understand the mechanics of ABS in order to better understand their role in the 2007 credit crisis. A pool of subprime mortgages that has been divided into three tranches to form an ABS is being reviewed. The mezzanine of the ABS has been further structured into an ABS CDO. The distribution of assets within the various tranches is as follows:



If the underlying subprime pool loses 20% of its principle value through default, what will the losses to the ABS CDO's equity, mezzanine and senior tranches, respectively, be?

- A. 75%, 50%, and 0%

- B. 100%, 75%, and 0%
- C. 100%, 100%, and 29%
- D. 100%, 100%, and 64%

73. A risk manager is estimating the average monthly returns of four funds based on the last 4 years of monthly returns as shown in the following table:

	Average Monthly Return (%)	Standard Deviation (%)
Fund A	0.21	1.13
Fund B	0.47	3.42
Fund C	0.54	1.98
Fund D	0.67	2.19

The risk manager is also given the following one-sided critical values of the t-distribution:

	Confidence Level		
Degrees of freedom	90%	95%	97.5%
3	1.64	2.35	3.18
47	1.30	1.68	2.01
1000	1.28	1.65	1.96

For which of the funds can the null hypothesis that the mean monthly return is 0% be rejected at the 95% confidence level but the null hypothesis that the average monthly return is less than 0.5% not be rejected at the 95% confidence level?

- A. Fund A
- B. Fund B
- C. Fund C
- D. Fund D

74. An analyst is attempting to simulate the returns of two assets that follow a multivariate standard normal distribution with a correlation of 0.4. The risk manager first simulates the returns of one asset, R_1 , with 1,000 draws from a standard normal distribution. Next, the analyst assigns an additional 1,000 draws from another independent standard normal distribution to variable Z_1 . To create a variable, R_2 , that has a correlation of approximately 0.4 with R_1 , which of the following formulas should be used?

- A. $R_2 = 0.40 * R_1 + 0.92 * Z_1$

-
- B. $R2 = 0.40 * R1 + 0.84 * Z1$
 - C. $R2 = 0.40 * R1 + 0.60 * Z1$
 - D. $R2 = 0.40 * R1 + 0.77 * Z1$

75. The parameters of a normal distribution have been estimated from an extremely large data set. The critical value of 2.33 is used to form a two-sided confidence interval around the sample mean, based on the distribution parameters estimated. A correct statement regarding the confidence interval is that:
- A. 5% of the distribution is outside the confidence interval.
 - B. There is a 1% probability of a particular observation failing either below the range or above the range of the confidence interval.
 - C. There is a 1% probability of a particular observation failing below the range of the confidence interval.
 - D. 99.5% of all observations will be within the confidence interval.
76. An operational risk manager uses the Poisson distribution to estimate the frequency of losses in excess of USD 2 million during the next year. It is observed that the frequency of losses greater than USD 2 million is three per year on average over the last 10 years. Assuming that this observation is indicative of future occurrences and that the probability of one event occurring, is independent of all other events, what is the probability of five losses in excess of USD 2 million occurring during the next two years?
- A. 10.08%
 - B. 14.04%
 - C. 14.62%
 - D. 16.06%
77. An effective risk governance strategy at a large global bank requires strong participation by the board of directors. Which of the following duties should be the responsibility of the board of directors?
- A. Establishing strong ethical standards and ensuring that senior management follows them.
 - B. Developing quantitative formulas for management to use to determine whether a risk should be hedged.
 - C. Defining and running stress tests and scenarios to assess the bank's vulnerability to a severe financial downturn.
 - D. Managing a division that implements hedging strategies for the bank's key risk exposures.
78. A model risk analyst at an asset management firm is reviewing a time series

forecasting process. The analyst wants to determine if the time series being forecast is covariance stationary. Which of the following is a characteristic of a covariance stationary time series?

- A. The autocovariance function depends only on the time displacement, not on time itself.
- B. The mean of the series can vary over time as long as the autocorrelation structure remains constant.
- C. The autocovariance structure of the series must be constant.
- D. The mean of the series must be 0 and changes must be normally distributed.

79. Underestimating correlations among asset classes during economic crises. A bank uses a 4-grade scale for its internal credit model. The 1-year rating transition probabilities for this model are given by:

Rating From	Rating To			
	A	B	C	D
A	90%	10%	0%	0%
B	10%	81%	8%	1%
C	0%	5%	80%	15%
D	0%	0%	0%	100%

If a newly issued bond is rated “A” by this model, what is the probability that it will be rated “B” or lower two years from now?

- A. 9%
- B. 10%
- C. 18%
- D. 19%

80. An analyst is looking to combine two stocks with annual returns that are jointly normally distributed and uncorrelated. Stock A has a mean return of 7% and a standard deviation of returns of 20%; Stock B has a mean return of 12% and a standard deviation of returns of 15%. If the analyst combines the stocks into an equally weighted portfolio, what is the probability that the portfolio return over the next year will be greater than 12%?

- A. 42.07%
- B. 44.32%
- C. 55.67%
- D. 57.93%

81. In the EWMA model, the half-life is defined as the time, T , at which $\lambda^T = 1/2$, where λ is the decay factor of the EWMA model. A risk analyst is using a specific EWMA model to calculate volatility and determines that the half-life of the model is 23 days. Based on the above information, which weight will be applied to the return that is five days old?

- A. 0.026
- B. 0.031
- C. 0.781
- D. 0.859

82. A firm uses an EWMA model to estimate the daily volatility of the return of a security. The following table shows the beginning-of-day estimate of the daily volatility, the end-of-day closing price, and the daily return, for each day during the past week:

Day	Estimated Volatility (%)	Closing Price (USD)	Daily Return
Mon	2.86	50.39	-0.50
Tue	2.80	50.65	0.52
Wen	2.75	50.89	0.47
Thu	2.70	50.72	0.33
Fri	2.64	50.58	0.28

- A. 0.93
- B. 0.94
- C. 0.96
- D. 0.98

83. A quantitative risk analyst is comparing the computational efficiency of different estimators generated using Monte Carlo simulation. Relevant information is summarized in the following table:

	Estimator A	Estimator B	Estimator C	Estimator D
Standard deviation	0.30	0.40	0.25	0.35
Time for generating one scenario (seconds)	35	25	40	30
Scenarios	20	40	30	50
Total time for generating scenarios (seconds)	400	1,000	1,200	1,500

Which of the estimators is most computationally efficient?

- A. Estimator A

- B. Estimator B
- C. Estimator C
- D. Estimator D

84. An investor holds a portfolio of stocks A and B. The current value, estimated annual expected return and estimated annual standard deviation of returns are summarized in the table below:

	Stock A	Stock B
current value	40,000	60,000
expected return	8%	9%
standard deviation	16%	20%

If the correlation coefficient of the returns on stocks A and B is 0.3, then the expected value of the portfolio at the end of this year, within two standard deviations, will be between:

- A. USD 69,00 and USD 134,400
- B. USD 71,800 and USD 145,400
- C. USD 78,200 and USD 139,000
- D. USD 81,400 and USD 135,800

85. Jeff Spider, FRM, is a consultant for SPA Consulting. He has been engaged by Limbo Company to select an equity investment manager for their defined benefit pension plan. Spider is considering Cutter Investments. The money management firm's 10 year performance is as follows: 35.1%, 15.6%, 12.0%, 22.2%, 50.3%, -20.0%, -33.4%, -30.6%, 30.8%, 13.0%. From the data provided, Spider calculated the following statistics:

Mean 9.5%

Median 14.3%

Excess kurtosis -0.9761

Indicate whether the returns distribution is positively or negatively skewed and whether the returns distribution is leptokurtic or platykurtic.

- | | |
|---------------|-------------|
| Skewed | Kurtosis |
| A. Positively | Leptokurtic |
| B. Negatively | Platykurtic |
| C. Positively | Platykurtic |
| D. Negatively | Leptokurtic |

86. Bob tests the null hypothesis that the population mean is less than or equal to 45. From a population size of 3,000,000 people, 81 observations are randomly

sampled. The corresponding sample mean is 46.3 and sample standard deviation is 4.5. What is the value of the most appropriate test statistic for the test of the population mean, and what is the correct decision at the 1 percent significance level?

- A. $z = 0.29$, and fail to reject the null hypothesis.
- B. $z = 2.60$, and reject the null hypothesis.
- C. $t = 0.29$, and accept the null hypothesis.
- D. $t = 2.60$, and neither reject nor fail to reject the null hypothesis.

87. Based on 21 daily returns of an asset, a risk manager estimates the standard deviation of the asset's daily returns to be 2%. Assuming that returns are normally distributed and that there are 260 trading days in a year, what is the appropriate Chi-square test statistic if the risk manager wants to test the null hypothesis that the true annual volatility is 25% at a 5% significance level?

- A. 25.80
- B. 33.28
- C. 34.94
- D. 54.74

88. An oil industry analyst with a large international bank has constructed a sample of 1,000 individual firms on which she plans to perform statistical analyses. She considers either decreasing the level of significance used to test hypotheses from 5% to 1%, or removing 500 state-run firms from her sample. What impact will these changes have on the probability of making Type I and Type II errors?

Level of significance decrease	Reduction in sample size
A. P(Type I error) increases	P(Type I error) increases
B. P(Type I error) decreases	P(Type II error) increases
C. P(Type II error) increases	P(Type I error) decreases
D. P(Type II error) decreases	P(Type II error) decreases

89. According to the Basel back-testing framework guidelines, penalties start to apply if there are five or more exceptions during the previous year. The Type I error rate of this test is 11 percent. If the true coverage is 97 percent of exceptions instead of the required 99 percent, the power of the test is 87 percent. This implies that there is a (an):

- A. 89% probability regulators will reject the correct model.
- B. 11% probability regulators will reject the incorrect model.
- C. 87% probability regulators will not reject the correct model.
- D. 13% probability regulators will not reject the incorrect model.

90. A regression of a stock's return (in percent) on an industry index's return (in percent) provides the following results:

	Coefficient	Standard Error
Intercept	2.1	2.01
Industry index	1.9	0.31
	Degrees of Freedom	SS
Explained	1	92.648
Residual	3	24.512
Total	4	117.160

Which of the following statements regarding the regression is incorrect?

- A. The correlation coefficient between the X and Y variables is 0.889.
 - B. The industry index coefficient is significant at the 99% confidence interval.
 - C. If the return on the industry index is 4%, the stock's expected return is 9.7%.
 - D. The variability of industry returns explains 21% of the variation of company returns.
91. A risk manager performs an ordinary least squares (OLS) regression to estimate the sensitivity of a stock's return to the return on the S&P 500. This OLS procedure is designed to:
- A. Minimize the square of the sum of differences between the actual and estimated S&P 500 returns.
 - B. Minimize the square of the sum of differences between the actual and estimated stock returns.
 - C. Minimize the sum of differences between the actual and estimated squared S&P 500 returns.
 - D. Minimize the sum of squared differences between the actual and estimated stock returns.

92. An analyst runs a regression of monthly stock returns on four independent variables over 48 months. From the regression, the total sum of squares (TSS) is computed as 580, and the sum of squared residuals (SSR) is 220. The regression coefficient of determination (R^2) and the adjusted R^2 are, closest to:

R^2	Adjusted R^2
A. 62%	58.5%
B. 38%	41.5%
C. 62%	41.5%
D. 38%	58.5%

93. Use the following information to answer the following question .

Regression Statistics

R squared 0.8537

R sq. adj. 0.8120

Std. error 10.3892

Num obs. 10

ANOVA

Based on the results and a 5% level of significance, which of the following hypotheses can be rejected?

	df	SS	MS	F	P-value
Explained	2	4410.4500	2205.2250	20.4309	0.0012
Residual	7	755.5500	107.9357		
Total	9	5166.0000			
	Coefficients	Std. Error	t-Stat	P-value	
Intercept	35.5875	6.1737	5.7644	0.0007	
X1	1.8563	1.6681	1.1128	0.3026	
X2	7.4250	1.1615	6.3923	0.0004	

I. $H_0: B_0 = 0$

II. $H_0: B_1 = 0$

III. $H_0: B_2 = 0$

IV. $H_0: B_1 = B_2 = 0$

A. I, II, and III

B. I and IV

C. III and IV

D. I, III, and IV

Question 94 and 95 refer to the following information

A bank analyst run an ordinary least squares regression of the daily returns of the stock on the daily returns on the S&P 500 index using the last 750 trading days of data. The regression results are summarized in the following tables:

Predictor	Coefficient	Standard Error	t-statistic	p-value
Constant	0.0561	0.00294	19.09710	0.00000
Return on the S&P 500	1.2054	0.00298	404.25225	0.00000

Analysis of Variance

Source	Degree of Freedom	Sum of Squares	Mean Square	F-statistic	p-value
Regression	1	11.43939	11.43939	163419.87971	0.00000
Residual Error	749	0.05425	0.00007		
Total	750	0.44677			

94. The bank analyst wants to test the null hypothesis that the beta of the portfolio is 1.2 at a 5% significance level. According to the regression results, the analyst would:
- Reject the null hypothesis because the t-statistic is greater than 1.64
 - Fail to reject the null hypothesis because the t-statistic is greater than 1.64
 - Reject the null hypothesis because the p-value is greater than 5%
 - Fail to reject the null hypothesis because the p-value is greater than 5%

95. A colleague of the bank analyst suggested adding the returns on the Dow Jones Industrial Average (DJIA) index as an additional explanatory variable. The new regression results show that the R^2 increased and the adjusted R^2 decreased. What conclusion can be drawn from these results?
- The increased R^2 gives an inflated estimate of how well the regression fits the data.
 - The decreased adjusted R^2 suggests that the coefficient of the returns on the DJIA is not significant.
 - The increased R^2 indicates an improvement in the regression.
 - The decreased adjusted R^2 suggests the existence of omitted variable bias in this regression.

96. You are conducting an ordinary least squares regression of the returns on stocks Y and X as $Y = a + b \times X + \varepsilon$ based on the past three year's daily adjusted closing price data. Prior to conducting the regression, you calculated the following information from the data:

Sample covariance	0.000181
Sample Variance of Stock X	0.000308
Sample Variance of Stock Y	0.000525
Sample mean return of stock X	-0.03%
Sample mean return of stock Y	0.03%

What is the slope of the resulting regression line?

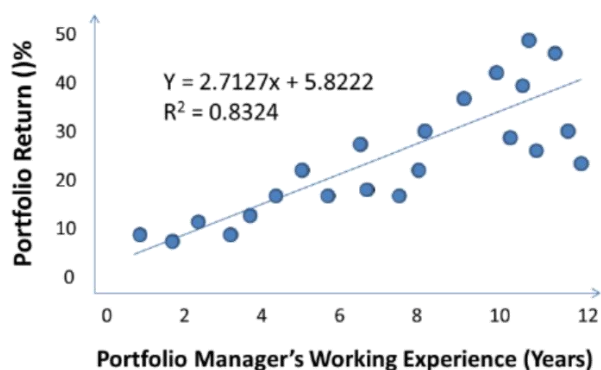
- 0.35
 - 0.45
 - 0.59
 - 0.77
97. A risk analyst is estimating the regression $R_Y = \alpha + \beta_1 R_X + \beta_2 R_Z + \varepsilon$, where R_X is the return of stock X, R_Y is the return of stock Y, and R_Z is the return of stock Z, using 20 years of daily return data. He wants to test the null hypothesis that $\beta_1 = 0$ and $\beta_2 = 0$ with a 95% confidence level by using an F- test. Critical values of the F-statistic at the 95% confidence level are given in the

following table:

$F_{1, \infty}$	3.8415
$F_{2, \infty}$	2.9957
$F_{3, \infty}$	2.6049

If the t-statistics for β_Y and β_Z are 2.34 and 1.64, respectively, and the correlation between the two t-statistics is 0.3. What conclusion can the risk analyst infer from the regression results?

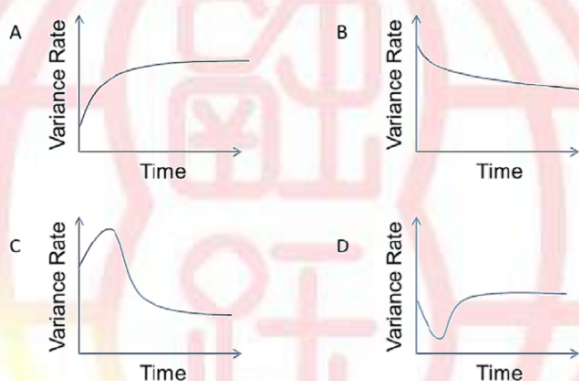
- A. The risk analyst should reject the null hypothesis since the F-statistic is more than 2.9957.
 - B. The risk analyst should fail to reject the null hypothesis since the F-statistic is less than 2.9957.
 - C. The risk analyst should reject the null hypothesis since the F-statistic is more than 3.8415.
 - D. The risk analyst should fail to reject the null hypothesis since the F-statistic is less than 3.8415.
98. A credit analyst covers a portfolio of 10 bonds that are all currently rated investment grade. Under the company's portfolio investment guidelines, no more than two bonds in the portfolio may be rated non-investment grade. The analyst has estimated that each bond has a 20% probability of being downgraded to non-investment grade over the following year and each downgrade is independent of other downgrades. What is the estimated probability that more than two bonds in the portfolio will be rated non-investment grade at the end of next year?
- A. 32.2%
 - B. 37.6%
 - C. 62.3%
 - D. 67.8%
99. A risk manager is examining the relationship between portfolio manager's years of working experience and the returns of their portfolios. He performs an ordinary least squares (OLS) regression of last year's portfolio returns (Y) on the portfolio managers' years of working experience (X) and provides the following scatter plot to his supervisor:



Which of the following assumptions of the OLS regression has most likely been violated?

- A. Perfect multicollinearity
- B. Expectation of zero for the error terms
- C. Normally distributed error terms
- D. Homoscedasticity

100. A commodity risk analyst is interested in estimating the volatility of a commodity using a GARCH(1,1) model with $w=0.000032$, $a=0.03$ and $\beta=0.91$. The current volatility is 2.35% per day. The resulting volatility term structure from this GARCH model is most likely to be represented by:



101. An analyst has conducted a regression on the effects of interest rates and inflation on security prices based on data from over 5,000 securities. The results of the regression are:

$$\text{Price} = 1.20 \pm 1.50 * \text{Interest Rate} + 0.20 * \text{Inflation}$$

	Constant	Interest Rate	Inflation
Standard Error	3.20	0.20	0.15

What is the 95% confidence interval for the interest rate coefficient?

- A. [1.03, 1.97]
- B. [1.11, 1.89]
- C. [1.17, 1.83]
- D. [1.20, 1.79]

102. As part of an operational risk review, the risk manager examines the impact of a new-employee training program on settlement errors. In particular, the risk manager considers the relationship between the number of training days that a new employee missed and the number of settlement errors associated with that new employee over the first 6 months of employment, as described in the

following table:

		Number of Missed Training Days			
		0	1	2	3
Number of Settlement Errors	0	5	3	1	0
	1	5	6	7	4
	2	3	5	6	7
	3	3	4	5	11
	4	1	1	4	5
	5	0	0	2	3

Using the information in this table, what is the conditional probability that the employee made 3 errors, given that she missed 2 training days?

- A. 16%
- B. 20%
- C. 24%
- D. 30%

103. A risk analyst noticed that the frequency of large operational loss events in a company follows a Poisson distribution. Assuming that the expected number of large operational loss events during each year is 4 and the risk events are independent of one another, what is the probability that exactly 5 large operational loss events happen over the course of two years?

- A. 2%
- B. 9%
- C. 16%
- D. 18%

104. A risk manager is using the exponentially weighted moving average approach to estimate the volatilities of the returns of assets X and Y and the correlation between their returns. With $\lambda = 0.9$, the estimate of the covariance between the returns of assets X and Y on day $t-1$ is 0.000225. Some of the returns and estimated return volatilities of the two assets are given in the following table:

Day	Asset X		Asset Y	
	Return	Volatility	Return	Volatility
t-1	0.25%	-	1.50%	-
t	0.30%	1.25%	2.00%	2.50%

What is the estimated correlation coefficient between the returns of Asset X and Y on day t ?

- A. 0.18

- B. 0.45
C. 0.66
D. 0.72

105. A risk analyst is estimating the variance of stock returns on day n , given by σ_n^2 , using the equation $\sigma_n^2 = \gamma V_L + \alpha U_{n-1}^2 + \beta \sigma_{n-1}^2$ where U_{n-1} and σ_{n-1} represent the return and volatility on day $n-1$, respectively. If the values of α and β are as indicated below, which combination of values indicates that the variance follows a stable GARCH (1,1) process?

- A. $\alpha = 0.084427$ and $\beta = 0.909073$
B. $\alpha = 0.084427$ and $\beta = 0.925573$
C. $\alpha = 0.090927$ and $\beta = 0.909073$
D. $\alpha = 0.090927$ and $\beta = 0.925573$

106. An analyst believes that the average return of hedge funds was 12% over the past year. The analyst picks a random sample of 10 hedge funds and finds that their average return was 29% with a standard deviation of 24% over the past year. The analyst decides to test at a 95% confidence level the null hypothesis H_0 : the average return of hedge funds was 12%. The possible related critical values of the t-statistic are provided below:

t-table(1-tail)			
Degrees of Freedom	$\alpha = 0.01$	$\alpha = 0.025$	$\alpha = 0.05$
9	2.821	2.262	1.833
10	2.764	2.228	1.812

The conclusion drawn from the t-test should be to:

- A. Reject the null hypothesis since the t-statistic is greater than the critical value.
B. Reject the null hypothesis since the t-statistic is less than the critical value.
C. Fail to reject the null hypothesis since the t-statistic is greater than the critical value.
D. Fail to reject the null hypothesis since the t-statistic is less than the critical value.

107. For a sample of 150 banks, a risk manager models the relationship between corporate revenue (Y_i), the average number of years of education of the employees (X_i), the number of branches the bank has (Z_i) and the average salary paid per employee (W_i) using model 1, as follows:

$$Y_i = \beta_{10} + \beta_{1X} X_i + \beta_{1Z} Z_i + \beta_{1W} W_i + \varepsilon_{1i}, i=1,2,\dots,150$$

Because the risk manager suspects linear dependence between X_i and W_i , model 2 is also used:

$$Y_i^2 = \beta_{20} + \beta_{2X}X_i + \beta_{2Z}Z_i + \varepsilon_{2i}, i=1,2,\dots,150$$

Which of the following statements is correct regarding these models?

- A. If the R^2 value of model 1 is less than the R^2 value of model 2, then the total sum of squares for model 1 is greater than the total sum of squares for model 2.
- B. Each β_{kj} represents the effect of its explanatory variable on the expected value of the dependent variable, Y_i^k when the values of all the other explanatory variables included in the model are constant.
- C. For each model, testing the null hypothesis that each $\beta_{kj} = 0$ simultaneously at the 95% confidence level is the same as testing the null hypotheses that each $\beta_{kj} = 0$ individually.
- D. If the sampling variance of β_{1Z} in model 1 is larger than the sampling variance of β_{2Z} in model 2, it could indicate that model 2 describes the relationship in a better way.

Questions 108 and 109 refer to the following information:

A portfolio manager is evaluating the relationship between an index fund (X) and could be used as a potential hedge of the index fund. The regression results of the returns of Fund Y on the returns of Fund X are given below:

ANOVA					
	Degrees of Freedom (d.f.)	Sum of Squares (SS)	Mean Square (SS/d.f.)	F	Significance of F
Regression	1	168789353.10	168789353.10	3242.15	0
Residual	1099	57215025.80	52060.99		
Total	1100	226004378.90			

	Coefficients	Standard Error	t-statistic	p-value	Lower 95%	Upper 95%
Intercept	2474.07	37.68	65.65	0	2400.13	2548.01
Return of Fund X	-17.84	0.31	-56.94	0	-18.46	-17.23

Regression Statistics	
Multiple R	0.86
R ²	0.75
Adjusted R ²	0.74
Standard Error	228.17
Observations	1101

108. What is the correlation coefficient (ρ) between Y and X? Further, if the portfolio manager currently holds a long position on X, should the manager go long or short Y to facilitate the hedge?
- A. $\rho = 0.75$ and the portfolio manager should short Y to hedge X exposure.
 - B. $\rho = -0.86$ and the portfolio manager should go long Y to hedge X exposure.
 - C. $\rho = -0.75$ and the portfolio manager should short Y to hedge X exposure.
 - D. $\rho = 0.86$ and the portfolio manager should go long Y to hedge X exposure.
109. Based on the R² of the regression, the portfolio manager would be correct to infer that:
- A. The return of Fund X is good at explaining the return of Fund Y.
 - B. The error term of the regression is heteroskedastic.
 - C. There are omitted factors that explain more of the return of Fund Y than the return of Fund X does.
 - D. The coefficient of the return of Fund X is statistically insignificant.
110. Which of the following statements about the best linear unbiased estimator (BLUE) is correct?
- A. The ordinary least squares estimator is the BLUE regardless of whether the errors are heteroskedastic or homoskedastic.
 - B. The ordinary least squares estimator is the BLUE only if the errors are independent and follow an identical normal distribution.
 - C. The BLUE has the lowest variance among all estimators for the same parameter.
 - D. When there are large outliers in the data, the ordinary least squares estimator may no longer be the BLUE.
111. An analyst has asked to select a model to forecast EUR/USD foreign exchange rates based on seasonally-adjusted, monthly historical trading data for the years 2000 through 2014. To examine out-of-sample forecasting performance, the hold-out-sample of 2014 data is used. The analyst wants to select the model with the smallest out-of-sample one-step-ahead mean squared prediction error. Which of the following in-sample properties indicates the best choice of trend forecasting model?

- A. A Schwarz information criterion value that is lower than that of other models.
- B. An Akaike information criterion value that is higher than that of other models.
- C. An R^2 that is lower than that of other models.
- D. A mean squared error that is lower than that of other models.

112. An analyst is trying to determine the quality of a pool of loans using default data. The analyst knows that of all pools, 10% are Low Risk, 70% are Average Risk. Each month, there is a 90% probability that a Low Risk pool has no defaults, an 80% chance that an Average Risk pool has no defaults and a 70% chance that a High-Risk pool has no defaults. If in one month the pool checked by the analyst did have defaults, what is the probability that this pool is either Low Risk or Average Risk?

- A. 28.57%
- B. 33.33%
- C. 66.67%
- D. 71.43%

113. Which one of the following statements about Monte Carlo simulation is false?

- A. Monte Carlo simulation can be used with a lognormally distributed.
- B. Monte Carlo simulation can generate distributions for portfolios that contain only linear positions.
- C. One drawback of Monte Carlo simulation is that it is computationally very intensive.
- D. Assuming the underlying process is normal, the standard error resulting from Monte Carlo simulation is inversely related to the square root of the number of trials.

114. When testing a hypothesis, which of the following statements is correct when the level of significance of the test is decreased?

- A. The likelihood of rejecting the null hypothesis when it is true decreases.
- B. The likelihood of making a type I error increases
- C. The null hypothesis is rejected more frequently, even when it is actually false
- D. The likelihood of making a type II error decreases

115. An economic analyst has calculated the probabilities of three possible states for the economy next year: growth, normal, and recession. A bank analyst has estimated the possible returns on two stocks, A and B, in each of the three scenarios shown in the following table:

State	Probability	Return of Stock A	Return of Stock B
Growth	0.20	0.30	0.20
Normal	0.60	0.10	0.10
Recession	0.20	-0.20	-0.10

Given that the standard deviation of the estimated returns on stocks A and B are 16.0% and 9.8%, respectively, what is the covariance of the estimated returns on stocks A and B?

- A. -0.0187
- B. -0.0156
- C. 0.0156
- D. 0.0178

116. An analyst is concerned with the symmetry and peakedness of a distribution of returns over a period of time for a company she is examining. She does some calculations and finds that the median return is 4.2%, the mean return is 4.8%, and the mode return is 3.7%. She also finds that the measure of excess kurtosis is 2. Based on this information, the correct characterization of the distribution of returns over time is:

Skewness Kurtosis

- A. Positive Leptokurtic
- B. Positive Platykurtic
- C. Negative Platykurtic
- D. Negative Leptokurtic

117. A credit analyst covers a portfolio of 10 bonds that are all currently rated investment grade. Under the company's portfolio investment guidelines, no more than two bonds in the portfolio may be rated non-investment grade. The analyst has estimated that each bond has a 20% probability of being downgraded to non-investment grade over the following year and each downgrade is independent of other downgrades. What is the estimated probability that more than two bonds in the portfolio will be rated non-investment grade at the end of next year?

- A. 32.2%
- B. 37.6%
- C. 62.3%
- D. 67.8%

118. Colleagues Benjamin Ecko and Bernard Charles recently discussed the application of the normal distribution for random variables. Ecko claimed that the z-statistic measures the distance, in standard deviation units, that a given observation is from the population mean. Charles claimed that there is a 95% chance that the z-statistic lies above negative 1.96. Regarding the statements of Ecko and Charles:

- A. Ecko is correct; Charles is correct.
- B. Ecko is correct; Charles is incorrect.
- C. Ecko is incorrect; Charles is correct.

D. Ecko is incorrect; Charles is incorrect.

119. Hedge Fund has been in existence for two years. Its average monthly return has been 6% with a standard deviation of 5%. Hedge Fund has a stated objective of controlling volatility as measured by the standard deviation of monthly returns. You are asked to test the null hypothesis that the volatility of Hedge Fund's monthly return is equal to 4% versus the alternative hypothesis that the volatility is greater than 4%. Assuming that all monthly returns are independently and identically normally distributed, and using the tables below. What is the correct test to be used and what is the correct conclusion at the 2.5% level of significance?

t Table: Inverse of the one-tailed probability of the Student's t-distribution		
Df	One-tailed Probability=5.0%	One-tailed Probability=2.5%
22	1.717	2.074
23	1.714	2.069
24	1.711	2.064

Chi-Square Table: Inverse of the one-tailed probability of the Chi-Square distribution		
Df	One-tailed Probability=5.0%	One-tailed Probability=2.5%
22	33.9244	36.7807
23	35.1725	38.0757
24	36.4151	39.3641

- A.** t-test; reject the null hypothesis
- B.** Chi-square test; reject the null hypothesis
- C.** t-test; do not reject the null hypothesis
- D.** Chi-square test; do not reject the null hypothesis

120. Adam Farman has been asked to estimate the volatility of a technology stock index. He has identified a statistic which has an expected value equal to the population volatility and has determined that increasing his sample size will decrease the sampling error for this statistic. His statistic can best be described as:

- A.** Unbiased and efficient
- B.** Unbiased and consistent
- C.** Efficient and consistent
- D.** Unbiased only

121. A company is expected to announce the terms of a materially important contract negotiation in early April. A trader expects the company's stock to be range-bound until then and has entered into a position that is short 100 March

calls with a strike price of USD 50 and long 100 April calls with a strike price of USD 50. After some consideration, the risk committee believes there is a possibility that the news will be released in mid-March and informs the trade of this change. Based on the new information, the trader sells the 100 April calls and buys 50 March calls with a strike at USD 30 and 50 March calls with a strike at USD 70. What types of positions did the trader have?

- A. The original position was long a call spread and the final position was long a strangle.
- B. The original position was long a calendar spread and the final position was long a butterfly spread.
- C. The original position was long a reverse calendar spread and final position was long a call spread.
- D. The original position was long a calendar spread and the final position was short a butterfly spread.

122. Rating agencies originally operated a subscriber-pay model, where investors subscribed to rating reports. As their influence grew, the agencies changed their business model to issuer-pay, in which the issuers pay the agencies. Which of the following statements best describes the biggest concern that has arisen as a result of this change of business model?

- A. Regulators have been more reluctant to incorporate ratings into regulation, which has complicated the regulatory process.
- B. The new model has resulted in a “free-rider” effect, in which the subscribers who use the ratings do not have to pay for them.
- C. The new model gave rise to a perceived conflict of interest, in which the agencies were evaluating their own clients.
- D. The agencies no longer tailored their offerings to different investor types, since investors were no longer paying them.

123. Consider a USD 1000 face value US Treasury bond with 1.5 years to maturity and an annualized coupon rate of 4.5%, paid semi-annually. If the annualized yield-to-maturity of the bond today is 4.0%, what is the best estimate of the present value of the bond?

- A. USD 943.00
- B. USD 951.40
- C. USD 1007.20
- D. USD 1013.90

124. A US company sells products in many countries but cannot always convert its foreign currency earnings back into USD. In Venezuela the company is unable to hedge the currency exposure of its earnings, and spot market transactions are

not possible due to recently implemented currency controls. The bolivar future (VEF) last traded at USD 1 = VEF 6; at that time the company calculated it had the equivalent of USD 50 million denominated in VEF. The company is required to estimate gains and losses in its foreign currency position. The company's economists use purchasing power parity to estimate that the exchange rate would now be USD 1 = VEF 7.2275 if it were traded. Assuming the real rate of interest is constant and equal in both countries, which of the following statements is true?

- A. The reported gain should be USD 10.2 million, and Venezuela had a higher inflation rate than the US.
- B. The reported loss should be USD 8.5 million, and Venezuela had a lower inflation rate than the US.
- C. The reported loss should be USD 10.2 million, and Venezuela had a higher inflation rate than the US.
- D. The reported loss should be USD 8.5 million, and Venezuela had a higher inflation rate than the US.

125. Consider the following futures prices:

Long Gilt Future – ICEU									
Contract	Month	Last	Chg	Open	High	Low	Volume	OpenInt	Date
Long Gilt Future – Mar 1	Mar 15	121.02	-0.18	120.96	121.14	120.92	28051	413074	01/12/15

Volume and Opening refer respectively to which of follow?

- A. The nominal value of contracts exchanged that day and the total number of contracts sold that day.
- B. The total number of contracts exchanged during that day and the number of contracts that are outstanding at the end of the day.
- C. The nominal value of all contracts sold during that day and number of contracts that are outstanding at the end of the day.
- D. The total number of contracts sold that day and total number of contracts that have been created since the opening of the contract.

126. To Be Announced (TBA) trades are a subset of the MBS market. Which of the following statements most accurately characterizes the structure of the TAB market?

- A. TBAs are comprised of highly diverse securities thereby reducing the risk to investors.
- B. The composition of a TBA is announced at the time the trade bids on it.
- C. The TBA market is essentially a forward market in which buyer and seller agree to exchange a pool of securities for cash in the future.

- D.** There are actually two separate TBA markets, one for fixed rate agency pools and the other for conventional adjustable-rate mortgage pools.

127. A large manufacturer of medical devices expects to purchase 1900 tons of a specific grade of steel known as “Marine Grade Stainless” in three months. Since futures contracts are not available on this type of steel. The risk manager suggests using the US Midwest Domestic Hot-Rolled Coil Steel Index Futures Contract to hedge against an increase in steel prices. The contract size is 20 tons and the 3-month futures price is USD 597 per ton. Using 250 days of historical information, the manager estimates that the standard deviation of changes in the spot price of steel is 0.045 and the standard deviation of changes in futures prices is 0.05. The correlation between changes in the spot and futures price is estimated at 0.90. Which of the following best describes the correct course of action for the risk manager?

- A.** Buy 77 futures contracts
B. Sell 77 futures contracts
C. Buy 95 futures contracts
D. Sell 95 futures contracts

128. The table below shows a US bank's positions in foreign currencies, assets and liabilities.

	Assets	Liabilities	FX Bought	FX Sold
Euros(EUR)	9,000,500	8,500,500	2,000,000	1,000,000
British Pounds(GBP)	5,000,000	6,000,000	4,000,000	500,000
Japanese Yen(JPY)	100,000,000	120,000,000	30,000,000	1,300,000
Australian Dollar(AUD)	1,000,000	500,000	4,500,000	3,500,000

Which of the following changes would result in a decrease in the bank's net exposure to these currencies?

- A.** A purchase of AUD 1,000,000, an increase in JPY liabilities of JPY 2,000,000, and a purchase of JPY 2,000,000
B. A sale of GBP 500,000, an increase in GBP assets of GBP 500,000, and a decrease in AUD liabilities of AUD 500,000
C. An increase in EUR liabilities of EUR 1,000,000, an increase in GBP liabilities of GBP 1,000,000, and an increase in AUD liabilities of AUD 1,000,000
D. An increase in EUR assets of EUR 4,000,000, an increase in EUR liabilities of EUR 2,000,000, and a sale of EUR 2,000,000

129. A firm is contemplating a hedge on a copper position using either futures contracts or options. The current spot price of copper is USD 875 per pound while

a September futures contract is currently trading at USD 925 per pound. There are also June USD 925 calls that are currently quoted at USD 20 and June USD 925 puts that are currently quoted at USD 22. If the basis stays the same and the spot price of copper increases to USD 900 per pound by the time of the expiration of the June options, what should the value in USD of a long hedge in futures and a long position in calls, respectively, be at that time?

- A. -25; -20
- B. 25; -20
- C. -25; 20
- D. 25; 20

130. Rating agencies do not provide all details about their rating methodologies.

However, broadly speaking the agencies do follow similar processes. Which of the following statements regarding credit of firms most accurately reflects the agencies' methodologies?

- A. Debt issuer domiciled in a country with a sovereign rating of BBB will not likely be rated higher than an issuer domiciled in a country with a speculative rating.
- B. Agencies generally avoid subjective elements when rating corporate debt, but subjective elements in the sovereign rating process are unavoidable.
- C. Rating agencies focus on the long-term horizon when evaluating sovereign entities but on the short-term horizon when evaluating corporate entities.
- D. The risk of the industry in which a firm operates will frequently place an upper boundary on a corporate rating.

131. In the event that a clearinghouse member is unable to make good on its side of a transaction with another clearinghouse member, the clearinghouse will resort to a number of measures to ensure that contracts executed among members are made good. Which of the following presents the preferred method followed by clearinghouse?

- A. Under-margined positions at the defaulting member firm are liquidated along with all of the member's proprietary positions and if that is insufficient, the defaulting firm's membership may be sold and its deposit liquidated.
- B. The member's deposit is liquidated and if that is insufficient, the clearinghouse draws down on a credit facility at a pre-designated bank, the cost of which is borne equally by all members of the exchange.
- C. The member's deposit is liquidated and, if necessary, other member's deposits are liquidated on an equal percentage basis; If that is insufficient, the clearinghouse then draws down on a credit facility.
- D. The clearinghouse has a credit facility at a pre-designated bank that

allows it to make good on all contracts, the cost of which is allocated across all members of the exchange using a weighting scheme based on the outstanding positions held by the member.

132. A fund manager implements a delta-neutral strategy for an equity portfolio consisting of a long position in 1,250 shares of stock and a short position in call options with a delta of 0.5. Which of the following actions is necessary to maintain a delta-neutral portfolio if the delta of the call options changes from 0.5 to 0.65?

- A. Purchase an additional 250 shares of the stock
- B. Purchase an additional 300 shares of the stock
- C. Purchase an additional 375 shares of the stock
- D. Sell 300 shares of the stock

133. In preparation for a briefing to the board of directors, the CRO considers specific explanations as to why certain risks should be hedged. Which of the following would be an accurate explanation of the impact of hedging risk exposures on shareholder wealth?

- A. Hedging increases the variability of the firm's profits, making the firm a more attractive investment for stakeholders.
- B. Hedging reduces a firm's expected costs of financial distress.
- C. Hedging does not increase shareholder wealth because shareholders have diversified portfolios.
- D. Hedging with derivatives reduces the compliance and operational costs of the firm.

134. An analyst is using recent prepayment information from a mortgage pool to update a prepayment model for a USD 100 million pool of 30-year residential mortgage loans that currently has a USD 90 million balance. The scheduled principal payments for this month are total USD 150,000, but the pool received a total of USD 350,000 in principal payments. Assuming that this monthly rate of prepayment continues, what is the conditional prepayment rate?

- A. 2.20%
- B. 2.37%
- C. 2.63%
- D. 4.57%

135. A US based automobile dealer enters into a foreign exchange contract to hedge an obligation of EUR 1 million payable in 3 months. The dealer received the following quotes from a large international bank (quotes are USD per EUR).

	Bid	Offer
A. Spot	1.19	1.21
3-month forward	1.25	1.27

Assuming the dealer fully hedges the obligation, what is the payoff on the hedge, using the 3-month forward, if the spot rate ends up at USD 1.23 per EUR three months from now?

- A. USD -40,000
- B. USD -20,000
- C. USD 20,000
- D. USD 40,000

136. S&P has recently analyzed the creditworthiness of a company to assign it an initial rating. During the review the company was found to have adequate payment capacity currently, although a negative change in the business environment could affect its capacity for repayment. The company was given an investment grade rating. Which of the following is most likely the specific rating assigned?

- A. AA
- B. A
- C. BBB
- D. BB

137. The treasurer of a US company has entered into a fixed-for-fixed currency swap with a German counterparty. The treasurer expects to pay EUR 100,000 and receive USD 120,000 at the end of each year for the next 4 years. Concerned that interest rates in the US will decrease, the treasurer opens an account with a local bank that pays a guaranteed nominal rate of 3%, compounded monthly. If the treasurer makes four annual end-of-year deposits of USD 120,000 each, what will the account balance be closest to at the end of the fourth year?

- A. USD 502,035
- B. USD 502,347
- C. USD 509,312
- D. USD 6,111,745

138. The four-year Eurodollar futures quote is 97.00. The volatility of the short-term interest rate (LIBOR) is 1.0%, expressed with continuous compounding. What is the equivalent forward rate, adjusted for convexity, given in ACT/360 day count with continuous compounding (i.e., the Eurodollar futures contract gives LIBOR in quarterly compounding ACT/360, so convert to continuous but a day count conversion is not needed)?

- A. 2.89%
- B. 2.95%
- C. 2.99%
- D. 3.00%

139. A US manufacturer is planning to receive a cash inflow of KRW 50 billion as an initial payment from a South Korean customer in 3 months. The manufacturer's CFO is concerned that since all of its expenses are in USD, a drop in the value of the KRW will reduce the profitability of the project. The manufacturer would like to choose a hedging strategy which can protect against some of the downside risk but allow the company to benefit from a KRW appreciation over the next 3 months. Which of the following is the most appropriate course of action?
- A. Long KRW futures contracts
 - B. Short KRW futures contracts
 - C. Long KRW call options
 - D. Long KRW put options
140. A wealth management executive is responding to a client question about different kinds of bonds and the security they offer. The client has asked the executive to identify the least secure type of bond from among four different types of bonds. Assuming all the bonds have the same maturity and are from issuers with identical credit quality, which of the following is the executive most likely to identify as least secure?
- A. Debenture
 - B. Equipment trust certificate
 - C. Mortgage bond
 - D. Subordinated bond
141. A metals trader is considering establishing a reverse cash and carry trade by shorting silver today and simultaneously buying silver 1-year forward. The current spot price for silver is GBP 10.00 per troy ounce and the 1-year forward price is GBP 10.25 per troy ounce. On a 1-year cash investment the trader can earn an interest rate of 4%. What is the implied market lease rate?
- A. The metals trader will pay GBP 0.15 per troy ounce.
 - B. The metals trader will receive GBP 0.15 per troy ounce.
 - C. The metals trader will pay GBP 0.40 per troy ounce.
 - D. The metals trader will receive GBP 0.40 per troy ounce.
142. A portfolio worth USD 20 million has a beta relative to the S&P 500 index of 0.75. The S&P 500 index is currently trading at 2,000 and 3-month S&P futures, with a contract size of USD 250×S&P 500 index are trading at 2,060. Using the 3-month futures contract, which of the following is the correct trade to increase the portfolio's beta to 1.78?

- A. Buy 40 futures contracts
- B. Sell 40 futures contracts
- C. Buy 69 futures contracts
- D. Sell 69 futures contracts

143. An interest rate analyst at a fund has obtained a table of USD interest rate swap rates as of today:

Term (Years)	Annualized Swap Rate
0.5	0.695%
1.0	0.905%
1.5	1.035%

Given this data, what is the semi-annually compounded 1.5-year spot rate, expressed as an annual rate?

- A. 0.88%
- B. 1.04%
- C. 2.08%
- D. 3.13%

144. An investor believes that the price of a stock, currently trading at USD 112, will increase by 10% over the next 3 months. Three-month American call and put options with a strike price of USD 110 are trading at USD 7 and USD 5 respectively. The investor has USD 560,000 to invest and is looking for a return greater than the expected increase in the stock price but wants to limit losses to the initial investment. Which of the following best describes the investor's strategy and total profit (ignoring taxes, transactions cost and the effect of discounting) if the stock ends up at USD 115 per share at option expiration?

- A. Buy 112,000 put options resulting in a net loss of USD 560,000
- B. Buy 80,000 call options resulting in a net loss of USD 160,000
- C. Buy 5,000 shares resulting in a net gain of USD 15,000
- D. Short 80,000 call options resulting in a net gain of USD 160,000

145. A firm that uses 5,000 barrels of oil each month implements a stack and roll hedge to protect against an increase in the price of oil. Assuming the firm wants to hedge its price exposure on the full 5,000 barrels of oil used each month, which of the following scenarios makes the stack and roll strategy unattractive compared to a hedging strategy of buying a series of futures contracts of different maturities?

- A. A decrease in the storage costs of crude oil
- B. A decrease in short-term interest rates
- C. A decrease in the firm's use of oil
- D. A steepening of the forward curve of crude oil futures

146. A trader holds a 1-year American put option with a strike price of USD 100 on a stock currently trading at USD 90. To value the option, a 1-step binomial tree is used where the stock price can move up or down by USD 10 over a 1-year period. If the risk-neutral probability of the stock moving up is 81% and the risk-free rate is 6% per year, what is the current value of the American put?

- A. USD 1.79
- B. USD 1.90
- C. USD 7.63
- D. USD 10.00

147. An investor has financed a purchase of an MBS pool using a dollar roll valued at USD 10 million. The net proceeds of buying the January/February dollar roll are USD 133,000. The short-term (1-month) interest rate is 0.5%, and the expected total principal pay down is 1%. The current prices are in the table below.

FNMA 30-Year TBAs 4% coupon	
Settlement	Price (USD)
15-Jan	102.00
15-Feb	101.73

If the February settlement price declined to USD 101.50, which of the following is true?

- A. The dollar roll is trading below carry and the proceeds are higher.
- B. The dollar roll is trading below carry and the proceeds are lower.
- C. The dollar roll is trading above carry and the proceeds are higher.
- D. The dollar roll is trading above carry and the proceeds are lower.

148. A bank is earning just 1% on its EUR denominated assets. Seeking a higher return, the bank's loan officer converts EUR 150 million into USD at the spot exchange rate of USD 1.18 per EUR and makes a 1-year USD loan at a rate of 4%. The officer realized that this transaction leaves the bank exposed to changes in the USD/EUR exchange rate and establishes a hedge by selling forward the USD loan proceeds, using the 1-year forward rate of USD 1.16 per EUR.

Assuming no default, what rate of return in EUR terms has the lending officer locked in on the loan?

- A. 2.2%
- B. 2.7%
- C. 4.0%
- D. 5.8%

149. A firm has entered into a 1-year fixed-for-fixed currency swap receiving USD semiannually and paying EUR annually. The USD leg has a notional value of USD 10,000,000 and an annual coupon of 1.5%. The EUR leg has a value of EUR 8,080,808 and an annual coupon of 0.5%. Given the following discount and forward rates, what is the present value in USD of the swap on December 15, 2015?

Pay Date	EUR/USD Forward Rate	USD Discount Curve
June 15, 2016	1.240	0.9975
December 15, 2016	1.245	0.9950

- A. -11,080
B. -10,893
C. 38,896
D. 39,083
150. A trader shorted a publicly traded stock at USD 112 per share in anticipation of a significant drop in price. Since establishing this position, however, the stock price has increased to USD 125 per share. If the price continues to increase, which of the following orders would be appropriate to limit further losses on this trade?
- A. A stop order to buy at USD 127
B. A stop order to sell at USD 115
C. A limit order to buy at USD 100
D. A limit order to buy at USD 127
151. A small bank's asset-liability committee has requested a report on the bank's sensitivity to interest rate risk. Currently the market value of the bank's liabilities is USD 200 million with a DV01 of USD 330,000, and the market value of the bank's assets is USD 220 million with a DV01 of USD 400,000. Which of the following correctly reports the bank's exposure to interest rate risk?
- A. The bank's equity will decrease by USD 70,000 for a parallel increase of 1% in the yield curve.
B. The bank's equity will increase by USD 70,000 for a parallel increase of 1% in the yield curve.
C. The effective duration of the bank's equity is -35.
D. The convexity of the bank's equity is -3,500.
152. A forward contract to buy a coupon bearing bond is priced at USD 910 and matures in 1 year. The underlying is a bond, with a USD 1,000 par value and a 6% annual coupon, which matures in 18 months. The bond is currently priced at USD 950. Coupons are paid semi-annually and the next coupon payment is in 6 months. Assuming the risk-free rates in the table below, is the forward contract mispriced

and, if so, what is the correct price?

Term	Risk-free Rate
6-month	3.0%
12-month	4.0%
18-month	5.0%

- A. Yes, the forward price should be USD 857.
- B. Yes, the forward price should be USD 899.
- C. Yes, the forward price should be USD 928.
- D. No, the forward price is correct at USD 910.

153. A US trading company is evaluating alternatives for handling profits it has earned in Venezuela, denominated in VEF, where currency controls make converting earning into its home currency (USD) difficult. It can use its VEF currency, the equivalent of USD 50 million, to buy 1.5 million barrels of oil and sell half at EUR 32 per barrel and half at CHF 35 per barrel. The EUR/USD exchange rate is EUR 1 = USD 1.2 and the USD/CHF exchange rate is USD 1 = CHF 1.05. What is the profit or loss in USD if the firm undertakes this transaction?

- A. -5,000,000
- B. -2,437,500
- C. 3,800,000
- D. 6,362,500

154. The risk manager for a large manufacturing company has identified the volatility of foreign exchange rates as the biggest driver of earnings uncertainty and would like to hedge some of that risk by taking a long position in either futures or a forward contract. In comparing these two alternatives which of the following is correct?

- A. To minimize the credit risk in the hedge, a forward contract with a local bank be used.
- B. If delivery needs to be made on one particular day, a futures contract with a local bank should be used.
- C. If a specific amount of currency is needed, a futures contract should be used.
- D. If the firm would prefer settlement at the end of the contract, a futures contract should be used.

155. The risk manager for an actively managed portfolio of stocks and bonds is analyzing the various types of risk exposures of the portfolio. Which of the following would be an example of “curve” risk?

- A. Long and short positions with different maturities are hedged against a parallel shift in the term structure of interest rates but not against a non-parallel shift.

- B. The portfolio has long positions in short-term corporate bonds and there has been a steady rise in corporate bankruptcies.
- C. The portfolio has a large position in domestic stocks for which volatility has been substantially increasing.
- D. The fixed income portfolio is net long domestic bonds and net short foreign bonds while domestic interest rates have been rising.

156. An investor in MBS is evaluating two methods of financing a recent purchase of an MBS pool. One method involves entering into a repurchase agreement (repo) and selling the pool now. The other method involves purchasing a dollar roll. One advantage of purchasing a roll instead of entering into a repo agreement is that roll buyers:

- A. Receive the same securities back when the transaction is concluded.
- B. Receive the interest and principal repayments on the pool during the life of the roll.
- C. Are more similar to a secured borrower than a repo participant.
- D. Are subject to less risk of prepayment than a repo buyer.

157. A new hire in the credit risk department of a bank is reviewing the bank's internal 1-year default score transition matrix given by:

Next year's score	Current score		
	1	2	3
1	40%	30%	0%
2	30%	30%	20%
3	20%	20%	40%
Default	10%	20%	40%

Which of the following is the best reason to conclude that the firm uses a point-in-time, rather than a through-the-cycle, scoring methodology?

- A. Internal scoring models are almost always point-in-time.
- B. The diagonal of the matrix has relatively low transition probabilities.
- C. The rows of the matrix never add up to 100%.
- D. The columns of the matrix always add up to 100%.

158. A risk consultant is reviewing the role of regulatory arbitrage in the 2007 credit crisis to better understand the lessons learned as a result of the crisis. Which of the following best describes how regulatory arbitrage took place in the mortgage securitization market?

- A. Banks securitized mortgages and then invested in tranches of these MBS to get a more favorable treatment for capital purposes.
- B. Mortgage originators were required to purchase a portion of MBS equity tranches, which were then offered in the secondary market.

- C. Pension funds which invested in mortgage securities were required to hold only securities rated BBB and above.
- D. Mortgage originators were encouraged to offer adjustable rate mortgages to subprime borrowers with initial low “teaser” rates.

159. Assume that it is March 1st in a year which is not a leap year. Calculate the dirty price of a US Treasury bond currently quoted at 98-16, with a 5% coupon paid semi-annually, maturing on February 28th in the following year. (Note that there are 181 actual days between February 28th and August 28th in a non-leap year; the 30-day convention would use 180 days for the same period.)

- A. 98.174
- B. 98.202
- C. 98.514
- D. 98.542

160. An investor has opened an account with a futures broker at a clearinghouse member firm and has purchased several positions in interest rate futures. What will the broker do each day in regard to this account?

- A. Observe the daily settlement prices, calculate a guaranty deposit and require an increase in margin if the newly measured guaranty deposit is greater than the one currently in place.
- B. Observe the daily settlement prices, calculate a valuation margin and require an increase in margin if the newly measured valuation margin is greater than the margin currently on deposit.
- C. Observe the daily settlement prices, calculate a new valuation margin and require this new margin to be posted.
- D. Observe the last quotations, calculate a guaranty deposit based on these quotations and require an increase in the deposit held if it is greater than that currently held.

161. There are many potential conflicts of interest between commercial banking, securities services, and investment banking when they are all conducted under the same corporate umbrella. Banks make more risky loans given the protection of deposit insurance. What is this behavior?

- A. Moral Hazard.
- B. Adverse Selection
- C. Agency Problem
- D. fraud

162. What is the expected return to a hedge fund manager if the fund uses a standard 2 and 20 incentive fee structure with an investment that has a 30% probability of making 62% and a 70% probability of losing 15%?

- A. 5.71%.
- B. 6.12%.
- C. 3.78%.
- D. 5.60%.

163. Former Treasury Secretary Robert Rubin decided to stop issuing 30-year Treasury bonds in 2001 and to replace them by borrowing more with shorter-maturity Treasury bills and notes (although the U.S. Treasury has since resumed issuing 30-year bonds). Which of the following statements concerning this decision is most accurate?

- A. If the pure expectations hypothesis of the term structure is correct, this decision will reduce the government's borrowing cost.
- B. If the liquidity theory of the term structure is correct, this decision will reduce the government's borrowing cost.
- C. If the liquidity theory of the term structure is correct, this decision will not change the government's borrowing cost.
- D. If the pure expectations hypothesis of the term structure is correct, this decision will increase the government's borrowing cost.

164. Suppose you observe a 1-year (zero-coupon) Treasury security trading at a yield to maturity of 5% (price of 95.2381% of par). You also observe a 2-year T- Note with a 6% coupon trading at a yield to maturity of 5.5% (price of 100.9232% of par). And, finally, you observe a 3-year T-Note with a 7% coupon trading at a yield to maturity of 6.0% (price of 102.6730). Assume annual coupon payments and discrete compounding. Use the bootstrapping method to determine the 2-year and 3-year spot rates.

2-year spot rate	3-year spot rate
A. 5.51 %	5.92
B. 5.46 %	5.92 %
C. 5.51 %	6.05 %
D. 5.46 %	6.05 %

165. A long position in a FRA 6×9 is equivalent to the following positions in the spot market:

- A. Borrowing in six months to finance a nine-month investment.
- B. Borrowing in nine months to finance six-month investment.
- C. Borrowing half a loan amount at six months and the remainder at nine months.
- D. Borrowing in six months, and it could be deferred until nine months.

166. ABC, Inc., entered a forward rate agreement (FRA) to receive a rate of 3.75% with continuous compounding on a principal of USD 1 million between the end of year 1 and the end of year 2. The zero rates are 3.25% and 3.50% for one and two years. What is the value of the FRA when the deal is just entered?

- A. USD 35,629
- B. USD 34,965
- C. USD 664
- D. USD 0

167. A \$1,000 par corporate bond carries a coupon rate of 6%, pays coupons semiannually, and has ten coupon payments remaining to maturity. Market rates are currently 5%. There are 90 days between settlement and the next coupon payment. The dirty and clean prices of the bond, respectively, are closest to:

- A. \$1043.76, \$1013.76
- B. \$1043.76, \$1028.76
- C. \$1056.73, \$1041.73
- D. \$1069.70, \$1054.70

168. The yield curve is upward sloping. You have a short T-bond futures position. The following bonds are eligible for delivery:

Bond	A	B	C
Spot price	102-14/32	106-19/32	98-12/32
Coupon	4%	5%	3%
Conversion factor	0.98	1.03	0.952

The futures price is 103-17/32 and the maturity date of the contract is September 1. The bonds pay their coupon semiannually on June 30 and December 31. The cheapest to deliver bond is:

- A. Bond A
- B. Bond B
- C. Bond C
- D. Insufficient information

169. Which of the following statements related to forward and futures prices is true?

- A. If the forward price does not equal the futures price, arbitrageurs will exploit this arbitrage opportunity.
- B. The level of interest rates determines whether the forward price is higher or lower than the futures price.
- C. The volatility of interest rates determines whether the forward price is higher or

- D. lower than the futures price.
- E. Whether the forward price will be higher or lower than the futures price depends on correlation between interest rate and futures price.

170. Consider a forward rate agreement (FRA) with the same maturity and compounding frequency as a Eurodollar futures contract. The FRA has a LIBOR underlying. Which of the following statements is true about the relationship between the forward rate and the futures rate?

- A. The forward rate is normally higher than the futures rate.
- B. They have no fixed relationship.
- C. The forward rate is normally lower than the futures rate.
- D. They should be exactly the same.

171. A large publicly held company refines crude oil into gasoline and sells gasoline wholesale with long-term contracts at fixed prices. The firm also owns the land, with full rights, from which it pumps crude oil the firm financed the purchase of the land by issuing floating-rate bonds. This firm could reduce the volatility of its earnings by entering into an:

I. interest-rate swap.

II. oil commodity swap.

- A. I only.
- B. II only.
- C. Both I and II.
- D. Neither I nor II.

172. A portfolio management firm manages the fixed-rate corporate bond portfolio owned by a defined-benefit pension fund. The duration of the bond portfolio is five years; the duration of the pension fund's liabilities is seven years. Assume that the fund sponsor strongly believes that rates will decline over the next six months and is concerned about the duration mismatch between portfolio assets and pension liabilities. Which of the following strategies would be the best way to eliminate the duration mismatch?

- A. Enter into a swap transaction in which the firm pays fixed and receives floating.
- B. Enter into a swap transaction in which the firm receives fixed and pays floating.
- C. Purchase an interest rate cap expiring in six months
- D. Sell Eurodollar futures contracts.

173. An oil driller recently issued USD 250 million of fixed-rate debt at 4.0% per annum to help fund a new project. It now wants to convert this debt to a floating-rate obligation using a swap. A swap desk analyst for a large investment bank that

is a market maker in swaps has identified four firms interested in swapping their debt from floating-rate to fixed-rate. The following table quotes available loan rates for the oil driller and each firm:

Firm	Fixed-rate (in %)	Floating-rate (in %)
Oil driller	4.0	6-month LIBOR +1.5
Firm A	3.5	6-month LIBOR +1.0
Firm B	6.0	6-month LIBOR +3.0
Firm C	5.5	6-month LIBOR +2.0
Firm D	4.5	6-month LIBOR +2.5

A swap between the oil driller and which firm offers the greatest possible combined benefit?

- A. Firm A
- B. Firm B
- C. Firm C
- D. Firm D

174. Details from an interest rate swap confirmation executed under an ISDA Master Agreement are shown below. Assuming no defaults, no netting of payments, and that 3-month LIBOR remains below the initial floating coupon level.

	Floating	Fixed
Currency	USD	USD
Coupon	3M LIBOR+0 bps	0.56000%
Index Definition	3M USD LIBOR BBA	-
Initial Coupon	0.45000%	-
Reset Frequency	3M, no compounding	-
First Reset Date	July 23, 2012	-
Effective Date	April 23, 2012	April 23, 2012
First Payment Date	July 23, 2012	October 23, 2012
Last Payment Date	October 23, 2014	October 23, 2014
Business Days	NY, LON	NY, LON
Day-count Basis	3M, ACT/360	6M, 30/360
Business Day Convention	Mod Following	Mod Following

How many total payments between the two parties will be made over the life of the swap?

- A. 7
- B. 14
- C. 21
- D. 22

175. Bank One enters into a five-year swap contract with Mervin Co. to pay LIBOR in return for a fixed 8% rate on a principal of \$100 million. Two years from now, the market rate on three-year swaps at LIBOR is 7%. At this time Mervin Co. declares bankruptcy and defaults on its swap obligation. Assume that the net payment is made only at the end of each year for the swap contract period. What is the market value of the loss incurred by Bank One as a result of the default?

- A. \$1.4604 million
- B. \$2.245 million
- C. \$2.624 million
- D. \$3.011 million

176. Consider the following 3-year currency swap, which involves exchanging annual interest of 2.75% on 10 million US dollars for 3.75% on 15 million Canadian dollars. The CAD/USD spot rate is 1.52. The term structure is flat in both countries. Calculate the value of the swap in USD if interest rates in Canada are 5% and in the United States are 4%. Assume continuous compounding. Round to the nearest dollar.

- A. \$152,000
- B. \$145,693
- C. \$131,967
- D. \$127,818

177. Which sequence of the commodities X, Y, and Z correctly identifies appropriate examples in terms of production, demand, and relative storage costs to other commodities?

Commodities	X	Y	Z
Production	Constant	Seasonal	Constant
Demand	Relatively constant	Constant	Seasonal
Storage costs	Relatively moderate	Moderate	Expensive

X

- A. Oil
- B. Natural gas
- C. Corn
- D. Natural gas

Y

- Corn
- Oil
- Natural gas
- Oil

Z

- Natural gas
- Corn
- Oil
- Corn

178. Your company is expecting a major export order from a London-Based client. The receivables under the contract are to be billed in GBP, while your reporting currency is USD. Since the order is a large sum, your company does not want to bear the exchange risk and wishes to hedge it using derivatives. To minimize the cost of hedging, which of the following is the most suitable

contract?

- A. A chooser option for GBP/USD pair
- B. A currency swap where you pay fixed in USD and receive floating in GBP
- C. A barrier put option to sell GBP against USD
- D. An Asian call option on GBP against USD

179. Suppose we plan on buying crude oil in one month to produce gasoline and heating oil for sale in two months. The 1-month futures price for crude oil is currently \$55.00/barrel. The 2-month futures prices for gasoline and heating oil are \$61.50/barrel and \$58.50/barrel, respectively. Which of the following amounts is closest to the 5-3-2 crack (commodity) spread?

- A. \$4.70/barrel.
- B. \$5.30/barrel.
- C. \$23.50/barrel.
- D. \$26.50/barrel.

180. A firm that uses 5,000 barrels of oil each month implements a stack and roll hedge to protect against an increase in the price of oil. Assuming the firm wants to hedge its price exposure on the full 5,000 barrels of oil used each month, which of the following scenarios the stack and roll strategy unattractive compared to a hedging strategy of buying a series of futures contracts of different maturities?

- A. A decrease in the storage costs of crude oil
- B. A decrease in short-term interest rates
- C. A decrease in the firm's use of oil
- D. A steepening of the forward curve of crude oil futures

181. Firms sometimes want to take delivery on terms that are different from the specifications of their futures contracts. If this happens often enough in a futures market, exchanges will set up a special procedure called an Exchange for Physical (EFP). Which of the following statements about EFP transactions is correct?

- A. In commodity futures markets, EFPs are quite rare as they are mainly used in financial futures markets.
- B. EFPs are considered a form of prearranged trading in futures contracts.
- C. The cash asset underlying the EFP is priced in the same standardized way as the futures contract on that asset.
- D. Using an EFP and a futures contract, it is impossible to synthetically create a cash asset position.

182. Suppose that you enter into a short futures contract to sell July silver for \$5.20 per ounce on the New York Commodity Exchange. The size of the contract

is 5,000 ounces. The initial margin is \$4,000, and the maintenance margin is \$3,000. What change in the futures price will lead to a margin call? What happens if you do not meet the margin call?

- A. Silver price > 5.40 per ounce; call margin
- B. Silver price < 5.40 per ounce; call margin
- C. Silver price > 5.40 per ounce; be forced to close out your position
- D. Silver price < 5.40 per ounce; be forced to close out your position

183. In late June, Simon purchases two September silver futures contracts. Each contract size is 5,000 ounces of silver and the futures price on the date of purchase was USD 18.62 per ounce. The broker requires an initial margin of USD 6,000 and a maintenance margin of USD 4,500. You are given the following price history for the September silver futures:

Day	Future Price (USD)	Daily Gain (Loss)
June 29	18.62	0
June 30	18.69	700
July 1	18.03	-6,600
July 2	17.72	-3,100
July 6	18.00	2,800
July 7	17.70	-3,000
July 8	17.60	-1,000

On which days did Simon receive a margin call?

- A. July 1 only
- B. July 1 and July 2 only
- C. July 1, July 2 and July 7 only
- D. July 1, July 2 and July 8 only

184. A portfolio manager owns Macrogrow, Inc., which is currently trading at \$35 per share. She plans to sell the stock in 120 days but is concerned about a possible price decline. She decides to take a short position in a 120-day forward contract on the stock. The stock will pay a \$0.50 per share dividend in 35 days and \$0.50 again in 125 days. The risk-free rate is 4%. The value of the trader's position in the forward contract in 45 days, assuming in 45 days the stock price is \$27.50 and the risk-free rate has not changed, is closest to:

- A. \$7.16.
- B. \$7.50.
- C. \$7.92.
- D. \$7.00.

185. The hedge ratio is the ratio of derivatives to a spot position or vice versa that achieves an objective such as minimizing or eliminating risk. Suppose that the

standard deviation of quarterly changes in the price of a commodity is 0.57, the standard deviation of quarterly changes in the price of a futures contract on the commodity is 0.85, and the correlation between the two changes is 0.3876. What is the optimal hedge ratio for a 3-month contract?

- A. 0.1893
- B. 0.2135
- C. 0.2381
- D. 0.2599

186. A portfolio manager manages a \$10 million portfolio that has a beta of 1.0 relative to the S&P 500. The S&P 500 futures are trading at 1,500 and the multiplier is 250. He would like to hedge exposure to market risk over the next few months. Suppose that at the maturity of the futures contract, the market index is trading at 1,490 and the portfolio has experienced a 1% decline in value. In regard to hedging the portfolio, which of the following statements is correct?

I. The appropriate hedge for the portfolio is a long position in 27 contracts.
II. The net impact of the market decline on the appropriately hedged portfolio is a gain of \$32,500.

- A. I only.
- B. II only.
- C. Both I and II.
- D. Neither I nor II.

187. Nevin Woodcomb is portfolio manager for the Matrix Tactical Growth Fund, a 1940 Act mutual fund with total assets of \$225 million. The mandate of the mutual fund is to make active tactical shifts in long and short exposure based on current views of stock market action. Recently, Woodcomb has been cautious on stocks and has positioned the fund with a beta of -0.30, however, the most recent jobless claims were more positive than Woodcomb expected, and he expects the stock market to rally strongly when the monthly non-farm payroll data is released. Woodcomb would like to take advantage of this market rally using S&P 500 index futures and increase the fund's beta to 1.25. Currently, S&P 500 futures are trading at 1,540 and the multiplier is 250. How can Woodcomb achieve his objective for his fund?

- A. Sell 135 contracts.
- B. Buy 555 contracts.
- C. Buy 788 contracts.
- D. Buy 906 contracts.

188. On September 15, a small energy company estimates that it will need to buy 20,000 barrels of crude oil on October 20. The company decides to hedge its price risk using November futures contracts priced at USD 75.00 per barrel. On October 20, the company purchases the crude oil at the spot price of USD 79.50 per barrel and closes out the futures contract when the futures price is USD 77.50 per barrel. What is the effective price paid per barrel incorporating the hedge?

- A. USD 77.00
- B. USD 77.50
- C. USD 79.50
- D. USD 82.00

189. Current spot CHF/USD rate: 1.3680 ($1.3680\text{CHF} = 1\text{USD}$) 3-month USD interest rates: 1.05%

3-month Swiss interest rates: 0.35%

(Assume continuous compounding)

A currency trader notices that the 3-month future price is USD 0.7350. In order to arbitrage, the trader should investment:

- A. Borrow CHF, buy USD spot, go long CHF futures
- B. Borrow CHF, sell CHF spot, go short CHF futures
- C. Borrow USD, buy CHF spot, go short CHF futures
- D. Borrow USD, sell USD spot, go long CHF futures

190. A risk analyst observes that an emerging market stock index has hit a new all-time high with a value of 10,000, measured in the emerging market's currency. The analyst suggests buying futures on the index as a hedge on the firm's short exposure to this market. If the interest rate is 4% annually in this market and the average annualized dividend yield on the index for the next six months is 1%, what is the approximate price of a 6-month futures contract on the index in the emerging market's currency?

- A. 9,700
- B. 9,850
- C. 10,150
- D. 10,300

191. A portfolio manager holds USD 25 million in various US Treasury securities and is concerned about interest rate volatility in the next few months. She has decided to use June US Treasury bond futures to hedge this risk. The current price for the futures contract is 94-30 and the duration of the cheapest to deliver bond is currently 9.50, which the portfolio manager expects will decrease to 9.25 by the maturity of the futures contract. Given a current duration of the portfolio of 2.30, which the portfolio manager expects will remain constant throughout the hedging

period, what is the most appropriate position to take in the futures contract?

- A. Short 61 contracts
- B. Short 63 contracts
- C. Short 65 contracts
- D. Short 67 contracts

192. A French industrial firm is considering hedging the exchange rate risk associated with incoming cash flow streams from three Asian countries. What is correct with respect to the hedge decision?

- A. The firm could hedge this risk by buying put options on each currency, but this would eliminate any upside to the firm if the currency moves in its favor.
- B. If the firm has a high-risk appetite for country risk, it should generally choose to hedge each currency stream.
- C. A cash flow stream in a foreign currency can be hedged by purchasing debt denominated in that currency.
- D. If the firm chooses to hedge, this may reduce the value of the firm at the time the hedge is made.

193. An analyst is pricing a 2-year European put option on a non-dividend-paying stock using a binomial tree with two-time steps of one year each. The stock price is currently USD 38, and the strike price of the put is USD 40. What is the value of the put closest to, assuming that the annual risk-free rate will remain constant at 2% over the next two years and the annual stock volatility is 15%?

- A. USD 3.04
- B. USD 3.48
- C. USD 3.62
- D. USD 3.81

194. On September 10, a trader opens a long position in 100 December S&P 500 futures contracts. The initial margin requirement is USD 2 million, and CME requires a maintenance margin of USD 1.5 million. Assume that the position is kept open until September 14 and no withdrawals take place. The following table summarizes the daily change in value of the position for that period:

Date	December S&P 500 Futures price	Daily Gain/Loss (USD)
September 10	1,734	-
September 11	1,756	550,000
September 12	1,712	-1,100,000
September 13	1,698	-350,000

On what dates will additional margin be required?

- A. September 12, but not September 13

- B. September 13, but not September 12
- C. September 12 and September 13
- D. Neither September 12 nor September 13

195. In futures trading, clearinghouses play an important role. Which of the tasks can one expect the clearing houses to fulfill in the settlement process of futures?

- A. In case of physical settlement, the clearinghouse guarantees that the longs will receive the specified merchandise.
- B. The clearinghouse performs the function of receiving delivery notices from longs and assigning the notices to shorts.
- C. When a seller wants to make a delivery, he or she instructs the clearinghouse to submit a notice of intention to deliver.
- D. When the clearinghouse receives a delivery notice, it must immediately identify a buyer to receive the delivery.

196. A bank uses a continuously-compounded annual interest rate of 5% in one of its risk models. What is the equivalent interest rate the bank should use if it converts to semi-annual compounding in the model?

- A. 4.94%
- B. 5%
- C. 5.06%
- D. 5.12%

197. An investor holds an American call option on a dividend paying stock with the following characteristics.

- ✓ Current stock price, $S = \text{USD } 50$
- ✓ Strike price, $K = \text{USD } 50$
- ✓ Time to expiration, $T = 2 \text{ months}$

A dividend, D , of USD 1 per share has just been announced, with an ex-dividend date, t , of one month from now. Assuming the risk-free rate, r , is 1.5% and the option stays at-the-money, is it optimal to exercise the option right before the ex-dividend date?

- A. Yes, because $S < K * e^{-r(T-t)} + D$
- B. Yes, because $D > K * [1 - e^{-r(T-t)}]$
- C. No, because the call option is at-the-money and early exercise is only optimal when it is deep in-the-money.
- D. No, because unlike an American put option, it is never optimal to exercise an American call option early.

198. A company has 500,000 shares of stock outstanding. One World, a single stock futures (SSF) exchange, is the only exchange that trades in SSFs for this stock. There is currently open interest in the July 2014 futures contract representing 500,000 shares. Since One World functions as a typical futures exchange, what should be expected to happen when a trader places a new buy order for this SSF contract on 10,000 shares of the company's stock?
- A. This is allowed and open interest in this SSF contract may increase.
 - B. A position limit will prevent the new SSF order from being accepted by the exchange.
 - C. This particular trade setup is a common method of market manipulation and would likely be reviewed by regulators.
 - D. The cash outlay would be greater than buying 10,000 shares of this stock.

199. Options have just started trading for a non-dividend-paying stock. The stock is trading at USD 50. The risk-free rate is 1.5% per year. The prices of some 1-year European options on the stock are displayed in the table below. What arbitrage opportunity exists given these prices?

Option	Strike (USD)	Price (USD)
Call	40	11
Call	50	8.75
Call	60	5

- A. Sell two calls with strike USD 40; buy one call with strike USD 50; sell one call with strike USD 60
 - B. Buy one call with strike USD 40; sell two calls with strike USD 50; buy one call with strike USD 60
 - C. Sell two calls with strike USD 40; buy one call with strike USD 50; buy one call with strike USD 60
 - D. Buy one call with strike USD 40; sell two calls with strike USD 50; sell one call with strike USD 60
200. The rating agencies have analyzed the credit-worthiness of a casino operator and determined that the company currently has adequate capacity to meet financial commitments. But this capacity could be adversely impacted by negative economic conditions. Any further credit rating reduction would move the casino operator into the speculative category, which of the following S&P/Moody's ratings has the casino operator been assigned?
- A. AA/Aa
 - B. A/A
 - C. BBB/Baa
 - D. BB/Ba

201. Futures exchanges and clearinghouses require that members put up margin in various situations to limit the risk to the exchange that might develop through futures trading. Which of the following statements is correct?
- A. Original margin requirements generally reflect the price volatility of futures contracts.
 - B. Guaranty deposit is defined as the deposit that the clearing member must make by the start of the trading session.
 - C. Variation margin is defined as the deposit that the clearing member must make when a trade is initiated.
 - D. Original margin represents the deposit that the clearing member must maintain at the clearinghouses as long as it remains a member.
202. A Mexican pharmaceutical producer enters into a swap agreement to hedge the interest rate risk of payments it will need to make every six months for the next two years. It agrees to pay 3% per year on a notional principal of MXN 100 million and receive 6-month LIBOR for two years at 6-month intervals. If the current 6-month LIBOR rate is 2.75% per year, and 6-month LIBOR in six months turns out to be 3.15% per year, what is the company's cash flow from the payment occurring at the end of month 12?
- A. MXN 72,816
 - B. MXN 75,000
 - C. MXN 150,000
 - D. MXN 200,000
203. A refiner plans to purchase crude oil in one month to produce and sell gasoline and kerosene in two months. Currently, the 1-month futures price for crude oil is USD 60 per barrel, the 2-month futures price for gasoline is USD 75 per barrel, and the 2-month futures price for kerosene is USD 65 per barrel. Assuming no interest rate considerations, what is the 7-4-3 crack spread per barrel of crude oil?
- A. USD -130.71
 - B. USD -10.71
 - C. USD 10.71
 - D. USD 130.71
204. You manage a US equity portfolio with the following characteristics:

Value	USD 5 million
Volatility	12% per year
Benchmark	S&P 500

Benchmark	value 1,750
Benchmark	volatility 13% per year
Portfolio	beta 2.0

Fears of a declining economy prompt you to reduce your market exposure, and you want to lower your beta to 0.8 for the next six months using S&P futures. If the 6-month S&P futures is at 2,000 and each contract is for USD 250 times the index value, which position will reduce your portfolio's beta to 0.8?

- A. Short 12 futures contracts
- B. Short 14 futures contracts
- C. Long 12 futures contracts
- D. Long 14 futures contracts

205. MTGE4, MTGE7, MTGE70 are mortgage-backed securities (MBS) that pay 4%, 7%, and 10% coupons. Prevailing mortgage rates are 10%. Assuming these securities have the same maturity and coupon frequency, which of the following is correct?

- A. In most cases, convexity is sufficient to approximate MBS price changes resulting from yield changes for the purpose of estimating VaR.
- B. In most cases, duration is sufficient to approximate MBS price changes resulting from yield changes for the purpose of estimating VaR.
- C. The optionality embedded in a MBS makes the implementation of the duration convexity method less appropriate for the purpose of estimating VaR.
- D. As rates fall, MTGE10 price change approximations using the duration-convexity method are likely to be better than MTGE4 price change approximations.

206. The annualized forward interest rate can be determined by the:

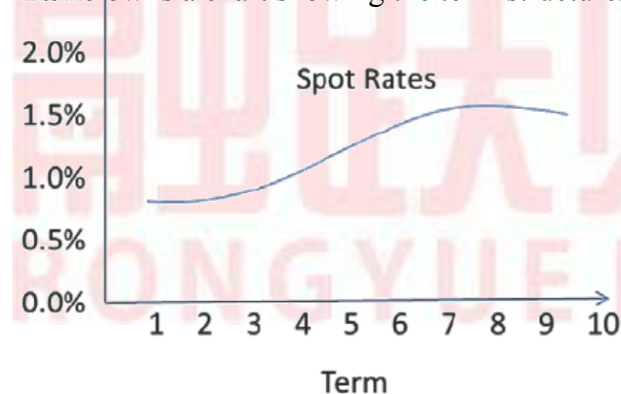
- A. Ratio of two consecutive discount factors that is then annualized.
- B. Product of two consecutive discount factors that is then annualized.
- C. Corresponding discount factor multiplied by the square root of time for the period, measured in years.
- D. Corresponding discount factor divided by the square root of time for the period, measured in years.

207. Stocks and futures each present different risk. When reviewing the characteristics of a stock, a futures contract, and the markets in which they trade, which of the following should be considered the least common?

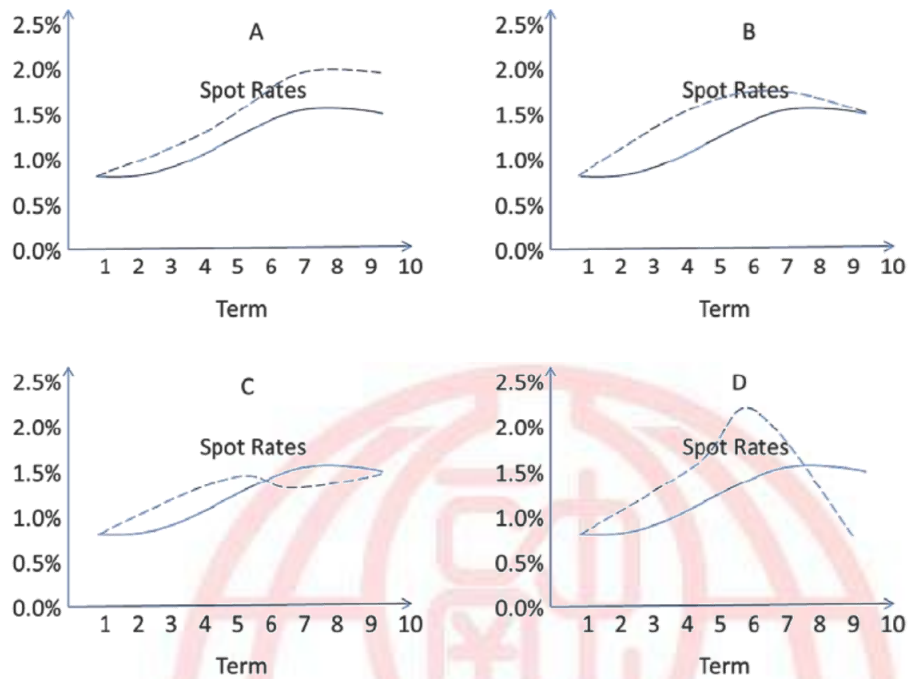
- A. There is a limit on the supply of outstanding shares for the stock.
- B. There is a position size maximum for the futures contract.
- C. There is a defined length of life for the stock.
- D. There is a limit for the price movement of the futures contract.

208. A risk manager is analyzing the option prices for a non-dividend-paying stock. How would the risk manager create a synthetic long European call option position on this stock using an appropriate zero-coupon risk-free bond and options having the same exercise price and exercise date?
- A. Buy a European put on the stock, buy the stock, and sell a zero-coupon risk-free bond.
 - B. Buy a European put on the stock, sell the stock, and buy a zero-coupon risk-free bond.
 - C. Sell a European put on the stock, buy the stock, and sell a zero-coupon risk-free bond.
 - D. Sell a European put on the stock, sell the stock, and buy a zero-coupon risk-free bond.
209. An investment manager holds a variety of equity and debt securities issued by a firm. These securities include floating rate notes, participating bonds, income bonds, and preferred stock. However, the firm faces financial difficulties and is in danger of default. Which of the following would constitute an act of default by the issuer?
- A. Failure to pay interest to the holders of a floating-rate note
 - B. Failure to pay a share of before-tax earnings to the holders of a participating bond
 - C. Failure to pay dividends to the holders of preferred stock
 - D. Failure to pay coupons to the holders of income bonds

210. Below is a chart showing the term structures of risk-free spot rates:



Which of the following charts presents the correct derived forward rate?



211. The manager of a derivatives portfolio wishes to estimate the VaR of the portfolio. When evaluating the delta-normal approach and the full revaluation approach for VaR estimation, which of the following statements is correct?

- A. The delta-normal approach is more accurate than the full revaluation approach when applied to complex derivatives.
- B. Both the full revaluation approach and the delta-normal approach assume that asset prices are normally distributed.
- C. The full revaluation approach does not require estimating the VaR of the underlying assets whereas the delta-normal approach does.
- D. The delta-normal approach is less computationally intensive than full revaluation approach.

212. For any portfolio P , let $\text{VaR}(P, \lambda, t)$ denote the VaR, and $\text{ES}(P, \lambda, t)$ denote the ES, with confidence level λ over a horizon of t days. Which of the following relationships is always true?

- A. $\text{ES}(P, \lambda, t) \leq \text{VaR}(P, \lambda, t)$
- B. $\text{VaR}(P1 + P2, \lambda, t) \leq \text{VaR}(P1, \lambda, t) + \text{VaR}(P2, \lambda, t)$
- C. $\text{ES}(3 \times P, \lambda, t) = 3 \times \text{ES}(P, \lambda, t)$
- D. $\text{VaR}(3 \times P, \lambda, t) = 9 \times \text{VaR}(P, \lambda, t)$

213. The Basel Committee has recommended several implementation principles for the governance of sound stress testing practices. One of the recommendations is that:

- A. Stress testing reports should not be passed up to senior management without first being approved by middle management.
- B. Stress testing reports should have limited input from their respective business areas to prevent biasing of the results.
- C. Stress testing reports should be separated by business lines to help identify risk concentrations.
- D. Stress testing reports should complement rather than replace the risk management tools used at the firm.

214. As a bank becomes more concentrated in particular industry sectors, the default correlation among the loans it makes increases. Assuming a bank can secure loans with similar average default rates as it becomes more concentrated, which of the following is most likely to occur?

- A. The gap between the unexpected loss of the loan portfolio and the sum of the risk contributions of each loan increases.
- B. The gap between the unexpected loss of the loan portfolio and the sum of the risk contributions of each loan decreases.
- C. The expected loss of the loan portfolio increases.
- D. The unexpected loss of the loan portfolio increases.

215. A portfolio manager is reviewing trades in a 6-year US Treasury note with a 4% coupon and a 5-year US Treasury note futures contract maturing 3 months from today. The manager is deciding whether to buy the futures contracts or to buy call options on the futures contract with a strike price of USD 110 and maturity of 3 months. Using the information in the following table, and assuming the 6-year par rate is 1.75%, which of the following is correct regarding the durations for the futures contracts and call options?

6-Year Par Rate	Futures Contract Price(USD)	Call Option Price(USD)
1.70%	110.08	1.92
1.75%	109.70	1.72
1.80%	109.30	1.57
1.85%	108.90	1.38

- A. The futures contract duration is significantly longer than the call option duration.
- B. The futures contract duration is significantly shorter than the call option duration.
- C. The futures contract duration and the call option duration are essentially equal.
- D. Both the futures contract duration and the call option are negative.

216. An asset has a return distribution with fat tails. Assuming efficient markets, which of the following is the best explanation for fat tails in this distribution?

- A. The return series exhibits conditional normality with time-varying volatility.
- B. The return series exhibits conditional normality with time-varying mean.

- C. The return series exhibits unconditional normality with time-varying volatility.
- D. The return series exhibits unconditional normality with time-varying mean.

217. All of the following should be classified as operational risk events except:

- A. A sale of a basket of securities is recorded as a purchase.
- B. A monthly volatility is used as input to a model that requires daily volatility as input.
- C. A trader generates large losses after taking positions that exceed trading limits.
- D. A loss is incurred because a portfolio manager relied on an analyst's optimistic forecast.

218. Which of the following methods is an example of a stress test that ignores the correlation among risk variables and examines the scenario in which all variables move in the direction that causes the greatest loss on the portfolio?

- A. Factor push method
- B. Prospective scenario analysis method
- C. Conditional scenario method
- D. Event-driven method

219. A risk manager is estimating the 1-day 95% ES on a domestic equity portfolio the historical simulation approach with a 100-day look back period. The six most extreme negative returns over the look back period, along with the time they occurred, are:

Order	Return	Number of Days Ago
1	-10.00%	95
2	-6.30%	17
3	-4.70%	65
4	-4.00%	4
5	-3.80%	5
6	-3.60%	30

Over the next 10 days, the portfolio experienced four days of extreme negative return: -25.0%, -4.1%, -7.8% and -9.5%. On the other six days, the portfolio experienced positive returns. The risk manager must now update the previous ES estimate. Assuming the portfolio has a current value of USD 100 million, what is the updated 1-day 95% ES using the historical simulation approach?

- A. USD 4.7 million
- B. USD 10.7 million
- C. USD 11.7 million
- D. USD 25.0 million

220. A bank's risk committee is reviewing the bank's most significant loss events and categorizing each event into specific risk categories. In one case, a model operator input the wrong price for a security into an algorithm used for trading, which then caused the algorithm to buy instead of sell the security. This situation would be an example of:
- A. Market risk.
 - B. Operational risk.
 - C. Strategic risk.
 - D. Liquidity risk.
221. A risk manager is measuring the VaR of a portfolio of investment securities for a regional bank. The portfolio has a current market value of USD 10 million with a mean daily return of 0.25% and variance of daily returns of 0.05%. Assuming that the portfolio's daily returns follow a normal distribution. The estimated 1-day 95% VaR is closest to:
- A. USD 261,600.
 - B. USD 286,600.
 - C. USD 342,800.
 - D. USD 367,800.
222. The Black-Scholes-Merton model assumes that:
- A. Only long positions can be taken in securities.
 - B. Transaction costs must be proportional to the price of the underlying security.
 - C. Securities are perfectly divisible.
 - D. The underlying security's price follows a normal distribution.
223. Consider a 1-year European call option with an exercise price of EUR 70. The price of the underlying non-dividend-paying stock is EUR 75 and the annual risk-free rate is 4%. The following estimates have been made:
Black-Scholes-Merton model $N(d1) = 45\%$
Risk-neutral probability of not exercising the call option at maturity = 63%
Which of the following is closest to the price of the call option?
- A. EUR 8.87
 - B. EUR 9.89
 - C. EUR 10.75
 - D. EUR 12.32
224. A portfolio manager is estimating VaR on a stock portfolio using the implied volatility of at-the-money index options, derived from the Black-Scholes-Merton

- model. Which of the following statements regarding this approach is most accurate?
- A. The method is difficult to implement because different options must be used as the price of the index changes.
 - B. Empirical research indicates that implied volatility is, on average, much lower than the realized volatility.
 - C. Empirical research indicates that using implied volatility to measure expected volatility is less accurate than using historical volatility.
 - D. The model assumes a constant volatility rather than a stochastic, time-dependent volatility.
225. A risk analyst seeks to model the frequency of operational loss events. Which of the following distributions would be the most appropriate for this purpose?
- A. Geometric
 - B. Bernoulli
 - C. Binomial
 - D. Poisson
226. A portfolio manager has a position in the stock of a company and would like to use options on the stock to construct a portfolio that is both delta and gamma neutral. Using puts and calls of differing strike prices and maturities, what is the minimum number of option positions needed to construct such a portfolio?
- A. 1
 - B. 2
 - C. 3
 - D. Cannot be determined
227. Which of the following represents a significant weakness of single-factor approaches to hedging interest rate risk?
- A. Single-factor approaches do not account for arbitrage opportunities among bonds with the same maturity but different coupon rates.
 - B. Single-factor approaches assume a correlation of 1.0 among interest rate changes across the entire yield curve.
 - C. Single-factor approaches assume that the short-term rate will converge to the long-term rate.
 - D. Single-factor approaches cannot be used to forecast future interest rates.
228. A bank's risk manager has been asked by the firm's CFO to describe the Basel Committee's principles for effective risk data aggregation and reporting. In particular, the CFO wants to know the key benefits and costs of adhering to these principles. Which of the following most accurately describes the effects of

implementing the Basel recommendations on data aggregation and risk reporting?

- A. Increased expected long-term profitability, but significant initial investments for banks.
- B. Faster decision making for banks, but increased potential to generate systemic risk.
- C. Efficiently gains for banks, but reduced ability to find a suitable merge partner.
- D. Reduced probability of losses, but increased magnitude of losses when they occur.

229. During the first hour of trading on an exchange, the share price of a stock increased from USD 75.00 to USD 75.30. If the price of a call option on the stock decreased from USD 1.50 to USD 1.25 during the same trading period, which of the following could best explain why?

- A. The delta of the call option is negative.
- B. The risk-free rate increased based on the previous day's aftermarket announcement by the Federal Reserve.
- C. The implied volatility of the stock decreased during the first hour of trading.
- D. The call option is deep in-the-money.

230. The following table gives the initial price of a 30-year C-STRIP and its present value after applying key rate 1-basis point shifts at 2, 5, 10, and 30 years.

	Initial Curve	2-Year Shift	5-Year Shift	10-Year Shift	30-Year Shift
Value	24.1234	24.4321	24.6642	24.8234	24.9523

What are key rate '01 and duration with respect to the 5-year shift?

- A. Key rate '01 equals -0.0035 and key rate duration equals -1.4570
- B. Key rate '01 equals -0.0410 and key rate duration equals -16.9200
- C. Key rate '01 equals -0.5408 and key rate duration equals -219.2700
- D. Key rate '01 equals -1.4570 and key rate duration equals -0.0035

231. Which of the following is a drawback of stress testing?

- A. Stress testing only considers scenarios that have never happened.
- B. Stress testing involves subjective decisions.
- C. Stress testing cannot account for correlation among assets.
- D. Stress testing cannot account for fat tails in return distributions.

232. For which of the following derivative instruments would the delta-normal method for calculating VaR yield the least reliable result?

- A. An at-the-money straddle with European options on a stock
- B. A forward contract on a foreign currency with a net present value of zero

- C. A put option on a corporate bond priced at par with a redemption price above par
- D. A call option on a corporate bond priced at par with a redemption price below par

233. A risk manager is analyzing the following US Treasury note position held by a bond trading desk:

Amount	USD 100 million face value
Structure	Option-less, annual coupons, full par at maturity
Coupon Rate	4%, paid annually
Maturity	3 years from today
Yield-to-maturity	5%

Ignoring the impact of convexity, what will the approximate decrease in the value of the position be if the US Treasury yield curve shifts upward by 10 bps?

- A. USD 266,000
- B. USD 280,000
- C. USD 288,000
- D. USD 294,000

234. An oil exploration company has a USD 250 million line of credit with a multinational bank, of which USD 100 million has already been drawn. The bank wants to compute an appropriate loan loss reserve for this position. The bank's internal credit risk model assigns the loan a 1-year default probability of 0.40% and expects an exposure amount of USD 220 million given default. The loss given default is estimated to be 60% with a standard deviation of 25%. What is the estimated unexpected loss of this loan?

- A. USD 528,000
- B. USD 9,029,000
- C. USD 11,305,000
- D. USD 52,800,000

235. The parameters of a normal distribution have been estimated from an extremely large data set. The critical value of 2.33 is used to form a two-sided confidence interval around the sample mean, based on the distribution parameters estimated.

A correct statement regarding the confidence interval is that:

- A. 5% of the distribution is outside the confidence interval.
- B. There is a 1% probability of a particular observation failing either below the range or above the range of the confidence interval.
- C. There is a 1% probability of a particular observation failing below the range of the confidence interval.
- D. 99.5% of all observations will be within the confidence interval.

236. A risk analyst is analyzing several indicators for a group of countries. If he specifically considers the Gini coefficient in his analysis, in which of the following factors is he most interested?

- A. Standard of living
- B. Peacefulness
- C. Perceived corruption
- D. Income inequality

Questions 237 and 238 refer to the following information:

A relative-value trader specializing in US Treasury notes and TIPS (Treasury Inflation Protect Securities) expects an environment of falling real yields and increasing inflation. Therefore, he expects TIPS to outperform Treasury notes, and he buys USD 100 million in face value of TIPS and sells short Treasury notes to keep his position DV01-neutral. The trader observes the following yields and DV01s for a 10-year maturity TIPS and a 10-year maturity Treasury note:

Bond	Annual yield (%)	DV01	Modified Duration
TIPS 5/8s of 7/15/2024	0.88	0.099	9.33
Treasury 2-1/8s of 8/15/2024	3.21	0.091	8.95

237. How much in face value of Treasury notes should the trader short to hedge the DV01 of the TIPS position?

- A. USD 91.92 million
- B. USD 95.93 million
- C. USD 104.25 million
- D. USD 108.79 million

238. A week later, nominal yields increase by 10bps and the market's expectation of inflation decreases by 10bps. Which of the following statements correctly describes the impact on the aggregate portfolio resulting from these changes?

- A. Since the increase in the nominal yield perfectly offsets the decrease in expected inflation, there is no impact.
- B. Since the DV01-neutral hedge immunizes the position against small changes in expected inflation and nominal yields, there is no impact.
- C. Since the DV01-neutral hedge immunizes the portfolio against small changes in the spread between nominal and real yields, there is no impact.
- D. Since changes in the real yield and the nominal yield are not one-to-one, there is an impact.

239. What is a limitation of the mean-variance framework for measuring financial risk?

- A. The mean-variance approach ignores the first two moments of the underlying distribution.

- B. The mean-variance approach ignores the skewness and kurtosis of the underlying distribution.
- C. The mean-variance approach restricts the underlying distribution to a non-negative Fishburn measure.
- D. The mean-variance approach requires that the underlying distribution have an entropy measure between 0 and 1.

240. The chief risk officer of an international bank is instructing his direct reports on best practices for conducting country risk analysis and presenting the findings to senior executives. Which of the following recommendations would be considered the most questionable?

- A. Risk analysis should be consistent, using rigorous frameworks that allow for valid cross-country comparison.
- B. Risk reports should be concise, with easy to understand conclusion that have sufficient detail to make them meaningful.
- C. Risk reports should be informative, providing the end user the rationale behind any assessment without and “black boxes” that are difficult to understand.
- D. Risk analysis should be open-ended, presenting several scenarios and taking no particular position on any issue that could bias decision-makers.

241. A small A portfolio manager bought 1,000 call options on a non-dividend-paying stock with a strike price of USD 100 for USD 5 each. The current stock price is USD 104 with a daily stock return volatility of 2.89%, and the delta of the option is 0.7. Using the delta-normal approach to calculate VaR, what is the approximate 1-day 95% VaR of this option?

- A. USD 238
- B. USD 3,461
- C. USD 4,944
- D. USD 7,063

242. The enterprise risk management process includes several stages. Which of the following procedures would take place during the risk assessment stage?

- A. Developing the following year's budget for the risk management function.
- B. Using simulation analysis to estimate VaR.
- C. Purchasing insurance to mitigate a specific risk factor.
- D. Selecting a risk strategy compatible with the firm's risk appetite.

243. A portfolio manager needs to hedge a USD 115 million liability. The portfolio manager is deciding between investing only in the 3%-coupon Treasury bond in the table below, or in a portfolio consisting of the shorter maturity 2%-coupon Treasury

bond and the longer maturity 4.5%-coupon Treasury bonds.

Coupon	Maturity	Price	Yield	Duration	Convexity
2%	6/31/2018	102	2.03%	4.5	35
3%	6/15/2023	101	3.29%	6	60
4.5%	6/14/2043	103	4.8%	14	400

The convexity of the barbell portfolio that will match the duration and price of the bullet position will be closest to:

- A. 60
- B. 74
- C. 83
- D. 93

244. A risk analyst is asked to calculate the 1-day 99% VaR of a portfolio as well as to estimate the number of daily exceedances that are expected over the next year. Assuming 250 trading days in a year, what is the expected number of days of exceedances for this model within a year?

- A. 3
- B. 5
- C. 13
- D. 25

245. An operational risk analyst is attempting to analyze a bank's loss severity distribution. However, historical data on operational risk losses is limited. Which of the following is the best way to address this issue?

- A. Generate additional data using Monte Carlo simulation and merge it with the bank's operational losses.
- B. Estimate the parameters of a Poisson distribution to model the loss severity of operational losses.
- C. Estimate relevant probabilities using expected loss information that is published by credit rating agencies.
- D. Merge external data from other banks with the banks with the bank's internal data after making appropriate scale adjustments.

246. A risk manager oversees the risk measurement of two portfolios. Portfolio A has a VaR of USD 5 million and an ES of USD 10 million. Portfolio B has a VaR of USD 7 million and an ES of USD 15 million. When combining portfolios A and B, the risk manager observes that the VaR of the aggregate portfolio is USD 15 million and the ES is USD 20 million. This is because:

- A. ES is subadditive, while VaR is not subadditive.
- B. VaR is subadditive, while ES is not subadditive.
- C. VaR satisfies positive homogeneity, while ES does not satisfy positive homogeneity.

- D.** ES satisfies positive homogeneity, while VaR does not satisfy positive homogeneity.

247. A stock is currently trading at USD 45, and its annual price volatility is 30%. The risk-free rate is 1.5% per year. A risk manager is developing a 1-step binomial tree for a 2-year horizon. What is the risk-neutral probability that the stock will move down?

- A.** 30%
- B.** 43%
- C.** 57%
- D.** 70%

248. A risk manager is exploring the interest rate sensitivity of an insurer's bond portfolio and is considering a 2-year 6% coupon bond with a face value of USD 100. The coupon is paid annually, and the bond yield is 8% per year with annual compounding. What is the approximate dollar duration of the bond, where dollar duration is defined as the modified duration multiplied by the current value of the bond?

- A.** 162
- B.** 173
- C.** 180
- D.** 187

249. Which of the following is an assumption of the Black-Scholes-Merton model?

- A.** Securities are traded in a frictionless market.
- B.** Short selling of securities is not possible.
- C.** Only American style options are used.
- D.** The underlying security's price follows a normal distribution.

250. A risk manager is reviewing the benefits of diversification with her firm's board of directors. She explains that if two securities have a 1-day 95% VaR of X and Y, then the 1-day 95% VaR of the combined portfolio will always be less than or equal to X+Y. Which of the following statements is consistent with the risk manager's explanation?

- A.** The risk manager assumed that the values of the two securities are jointly normally distributed random variables.
- B.** The risk manager assumed that the values of the two securities are uncorrelated.
- C.** The risk manager assumed that the values of the two securities are independent and identically distributed random variables.

- D.** The risk manager made no assumptions because VaR is a coherent risk measure which supports her statement.

251. Which of the following statements is correct in evaluating the interest cost of carrying a dynamic delta hedge on a portfolio of short option positions?

- A.** The interest cost will be highest when the options are deep out-of-the-money.
B. The interest cost will be highest when the options are deep in-the-money.
C. The interest cost will be lowest when the options are at-the-money.
D. The interest cost will be highest when the options are at-the-money.

252. A portfolio manager holds USD 25 million in various US Treasury securities and is concerned about interest rate volatility in the next few months. She has decided to use June US Treasury bond futures to hedge this risk. The current price for the futures contract is 94-30 and the duration of the cheapest to deliver bond is currently 9.50, which the portfolio manager expects will decrease to 9.25 by the maturity of the futures contract. Given a current duration of the portfolio of 2.30, which the portfolio manager expects will remain constant throughout the hedging period, what is the most appropriate position to take in the futures contract?

- A.** Short 61 contracts
B. Short 63 contracts
C. Short 65 contracts
D. Short 67 contracts

253. A risk manager is considering switching from using historical volatility to using implied volatility in VaR calculations. Which of the following statements about implied volatility is correct?

- A.** Implied volatility estimates are model dependent and a misspecified model can result in erroneous forecasts.
B. Implied volatility estimates require that historical returns are indicative of future returns.
C. Implied volatility estimates tend to underestimate future volatility as a result of mean reversion.
D. Implied volatility estimates are generally accurate even if there is only one trade in the option used to calculate an estimate.

254. A risk manager wants to protect a portfolio of non-callable bonds against interest rate risk and is considering taking positions in two additional bonds, Bond A and Bond B, to accomplish this. Given the following information, what positions in Bond A and Bond B immunize the portfolio against change in the 5-year and 10-year key rates?

	Key Rates 01s (USD 1,000 Face Value)	
	5-year	10-year
Bond A	0.4600	0.0000
Bond B	0.8000	4.0000
Portfolio	1.0200	5.1000

- A. Bond A: USD 0 Bond B: USD 732
 B. Bond A: USD -2,717 Bond B: USD -1,275
 C. Bond A: USD -500 Bond B: USD 732
 D. Bond A: USD 0 Bond B: USD -1,275

255. A risk manager is measuring the VaR of a portfolio of investment securities for a regional bank. The portfolio has a current market value of USD 10 million with a mean daily return of 0% and variance of daily returns of 0.0005. Assuming there are 250 trading days in a year and that the portfolio returns a normal distribution, the estimated annual 90% VaR is closest to:

- A. USD 101,000
 B. USD 287,000
 C. USD 4,531,000
 D. USD 5,815,000

256. A risk manager is evaluating an option portfolio that has been hedged to satisfy a risk limit. All other things being equal, which of the following portfolio characteristics will typically result in a need to rebalance the hedge more frequently to remain in compliance?

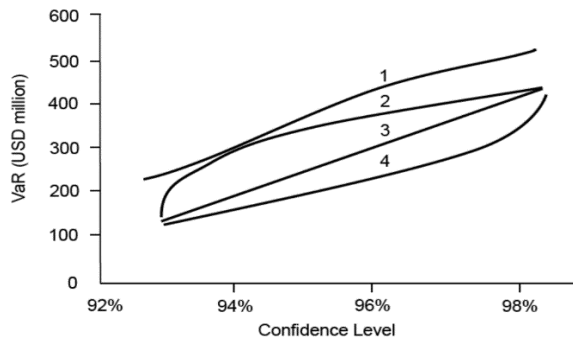
- A. Small delta value
 B. Large delta value
 C. Large theta value
 D. Large gamma value

QUESTION 257 AND 258 REFER TO THE FOLLOWING INFORMATION

A 1-year loan facility has the characteristics given in the table below:

COM	Commitment	USD 75,000,000
SO	Outstanding	USD 35,000,000
MAT	Maturity type	1-year unsecured
UGD	Unused draw-down on default	80%
EDF	1-year expected default frequency	0.50%
σ_{EDF}	Standard deviation of EDF	1.75%
LGD	Loss given default for unsecured asset	60%
σ_{LGD}	Standard deviation of LGD	20%

257. What is the expected loss on this loan?
- A. USD 134,000
 - B. USD 189,000
 - C. USD 201,000
 - D. USD 285,000
258. What is the unexpected loss on this loan?
- A. USD 1,180,000
 - B. USD 1,312,000
 - C. USD 1,673,000
 - D. USD 1,861,000
259. An increase in which of the following factors will increase the duration of a fixed-rate coupon bond?
- A. Yield-to-maturity
 - B. Maturity
 - C. Coupon value
 - D. Coupon frequency
260. Which of the following statements about internal credit rating systems is correct?
- A. When back testing internal credit rating systems, the minimum time period required for investment-grade securities should be greater than that required for non-investment-grade securities.
 - B. A through-the-cycle approach to designing internal credit rating systems leads to more rating changes over time than a point-in-time approach.
 - C. For an internal credit rating system to be consistent, banks must use the same transition matrix for all asset classes.
 - D. An effective way to compensate for the difficulty of obtaining qualitative data for small firms is to combine a qualitative approach for large firms with a quantitative approach for small firms.
261. A risk manager who works for a private equity fund calculates a daily VaR on a portfolio using the delta-normal approach for a range of confidence levels. The risk manager then graphs VaR against the confidence level. As shown below along with three other curves:



Assuming that the VaR of the portfolio has been accurately calculated, which curve did the risk manager create?

- A. Curve 1
- B. Curve 2
- C. Curve 3
- D. Curve 4

262. Which of the following regarding the delta-normal method for computing VaR is correct?

- A. The delta-normal method is implemented with a simulation of price paths.
- B. The delta-normal method assumes that the distribution of asset returns has fat tails.
- C. The delta-normal method accounts for asymmetric distributions of asset returns.
- D. The delta-normal method assumes that asset returns follow a normal distribution.

263. A risk manager is comparing the delta-normal method for estimating the VaR of stock and stock option portfolios with the Monte Carlo simulation approach. Assuming that all of the options have the same underlying stock and expiration date, for which of the following combined positions would the delta-normal method estimate a VaR of zero while the Monte Carlo simulation would estimate a positive VaR?

- A. Long the underlying stock and long an at-the-money call
- B. Long an at-the-money call and long an at-the-money put
- C. Long an at-the-money call and short an at-the-money put
- D. Long an at-the-money put and short an at-the-money call

264. A bank analyst wants to simulate 1-year price paths for a stock that is currently priced at USD 100 by using a geometric Brownian motion model. The model used assumes a normal distribution for the daily returns, with a mean of 0% and a volatility of 15% per year. For one of the price paths, the first two daily draws are given by:

$$\varepsilon(\text{day 1}) = 0.1536 \text{ and } \varepsilon(\text{day 2}) = -0.4567$$

What is the simulated stock price at the end of the second day for this price path assuming 250 trading days per year?

- E. USD 99.42
- F. USD 99.71
- G. USD 100.15
- H. USD 100.58

265. For which of the following will the delta-normal or delta-gamma approach be least effective at measuring the VaR of a long position?

- A. A forward contract on a commodity
- B. A US Treasury strip
- C. An in-the-money call option on a stock
- D. An at-the-money straddle on a stock

266. Which statement is always correct for a European call and put on the same non-dividend paying stock that have the same strike price and time to maturity?

- A. The gamma of the call is equal to the gamma of the put.
- B. The delta of the call is equal to the delta of the put.
- C. The Vega of the call is greater than the Vega of the put.
- D. The theta of the call is greater than the theta of the put.

267. All of the following should be classified as operational risk events except:

- A. A sale of securities is recorded as a purchase.
- B. A loss is incurred on an option portfolio because actual volatility exceeded expected volatility.
- C. A monthly volatility is used as an input to a model that requires daily volatility inputs.
- D. A trader generates large losses by taking positions that exceed his trading limits.

268. A risk manager assigned to a fixed-income trading desk is evaluating the interest rate sensitivity of a USD 15 million par position in a 15-year zero-coupon bond. The bond has a current market value of USD 5,340,000. Assuming semi-annual compounding, what is the modified duration of the bond?

- A. 13.5 years
- B. 14.0 years
- C. 14.5 years
- D. 15.0 years

269. A chief risk officer is educating the board of his bank on how to use a variety of risk metrics to gauge the risk exposure of the bank's loan portfolio. Afterwards, he asks the board members to write down one thing they have learned during the session about VaR. Which of the following four statements made by the board members demonstrates that the board could use another session because it did not understand VaR?

- A. Two positions that have the same VaR can have very different risk exposures.
- B. For a given confidence level and holding period, VaR is an estimate of the most we can lose if a tail event occurs during the corresponding holding period.
- C. A good holding period to use for VaR measurement in any given market is the length of time required to ensure orderly liquidation of positions in that market.
- D. The VaR confidence level should be set high when used for firm-wide capital requirements but set low when used for back testing the model.

270. The trading desk is considering purchasing one of four possible 10-year AA- rated bonds. All four of the bonds have face value of USD 10,000, identical annually compounded yields of 9.5% per year, and the following coupon characteristics:

Bond	Coupon Rate	Coupon Frequency
A	6%	Semi-annual
B	6%	Annual
C	12%	Semi-annual
D	0%	No coupon

The risk manager is concerned about the interest rate sensitivity of the bonds. Based on the information given, which of the following statements is correct?

- A. Bond A has greater Macaulay duration than bond B.
- B. Bond C has greater Macaulay duration than bond A.
- C. Bond D has modified duration equal to 10.
- D. Bond C has greater DV01 than bond A.

271. For a non-dividend-paying security satisfying the Black-Scholes- Merton(BSM) model's underlying assumptions, an exact analytic solution of the BSM differential equation exists for each of the following derivatives except:

- A. An American put on the security
- B. A European call on the security
- C. An American call on the security
- D. A forward contract on the security

272. Assume an investor holds a portfolio of bonds as follows:

- \$2,000,000 par value of 10-year bonds with a duration of 6.95 priced at 95.5000.
- \$3,000,000 par value of 15-year bonds with a duration of 9.77 priced at 88.6275.

\$5,000,000 par value of 30-year bonds with a duration of 14.81 priced at 114.8750. The duration of this portfolio is closest to:

- A. 10.64.
- B. 12.06.
- C. 13.28.
- D. 13.57.

273. Which of the following statements are TRUE?

- I. The convexity of a 10-year zero coupon bond is higher than the convexity of a 10-year, 6% bond.
 - II. The convexity of a 10-year zero coupon bond is higher than the convexity of a 6% bond with a duration of 10 years.
 - III. Convexity grows proportionately with the maturity of the bond.
 - IV. Convexity is always positive for all types of bonds.
 - V. Convexity is always positive for “straight” bonds.
- A. I only
 - B. I and II only
 - C. I and V only
 - D. II, III, and V only

274. A \$1,000 par bond with 22 years to maturity and a 4% semiannual coupon has a yield to maturity of 5%. Assuming a 5-basis point change in yield, the convexity of the bond is closest to:

- A. 258.
- B. 502.
- C. 942.
- D. 129.

275. A hedge fund manager wants to change her interest rate exposure by investing in fixed-income securities with negative duration. Which of the following securities should she buy?

- A. Short maturity calls on zero-coupon bonds with long maturity.
- B. Short maturity puts on interest-only strips from long maturity conforming mortgages.
- C. Short maturity puts on zero-coupon bonds with long maturity.
- D. Short maturity calls on principal-only strips from long maturity conforming mortgages.

276. A small bank's asset-liability committee has requested a report on the bank's sensitivity to interest rate risk. Currently the market value of the bank's liabilities is USD 200 million with a DV01 of USD 330,000, and the market value of the

bank's assets is USD 220 million with a DV01 of USD 400,000. Which of the following correctly reports the bank's exposure to interest rate risk?

- A. The bank's equity will decrease by USD 70,000 for a parallel increase of 1% in the yield curve.
- B. The bank's equity will increase by USD 70,000 for a parallel increase of 1% in the yield curve.
- C. The effective duration of the bank's equity is 35.
- D. The convexity of the bank's equity is -3,500.

277. On You are using key rate shifts to analyze the effect of yield changes on bond prices. Suppose that the 10 – year yield has increased by 10 basis points and that this shock decreases linearly to zero for the 20-year yield. What is the effect of this shock on the 14-year yield?

- A. Increase of 0 basis points
- B. Increase of 4 basis points
- C. Increase of 6 basis points
- D. Increase of 10 basis points

278. An investor has a short position in a 20-year, 5% coupon, U.S. Treasury bond (T-bond) with a yield to maturity (YTM) of 6% and par value of \$100. Assume discounting occurs on a semiannual basis. Which of the following amounts is closest to the dollar value of a basis point (DV01)? Using a 30-year, 5% coupon, U.S. T-bond yielding 5% with a DV01 of 0.1544 to hedge the interest rate risk in the 20-year bond, which of the following actions should the investor take?

- A. 0.1053 Buy \$68.72 of the hedging instrument.
- B. 0.1061 Buy \$68.72 of the hedging instrument.
- C. 0.1053 Buy \$87.50 of the hedging instrument.
- D. 0.1061 Buy \$87.50 of the hedging instrument.

279. A stock is currently trading at USD 45, and its annual price volatility is 30%. The risk-free rate is 1.5% per year. A risk manager is developing a 1-step binomial tree for a 2-year horizon. What is the risk-neutral probability that the stock will move down?

- A. 30%
- B. 43%
- C. 57%
- D. 70%

280. A 1-year American put option with an exercise price of \$40 will be worth \$10.00 at maturity with a probability of 0.25 and \$0.00 with a probability of 0.75.

The current stock price is \$36. The discount rate is 5%. The optimal strategy is to:

- A. exercise the option because the payoff from exercise exceeds the present value of the expected future payoff.
- B. not exercise the option because the payoff from exercise is less than the discounted present value of the future payoff.
- C. exercise the option because it is currently at-the-money.
- D. not exercise the option because it is out-of-the-money.

281. The current stock price of a company is USD 80. A risk manager is monitoring call and put options on the stock with exercise prices of USD 50 and 5 days to maturity. Which of these scenarios is most likely to occur if the stock price falls by USD 1?

Scenario	Call Value	Put Value
A	Decrease by USD 0.94	Increase by USD 0.08
B	Decrease by USD 0.94	Increase by USD 0.89
C	Decrease by USD 0.07	Increase by USD 0.89
D	Decrease by USD 0.07	Increase by USD 0.08

- A. Scenario A
- B. Scenario B
- C. Scenario C
- D. Scenario D

282. bank has sold USD 300,000 of call options on 100,000 equities. The equities trade at 50, the option strike price is 49, the maturity is in 3 months, volatility is 20%, and the interest rate is 5%. How does it the bank delta hedge? (round to the nearest thousand share)

- A. Buy 65,000 shares
- B. Buy 100,000 shares
- C. Buy 21,000 shares
- D. Sell 100,000 shares

283. If the current market price of a stock is USD 50, which of the following options on the stock has the highest gamma?

- A. Call option expiring in 30 days with strike price of USD 50
- B. Call option expiring in 5 days with strike price of USD 30
- C. Call option expiring in 5 days with strike price of USD 50
- D. Put option expiring in 30 days with strike price of USD 30

284. If risk is defined as a potential for unexpected loss, which factors contribute to the risk of a short call option position?

- A. Delta, Vega, Rho
- B. Vega, Rho
- C. Delta, Vega, Gamma, Rho
- D. Delta, Vega, Gamma, Theta, Rho

285. An investor is long a short-term at-the-money put option on an underlying portfolio of equities with a notional value of USD 100,000. If the 95% VAR of the underlying portfolio is 10.4%, which of the following statements about the VAR of the option position is correct when second-order terms are considered?

- A. The VAR of the option position is slightly more than USD 5,200.
- B. The VAR of the option position is slightly more than USD 10,400.
- C. The VAR of the option position is slightly less than USD 5,200.
- D. The VAR of the option position is slightly less than USD 10,400.

286. A financial institution created a model to measure interest rate volatility. The historical distribution of interest rate volatility did not appear to be normally distributed due to the obvious large fat-tails. The firm is contemplating using a regime-switching volatility model to capture the apparent existence of time-varying high and low interest rate volatility. Which of the following statements best characterize the implementation of a regime-switching model for this firm?

- A. The interest rate distributions are conditionally normally distributed assuming static interest rate volatility.
- B. The assumption of normality is not appropriate in this case, and therefore, a regime-switching model is unlikely to work well.
- C. The probability of large deviations from normality occurring are more likely with a regime-switching model.
- D. The regime-switching model may resolve the fat-tail problem.

287. Which of the following problems are NOT inherent disadvantages of the historical simulation approach to estimating VaR

- I. It gives more weight to more recent observations
- II. For long-only portfolios, it is likely to understate VaR following a recent structural increase in volatilities
- III. It always ignore the fat tails present in the distribution of returns on many financial assets
- IV. Because of the delta approximation, it inadequately measures the risk of nonlinear instruments

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

288. The hybrid approach for estimating VaR is the combination of a parametric and a nonparametric approach. It specifically combines the historical simulation approach with:

- A. The delta normal approach.
- B. The exponentially weighted moving average approach.
- C. The multivariate density estimation approach.
- D. The generalized autoregressive conditional heteroskedasticity approach.

289. Bank regulators are examining the loan portfolio of a large, diversified lender. The regulators' main concern is that the bank remains solvent during turbulent economic times. Which of the following is most likely the area on which the regulators will want to focus?

- A. Expected loss, since each asset can expect, on average, to decline in value from a positive probability of default.
- B. Expected loss, given the decrease in underwriting standards of new loans.
- C. Unexpected loss, since the bank will need to set aside additional capital for the unlikely event that recovery rates are smaller than expected.
- D. Unexpected loss, since the bank will need to set aside additional capital for the unlikely event that usage given default is smaller than expected.

290. A loan portfolio is made up of ten noncorrelated loans, each with a value of \$1 million and an estimated probability of default of 3% in any given year. Recovery in the case of default is expected to be zero. Which of the following amounts is closest to the cumulative expected loss on the loan portfolio over two years?

- A. \$0.03 million.
- B. \$0.059 million.
- C. \$0.30 million.
- D. \$0.591 million.

291. Which of the following is not a true statement about internal credit ratings?

- A. The “at-the-point-in-time” approach makes heavy use of econometric modeling that relates current financial variables to estimated default risk.
- B. The “through-the-cycle” approach is forward-looking and attempts to incorporate future economic scenarios into current default risk estimates.
- C. “at-the-point-in-time” credit scores volatility is much higher than “through-the-cycle” score volatility.

- D.** A sound internal system uses at-the-point-in-time scoring for small-to-medium- sized companies and private firms and through-the-cycle scoring for large firms.
292. A There are several challenges analysts face when using agency ratings on foreign debt as an indicator of default risk. Which of the following statements is false regarding weaknesses of rating agency sovereign debt ratings?
- A.** Ratings can be politically influenced.
 - B.** Ratings are often subjective interpretations of available data.
 - C.** Ratings are often delayed relative to changes in real-life situations.
 - D.** Rating agencies are required to use government data for quantitative assessments of the likelihood of repayment.
293. A risk manager uses a two-step binomial tree to value an at-the-money, 1-year American put option on a stock with a current price of USD 75.00. There are two-time steps of 6 months each, in which the stock price moves up or down by 5.0%. The risk-free rate is 4.0% per year. What is the risk-neutral probability of a down move in 6 months?
- A.** 9.2%
 - B.** 29.8%
 - C.** 70.2%
 - D.** 90.8%
294. A European put option on a non-dividend paying stock has a remaining life of 6 months with a strike of USD 50 and the risk-free rate of 1%, after 3 months which of the following stock prices has the highest time-value of the option (in% of stock price)?
- A.** USD 10
 - B.** USD 40
 - C.** USD 50
 - D.** USD 60
295. An investor is looking to create an options portfolio on XYZ stock that will have virtually zero Vega exposure while maximizing the ability to profit from increases in interest rates. If the current price of XYZ is \$50, which of the following would accomplish his goals?
- A.** Sell a call with a strike price of \$50.
 - B.** Buy a call with a strike price of \$25.
 - C.** Sell a put with a strike price of \$50.
 - D.** Buy a put with a strike price of \$25.
296. Rational Investment Inc. is estimating a daily VaR for its fixed income portfolio currently valued at USD 800 million. Using returns for the last 400 days

(ordered in decreasing order, from highest daily return to lowest daily return), the daily returns are the following: 1.99%, 1.89%, 1.88%, 1.87%,, -1.76%, -1.82%, -1.84%, -1.87%, -1.91%. At the 99% confidence level, what is your estimate of the daily VaR using the historical simulation method?

- A. USD 14.08 million
- B. USD 14.56 million
- C. USD 14.72 million
- D. USD 15.04 million

297. In building a portfolio of fixed income securities for one of your clients, you determine that the use of STRIPS (separate trading of registered interest and principal securities) issued by the Treasury would assist in reducing reinvestment risk. Which of the following statements regarding STRIPS is correct?

- A. STRIPS tend to trade at a premium.
- B. Shorter-term C-STRIPS (coupon) tend to trade at a discount.
- C. Longer-term C-STRIPS (coupon) tend to trade at a premium.
- D. STRIPS tend to have significant risk of illiquidity.

298. The price of a three-year zero-coupon government bond is 85.16. The price of a similar four-year bond is 79.81. What is the one-year implied forward rate from year 3 to year 4?

- A. 5.4%
- B. 5.5%
- C. 5.8%
- D. 6.7%

299. A trading portfolio consists of two bonds, A and B. Both have modified duration of three years and face value of USD 1000. A is a zero-coupon bond, and its current price is USD 900. Bond B pays annual coupons and is priced at par. What do you expect will happen to the market prices of A and B if the risk-free yield curve moves up by one basis point?

- A. Both bond prices will move up by roughly the same amount.
- B. Both bond prices will move up, but bond B will gain more than bond A.
- C. Both bond prices will move down by roughly equal amounts.
- D. Both bond prices will move down, but bond B will lose more than bond A.

300. A portfolio manager uses her valuation model to estimate the value of a bond portfolio at USD 125.482 million. The term structure is flat. Using the same model, she estimates that the value of the portfolio would increase to USD 127.723 million if all interest rates fell by 30 basis points and would decrease to USD 122.164

million if all interest rates rose by 30 basis points. Using these estimates, the effective duration of the bond portfolio is closest to:

- A. 7.38
- B. 8.38
- C. 14.77
- D. 16.76

301. According to James Lam, a successful enterprise risk management (ERM) program can be broken down into seven key components:

- Corporate Governance
- Line Management
- Portfolio Management
- Risk Transfer
- Risk Analytics
- Data and Technology Resources
- Stakeholders Management

In particular, he says it is important that "expected losses and the cost of risk capital should be included in the pricing of a product or the required return of an investment project. In business development, risk acceptance criteria should be established to ensure that risk management issues are considered in new product and market opportunities. Transaction and business review processes should be developed to ensure the appropriate due diligence. Efficient and transparent review processes will allow managers to develop a better understanding of those risks that they can accept independently and those that require corporate approval or management." To which component does this key activity--i.e., pricing of risk at its inception--primarily refer?

- A. Corporate Governance
- B. Line Management
- C. Portfolio Management
- D. Risk Transfer

302. Which of the following statements best summarizes good risk management ?

- A. Good risk management reduces the bank's exposure to danger
- B. Good risk management optimizes the bank's value subject to constraints
- C. A bank with good risk management practices should offer low risk to shareholders
- D. Good risk management ensures that a bad outcome will not occur

303. What do these incidents have in common: Chase Manhattan Bank/Drysdale Securities, Kidder Peabody, Barings, Allied Irish Bank, and Union Bank of Switzerland (UBS) in 1997-1998?

- A. They are cases in which the firm or its investors and lenders were seriously misled about the size and nature of the positions it had (Disasters due to misleading reporting)
- B. They are cases in which the firm and its investors and lenders had reasonable knowledge of its positions, but had losses result from unexpectedly large market moves (Disasters due to large market

- moves)
- C. They are cases in which losses did not result from positions held by the firm, but instead resulted from fiduciary or reputational exposure to positions held by the firm's customers (Disasters due to the conduct of customer business)
 - D. None of the above

304. Which of the following is least likely to be a key function of members of the board of directors?

- A. Build risk-adjusted valuations for each business unit in order to verify management's models
- B. Review corporate strategy and oversee major capital transactions, including expenditures, acquisitions and divestitures.
- C. Align key executive and board compensation (remuneration) with the longer term interests of the company and its shareholders
- D. Ensure integrity of financial (and accounting) reporting systems and monitor risk management systems

305. In regard to Conflicts of Interest, which is true in principle about the responsibility of members:

- A. Members will not knowingly perform risk management services directly or indirectly involving an actual (but not potential) conflict of interest, under any conditions
- B. Members will not knowingly perform risk management services directly or indirectly involving an actual or potential conflict of interest, under any conditions
- C. Members will not knowingly perform risk management services directly or indirectly involving an actual or potential conflict of interest, unless full disclosure has been provided to GARP
- D. Members will not knowingly perform risk management services directly or indirectly involving an actual or potential conflict of interest, unless full disclosure has been provided to all affected parties of any actual or apparent conflict of interest

306. Peter the portfolio manager observes the following three well-diversified portfolios (A, B and C) that exist in a single-factor economy: If Peter seeks to conduct an arbitrage with a long/short portfolio with \$2.0 million of gross exposure, what is the expected profit (assuming no transaction costs and no margin)?

Risk-free rate	2%	$\beta(i, M)$
Portfolio	$E(r)$	
A	8.00%	0.6
B	10.00%	0.9
C	14.00%	1.2

- A. No profit, as an arbitrage is not possible
- B. \$10,000
- C. \$25,000
- D. \$30,000

307. The joint probability distribution of random variables X and Y is given by $f(x, y) = k \times x \times y$ for $x=1, 2, 3$, $y=1, 2, 3$, and k is a positive constant. What is the probability that $X+Y$ will exceed 5?

- A. $1/9$
- B. $1/4$
- C. $1/36$
- D. Cannot be determined

308. We want to regress hourly Earnings (the regressand) against years of Education (the regressor) based on the following OLS regression model: $\text{Earnings}(i) = B(0) + B(1) \times \text{Education}(i) + u(i)$, where $u(i)$ is the error term. After we run the regression, which of the following statement MOST NEARLY demonstrates homoskedasticity?

- A. $\text{Education}(i)$ is not a linear function of any other regressor
- B. $\text{Earnings}(i)$ is independent of $\text{Education}(i)$
- C. The variance of the error, $u(i)$, is independent of $\text{Education}(i)$
- D. The error term has a conditional mean of zero, $E[u(i) | \text{Education}(i)] = 0$

309. For the purpose of updating volatility for an asset return series, your colleague Emma is trying to choose between an EWMA and a GARCH(1,1) volatility model. Among the following reasons, which is the BEST reason to prefer the EWMA over the GARCH(1,1) model?

- A. She wants to forecast forward volatility
- B. She wants to incorporate the concept of mean reversion into the model
- C. She wants the weights assigned to the historical returns to decline exponentially
- D. In terms of best fit, her GARCH(1,1) alpha parameter is 0.92 and beta parameter is 0.13

310. The most recent estimate of the daily volatility of an asset, $\sigma(n-1)$, is 3.0% and the price of the asset at the close of trading yesterday was \$42.00. The price of the asset at the close of trading today is \$45.78. In order to update the volatility, you are trying to choose between two different volatility models:

- EWMA with lambda parameter, $\lambda = 0.780$
- GARCH(1,1) with parameters $\alpha = 0.110$, $\beta = 0.850$, and $\omega = 0.00040$

You are keenly interested in the weights each model assigns to historical returns. Which model assigns more weight to the squared return that occurred ten (10) days prior to today, $u(n-10)^2$? (note: assume an infinite series of weights rather than a truncated series)

- A. EWMA assigns 8.14% to $u(n-10)^2$ that is ten days old, $u(n-10)^2$, which is more than GARCH
- B. GARCH assigns 2.55% to $u(n-10)^2$ that is ten days old, $u(n-10)^2$, which is more than EWMA
- C. They both assign the SAME weight of 1.13% to $u(n-10)^2$ that is ten days old, $u(n-10)^2$
- D. We do not have enough information because the long run variance in GARCH(1,1) is not given

311. What is the difference between autocorrelation and partial autocorrelation?

- A. In the time series context, autocorrelation and partial autocorrelation are synonyms; i.e., there is no real difference, they are identical concepts
- B. The partial autocorrelation is the correlation between $y(t)$ and $y(t-\pi)$ multiplied by the variance of $y(0)$, an operation which standardizes the association across cycles
- C. In the time series context, partial autocorrelation is the second moment of autocorrelation; if autocorrelation is positive (negative), then partial autocorrelation must be positive (negative)
- D. Autocorrelation is the typical correlation between $y(t)$ and $y(t-\pi)$ while partial autocorrelation measures the association between $y(t)$ and $y(t-\pi)$ after controlling for the effects of $y(t-1), \dots, y(t-\pi+1)$

312. If a time series is reasonably approximated as white noise, then each of the following is true EXCEPT which is not true of a white noise process?

- A. Serial correlations (aka, autocorrelations) are zero
- B. Observations in the time series are normally distributed
- C. In a large sample, the distribution of the sample autocorrelations is approximately normal with mean of zero
- D. In a large sample, the distribution of the sample autocorrelations is approximately normal with variance of $1/T$

313. If the current USD/AUD rate is 0.6650 (1 AUD = 0.6650 USD) and the risk-free rates for the USD and AUD are 1.0% and 4.5% respective, what is the lower bound of a 5-month European put option on the AUD with a strike price of 0.6880?

- A. 0.0235
- B. 0.0285
- C. 0.0325
- D. 0.0385

314. America's Best Fund (Class A) is an open-ended mutual fund with 1.20 million shares outstanding. Currently, it is 10 am U.S. eastern standard time (EST) in the morning and the

fund owns the following:

- \$9.30 million in large cap equities
- \$1.0 million in short-term U.S. Treasury bills; aka, the risk-free asset
- \$500,000 in cash

Which of the following statements is TRUE?

- A. The fund's net asset value (NAV) is about \$7.75 per share
- B. If the fund reinvests dividends earned on the equities, the fund's investors are not taxed on these reinvested dividends
- C. An immediate order to buy shares, at 10 am, can specify the total dollar amount but will know neither the exact NAV nor exact number of shares purchased
- D. Unless and until the fund issues additional shares in a secondary offering or initiates a share buyback, the number of shares outstanding will remain fixed at 1.20 million

315. Assume an investor has a position in a currency swap. He receives euro in exchange for paying yen. What are the conditions for the swap to be in-the-money?

- I The value of yen falls
- II The value of yen rises
- III The euro interest rate falls
- IV The euro interest rate rises

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

316. A Eurodollar futures price changes from 98.00 to 97.20. What is the gain/loss to an investor who is LONG one contract?

- A. LIBOR decreased by 80 basis point for a loss (to the long position) of \$2,000
- B. LIBOR increased by 80 basis point for a loss (to the long position) of \$2,000
- C. LIBOR decreased by 80 basis point for a gain (to the long position) of \$2,000
- D. LIBOR increased by 80 basis point for a gain (to the long position) of \$2,000

317. All else being equal, which of the following options would cost more than plain-vanilla options that are currently at-the-money?

- I. Lookback options
- II. Barrier options
- III. Asian options
- IV. Chooser option

- A. I only
- B. I and IV

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

318. Each of the following is TRUE except for:

- A. Margin requirements are the same on the short futures position as they are on the long futures position
- B. Marking to market is an arrangement between the broker and the individual client that does not involve the exchange
- C. Brokers can require higher margins from clients than those specified by the exchange, but they cannot require lower margins than those specified by the exchange
- D. The investor can typically withdraw any balance in the margin account in excess of the initial margin

319. Which of the following reduces counterparty risk but is expensive especially because it typically cannot be rehypothecated?

- A. Initial margin required by CCP
- B. Centralized auction process in a CCP
- C. Bilateral netting in a bilateral OTC contract
- D. Variation margin required in a bilateral OTC contract

320. A stock currently trades at \$50.00. Consider the following four options on the stock:

- An in-the-money (ITM) European call option (on the stock) with a strike price of \$48.00 has a price of \$6.00.
- An out-of-the-money (OTM) European call option with a strike price of \$52.00 has a price of \$4.00.
- An out-of-the-money (OTM) European put option with a strike price of \$48.00 has a price of \$2.19
- An in-the-money (ITM) European put option with a strike price of \$52.00 has a price of \$3.96

Please note that option profit equals the payoff minus the initial cost, such the profit is net cash flows without regard to the time value of money. If we consider only spread trades that use the above option(s), each of the following is true about such spread trades EXCEPT which is false?

- A. A bull spread that employs the two call options has a maximum profit (profit = payoff minus cost) of \$2.00 and a maximum net loss of
- B. A bull spread that employs the two put options has a maximum profit of \$1.77 and maximum net loss of \$2.23
- C. A bear spread that employs the two put options has a maximum profit of \$2.23 and a maximum net loss of \$1.77
- D. A bear spread that employs the two call options has a maximum profit of \$1.77 and a maximum net loss of \$2.23

321. As Tuckman explains, "Mortgage borrowers have a prepayment option, that is, the option to pay the lender the outstanding principal at any time and be freed of the obligation to make

further payments." In this way, prepayment risk is a defining characteristic of mortgages and mortgage-backed securities (MBS). Each of the following is true about prepayment risk and the prepayment option EXCEPT which is not?

- A. The prepayment option implies negative convexity (in the price-rate relationship) at low yields
- B. The prepayment option does NOT imply negative duration at low yields
- C. It is realistic for a prepayment model to assume the conditional prepayment rate (CPR) is a decreasing function of rates; i.e., CPR increases as rates decrease
- D. Due to the prepayment option, the duration of a mortgage-backed security (MBS) should be calculated analytically with Macaulay duration; i.e., as the weighted average maturity of mortgages in the pool where weights are present values of bond cash flows as a proportion of bond price

322. Analyst Peter observes that conditional equity returns exhibit leptokurtosis (i.e., heavy-tail) and negative skewness. Due to time constraints, Peter must use a parametric (analytical) value at risk (VaR) model. Which of the following models is most likely able to model his conditional returns?

- A. Normal VaR; i.e., basic so-called delta-normal VaR where portfolio return is a linear function of asset returns that are normal
- B. Normal mixture VaR; i.e., portfolio return is a linear function of asset returns that are parametric but characterized by a mixture of normal ("normal mixture") densities
- C. Normal GARCH (1,1) VaR model; i.e., Monte Carlo simulation with GARCH volatility
- D. Student's t GARCH (1,1) VaR model; i.e., portfolio return is a linear function of asset returns that are characterized (parametrically) by student's t distribution

323. An at-the-money European call option on the DJ EURO STOXX 50 index with a strike of 2200 and maturing in 1 year is trading at EUR 350, where contract value is determined by EUR 10 per index point. The risk-free rate is 3% per year, and the daily volatility of the index is 2.05%. If we assume that the expected return on the DJ EURO STOXX 50 is 0%, the 99% 1-day VaR of a short position on a single call option calculated using the delta-normal approach is closest to:

- A. EUR 8.
- B. EUR 53.
- C. EUR 84.
- D. EUR 525.

324. What is the impact of embedded put option if there's no change in the credit risk of a bond, if interest rate increase?

- A. effective duration of the bond will be reduced
- B. effective duration of the bond will be increased

-
- C. no change to effective duration of the bond
 - D. uncertain

325. Which of the following best summarizes the key difference(s) between these two approaches to VaR estimation: exponentially weighted moving average (EWMA; aka, RiskMetrics) versus the Hybrid approach?

- A. Hybrid approach does not utilize exponentially declining weights
- B. Hybrid is parametric and EWMA is non-parametric
- C. Hybrid estimates the VaR as a quantile (percentile) of ordered (but weighted) historical returns, but EWMA does not sort returns
- D. There is no difference: EWMA is the hybrid approach

326. Steve, a market risk manager at Marcat Securities, is analyzing the risk of its S&P 500 index options trading desk. His risk report shows the desk is net long gamma and short Vega. Which of the following portfolios of options shows exposures consistent with this report?

- A. The desk has substantial long-expiry long call positions and substantial short-expiry short put positions.
- B. The desk has substantial long-expiry long put positions and substantial long-expiry short call positions.
- C. The desk has substantial long-expiry long call positions and substantial short-expiry short call positions.
- D. The desk has substantial short-expiry long call positions and substantial long-expiry short call positions.

327. A portfolio contains three independent (i.i.d.) and very risky bonds, each with identical face values of \$100, probability of default (EDF) is 3.0% and loss given default (LGD) of 65.0%. What is the 95% confident and 99% confident portfolio value at risk ??

- A. Zero and zero at both 95% and 99%.
- B. 100 and 100 at both 95% and 99%.
- C. 200 at 95% and 300 at 99%
- D. 285 at 95% and 300 at 99%

328. An out-of-the-money (OTM) European call option with a maturity of one year ($T = 1.0$ year) has a strike price of \$40.00 while the current price of the non-dividend-paying asset is \$30.00. The volatility of the underlying asset price is 44.0% per annum and the risk-free rate is 2.0%. The price of the call is \$2.48 because per the Black-Scholes option pricing model (BSM OPM) $\$2.48 = \$30 \times 0.3489 - \$40 \times \exp(-0.020 \times 1.0) \times 0.2037$. Each of the following is true about this call option EXCEPT which is false?

- A. The option's delta is about 0.35
- B. The risk-neutral probability that the call will be exercised (i.e., expire in-the-money) is about 20.4%
- C. The price of a put option (on the same underlying asset) with an identical strike price and maturity is about \$6.23
- D. The call price will increase with an increase in either stock price, volatility, risk-free rate or maturity

329. A long position in European call options is approaching its expiration such that its maturity is near zero. The options happen to be nearly at-the-money; i.e., the current asset price is nearly equal to the strike price. Which of the following is most likely true?

- A. Vega is increasing as expiration approaches
- B. Delta is tending toward 1.0 as expiration approaches
- C. Gamma is positive and large, while theta is negative and large
- D. Both gamma and theta are tending toward zero as expiration approaches

330. A zero-coupon bond with a 20-year maturity has a face value of \$1,000 when the yield curve is flat at a certain per annum rate with continuous compounding. If the yield increases by 80 basis points (0.80%), which is nearest to the estimated decrease in the bond price in percentage terms?

- A. -14.72%
- B. -15.33%
- C. -16.00%
- D. Need an actual yield (estimate varies by yield)

Answers

1	2	3	4	5	6	7	8	9	10
C	D	A	A	C	A	C	A	B	C
11	12	13	14	15	16	17	18	19	20
A	D	A	C	B	C	A	D	B	A
21	22	23	24	25	26	27	28	29	30
B	B	A	D	B	D	B	B	D	A
31	32	33	34	35	36	37	38	39	40
D	D	B	A	B	B	A	A	B	C
41	42	43	44	45	46	47	48	49	50
B	A	B	B	B	D	A	D	C	C

51	52	53	54	55	56	57	58	59	60
B	A	D	A	C	A	D	B	C	C
61	62	63	64	65	66	67	68	69	70
C	B	B	D	C	B	B	C	C	A
71	72	73	74	75	76	77	78	79	80
D	C	D	A	C	D	A	C	C	A
81	82	83	84	85	86	87	88	89	90
A	C	C	C	B	B	B	B	D	D
91	92	93	94	95	96	97	98	99	100
D	A	D	D	B	C	A	A	D	B

101	102	103	104	105	106	107	108	109	110
C	B	B	C	A	D	B	B	A	D
111	112	113	114	115	116	117	118	119	120
A	D	B	A	C	A	A	B	D	B
121	122	123	124	125	126	127	128	129	130
B	C	C	D	B	C	A	C	B	B
131	132	133	134	135	136	137	138	139	140

A	C	B	C	A	C	B	A	D	D
141	142	143	144	145	146	147	148	149	150
A	A	B	B	D	D	D	D	D	A

151	152	153	154	155	156	157	158	159	160
C	C	C	B	A	D	B	A	C	C
161	162	163	164	165	166	167	168	169	170
A	D	B	C	B	D	C	C	D	C
171	172	173	174	175	176	177	178	179	180
A	B	C	B	C	C	A	C	B	D
181	182	183	184	185	186	187	188	189	190
B	C	B	A	D	D	D	A	C	C
191	192	193	194	195	196	197	198	199	200
C	C	B	A	D	C	B	A	B	C

201	202	203	204	205	206	207	208	209	210
A	B	C	A	C	A	C	A	A	D
211	212	213	214	215	216	217	218	219	220
D	C	D	D	B	A	D	A	B	B
221	222	223	224	225	226	227	228	229	230
C	C	A	D	D	B	B	B	C	C
231	232	233	234	235	236	237	238	239	240
B	A	A	B	A	D	D	D	B	D
241	242	243	244	245	246	247	248	249	250
B	B	D	A	D	A	C	B	A	A

251	252	253	254	255	256	257	258	259	260
D	C	A	D	C	D	C	A	B	C
261	262	263	264	265	266	267	268	269	270
D	D	B	B	C	A	B	C	B	D
271	272	273	274	275	276	277	278	279	280
A	B	C	A	C	C	C	B	C	A
281	282	283	284	285	286	287	288	289	290
A	A	C	C	C	D	C	B	C	D
291	292	293	294	295	296	297	298	299	300
D	D	B	C	B	B	A	D	D	A

301	302	303	304	305	306	307	308	309	310
B	B	A	A	D	B	B	C	D	B
311	312	313	314	315	316	317	318	319	320
D	B	C	C	A	D	B	B	A	D
321	322	323	324	325	326	327	328	329	330
D	B	D	A	C	D	B	C	C	A