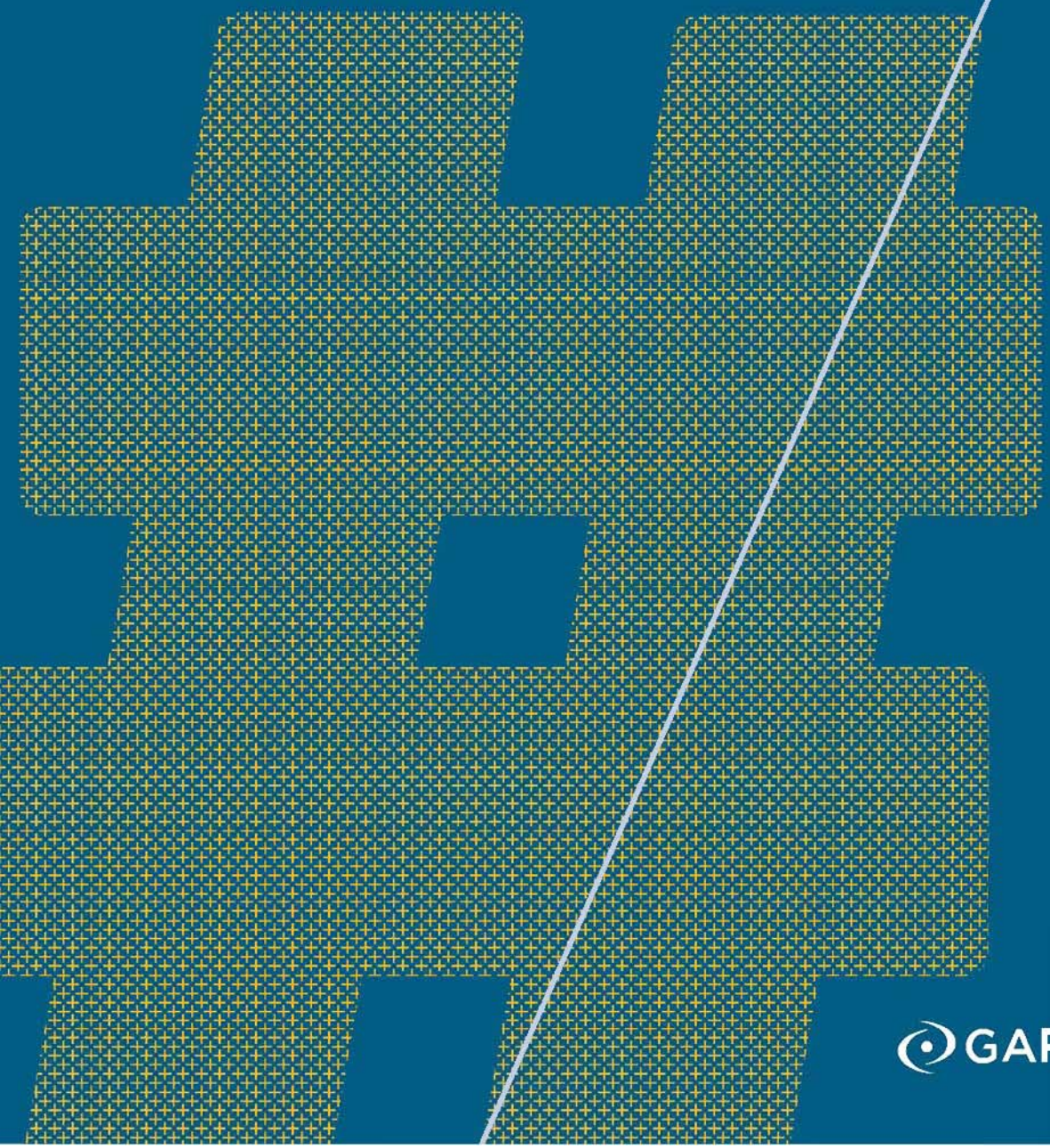
Financial Risk Manager (FRM®) Examination

2012 Practice Exam Part I / Part II



GARP | Global Association of Risk Professionals

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INTRODUCTION

The FRM Exam is a practice-oriented examination. Its questions are derived from a combination of theory, as set forth in the core readings, and "real-world" work experience. Candidates are expected to understand risk management concepts and approaches and how they would apply to a risk manager's day-to-day activities.

The FRM Examination is also a comprehensive examination, testing a risk professional on a number of risk management concepts and approaches. It is very rare that a risk manager will be faced with an issue that can immediately be slotted into one category. In the real world, a risk manager must be able to identify any number of risk-related issues and be able to deal with them effectively.

The 2012 FRM Practice Exams I and II have been developed to aid candidates in their preparation for the FRM Examination in May and November 2012. These Practice Exams are based on a sample of questions from the 2010 FRM Examination and are suggestive of the questions that will be in the 2012 FRM Examination.

The 2012 FRM Practice Exam for Part I contain 25 multiple-choice questions and the 2012 FRM Practice Exam for Part II contains 20 multiple-choice questions. Note that the 2012 FRM Examination Part I will contain 100 multiple-choice questions and the 2012 FRM Examination Part II will contain 80 multiple-choice questions. The Practice Exams were designed to be shorter to allow candidates to calibrate their preparedness without being overwhelming.

The 2012 FRM Practice Exams do not necessarily cover all topics to be tested in the 2012 FRM Examination as the material covered in the 2012 Study Guide may be different from that covered by the 2011 Study Guide. The questions selected for inclusion in the Practice Exams were chosen to be broadly reflective of the material assigned for 2012 as well as to represent the style of question that the FRM Committee considers appropriate based on assigned material.

For a complete list of current topics, core readings, and key learning objectives candidates should refer to the 2012 FRM Examination Study Guide and AIM Statements.

Core readings were selected by the FRM Committee to assist candidates in their review of the subjects covered by the exam. Questions for the FRM examination are derived from the "core" readings. It is strongly suggested that candidates review these readings in depth prior to sitting for the Exam.

Suggested Use of Practice Exams

To maximize the effectiveness of the Practice Exams, candidates are encouraged to follow these recommendations:

1. **Plan a date and time to take each Practice Exam.** Set dates appropriately to give sufficient study/review time for the Practice Exam prior to the actual Exam.

2. **Simulate the test environment as closely as possible.**
   - Take each Practice Exam in a quiet place.
   - Have only the practice exam, candidate answer sheet, calculator, and writing instruments (pencils, erasers) available.
   - Minimize possible distractions from other people, cell phones and study material.
   - Allocate 90 minutes for the Practice Exam and set an alarm to alert you when 90 minutes have passed. Complete the exam but note the questions answered after the 90 minute mark.
   - Follow the FRM calculator policy. You may only use a Texas Instruments BA II Plus (including the BA II Plus Professional), Hewlett Packard 12C (including the HP 12C Platinum and the Anniversary Edition), Hewlett Packard 10B II, Hewlett Packard 10B II+ or Hewlett Packard 20B calculator.

3. **After completing the Practice Exam,**
   - Calculate your score by comparing your answer sheet with the Practice Exam answer key. Only include questions completed in the first 90 minutes.
   - Use the Practice Exam Answers and Explanations to better understand correct and incorrect answers and to identify topics that require additional review. Consult referenced core readings to prepare for Exam.

Financial Risk Manager (FRM®) Examination

2012 Practice Exam

PART I

Answer Sheet

	a.	b.	c.	d.
1.	○	○	○	○
2.	○	○	○	○
3.	○	○	○	○
4.	○	○	○	○
5.	○	○	○	○
6.	○	○	○	○
7.	○	○	○	○
8.	○	○	○	○
9.	○	○	○	○
10.	○	○	○	○
11.	○	○	○	○
12.	○	○	○	○
13.	○	○	○	○
14.	○	○	○	○
15.	○	○	○	○

	a.	b.	c.	d.
16.	○	○	○	○
17.	○	○	○	○
18.	○	○	○	○
19.	○	○	○	○
20.	○	○	○	○
21.	○	○	○	○
22.	○	○	○	○
23.	○	○	○	○
24.	○	○	○	○
25.	○	○	○	○

Correct way to complete

1. ● ● ● ●

Wrong way to complete

1. 

Financial Risk Manager (FRM®) Examination

2012 Practice Exam

PART I

Questions

1. You have been asked to estimate the VaR of an investment in Big Pharma Inc. The company's stock is trading at USD 23 and the stock has a daily volatility of 1.5%. Using the delta-normal method, the VaR at the 95% confidence level of a long position in an at-the-money put on this stock with a delta of -0.5 over a 1-day holding period is closest to which of the following choices?

a. USD 0.28
b. USD 0.40
c. USD 0.57
d. USD 2.84

2. Alan bought a futures contract on a commodity on the New York Commodity Exchange on June 1. The futures price was USD 500 per unit and the contract size was 100 units per contract. Alan set up a margin account with initial margin of USD 2,000 per contract and maintenance margin of USD 1,000 per contract. The futures price of the commodity varied as shown below. What was the balance in Alan's margin account at end of June 5?

Day	Futures Price (USD)
June 1	497.30
June 2	492.70
June 3	484.20
June 4	471.70
June 5	468.80

a. USD -1,120
b. USD 0
c. USD 880
d. USD 1,710

3. Gregory is analyzing the historical performance of two commodity funds tracking the Reuters/Jefferies-CRB® Index (CRB) as benchmark. He collated the data on the monthly returns and decided to use the information ratio (IR) to assess which fund achieved higher returns more efficiently and presented his findings.

	Fund I	Fund II	Benchmark returns
Average monthly returns	1.488%	1.468%	1.415%
Average excess return	0.073%	0.053%	0.000%
Standard deviation of returns	0.294%	0.237%	0.238%
Tracking error	0.344%	0.341%	0.000%

What is the information ratio for each fund and what conclusion can be drawn?

a. IR for Fund I = 0.212, IR for Fund II = 0.155; Fund II performed better as it has a lower IR.
b. IR for Fund I = 0.212, IR for Fund II = 0.155; Fund I performed better as it has a higher IR.
c. IR for Fund I = 0.248, IR for Fund II = 0.224; Fund I performed better as it has a higher IR.
d. IR for Fund I = 0.248, IR for Fund II = 0.224; Fund II performed better as it has a lower IR

4. A trading portfolio consists of two bonds, A and B. Both have modified duration of three years and face value of USD 1000, but A is a zero-coupon bond and its current price is USD 900, and 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 1 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.

5. You have a portfolio of USD 50 million and you have to hedge it using index futures. The correlation coefficient between the portfolio and index futures being used is 0.65. The standard deviation of the portfolio is 7% and that of the hedging instrument is 6%. The price of the index futures is USD 150 and one contract size is 100 futures. Among the following positions, which position reduces the risk the most?

a. Long 3364 futures contracts
b. Short 3364 futures contracts
c. Long 2527 futures contracts
d. Short 2527 futures contracts

6. An analyst gathered the following information about the return distributions for two portfolios during the same time period:

Portfolio	Skewness	Kurtosis
A	-1.6	1.9
B	0.8	3.2

The analyst states that the distribution for Portfolio A is more peaked than a normal distribution and that the distribution for Portfolio B has a long tail on the left side of the distribution. Which of the following is correct?

a. The analyst's assessment is correct.
b. The analyst's assessment is correct for Portfolio A and incorrect for portfolio B.
c. The analyst's assessment is incorrect for Portfolio A but is correct for portfolio B.
d. The analyst is incorrect in his assessment for both portfolios.

Common text for questions 7 and 8:
A risk manager for Bank XYZ, Mark, is considering writing a 6-month American put option on a non-dividend-paying stock ABC. The current stock price is USD 50 and the strike price of the option is USD 52. In order to find the no-arbitrage price of the option Mark uses a two-step binomial tree model. The stock price can go up or down by 20% each period. Mark's view is that the stock price has an 80% probability of going up each period and a 20% probability of going down The annual risk-free rate is 12% with continuous compounding

7. What is the risk-neutral probability of the stock price going up in a single step?

a. 34.5%
b. 57.6%
c. 65.5%
d. 80.0%

8. The no-arbitrage price of the option is closest to:

a. USD 2.00
b. USD 2.93
c. USD 5.22
d. USD 5.86

9. For non-dividend-paying stocks, according to put-call parity, the payoff on a long stock position can be synthetically created with:

   a. a long call, a short put and a long position in a risk-free discount bond
   b. a short call, a short put and a long position in a risk-free discount bond
   c. a long call, a long put and a long position in a risk-free discount bond
   d. a long call, a short put and a short position in a risk-free discount bond

10. Junaid Manzoor has been hired as head of risk management by KDB Asset Management, a small investment firm in Pakistan. Manzoor implements a risk measurement framework to gauge portfolio risk for the firm. Unfortunately, the methodology he implements for risk measurement has changed considerably in recent years and is no longer used internationally. Neither Manzoor nor anyone else at the firm is aware of the changes to risk measurement approaches. As a GARP member, has Junaid violated the GARP Code of Conduct?

   a. No, this is not a violation of the GARP Code of Conduct because neither Manzoor nor the firm is aware of the changes to risk measurement approaches.
   b. No, this is not a violation as the methodology worked when Manzoor took his FRM exams.
   c. This is only a violation of the GARP Code of Conduct if investment decisions are made based on Manzoor's risk reports.
   d. Yes, this is a violation of the GARP Code of Conduct

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

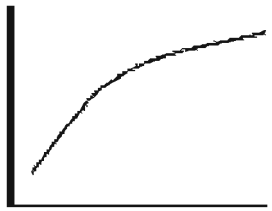
   a. The likelihood of rejecting the null hypothesis when it is true decreases.
   b. The likelihood of making a Type I error increases.
   c. The null hypothesis is rejected more frequently, even when it is actually false.
   d. The likelihood of making a Type II error decreases.

12. Howard Freeman manages a portfolio of investment securities for a regional bank. The portfolio has a current market value equal to USD 6,247,000 with a daily variance of 0.0002. Assuming there are 250 trading days in a year and that the portfolio returns follow a normal distribution, the estimate of the annual VaR at the 95% confidence level is closest to which of the following?

a. USD 32,595
b. USD 145,770
c. USD 2,297,854
d. USD 2,737,868

13. An investor finds that the gold lease rate is 5% and the corresponding risk free rate is 6%. Under these conditions, which of the following charts of forward prices (y-axis) versus time (x-axis) best indicates the structure of the forward market for gold?

a.



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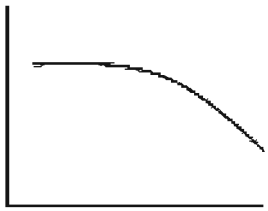

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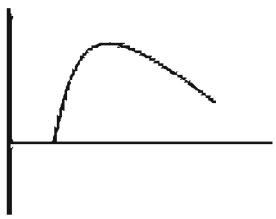
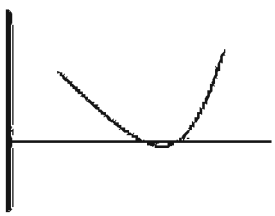


d.



14. A multiple choice exam has ten questions, with five choices per question. If you need at least three correct answers to pass the exam, what is the probability that you will pass simply by guessing?

a. 0.8%
b. 20.1%
c. 67.8%
d. 32.2%

15. 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

16. All else held constant and assuming no change in the value of the underlying, what impact should an increase in interest rates have on the price of stock index futures?

a. Increase futures prices
b. Reduce futures prices
c. Have no impact on futures prices
d. Make futures prices same as spot

17. 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

18. A hedge fund has invested USD 100 million in mortgage backed securities. The risk manager is concerned about prepayment risk if interest rates fall. Which of the following strategies is an effective hedge against the potential loss due to a drop in interest rates?

a. Short forward rate agreement (FRA), long T-bond futures
b. Long FRA, short T-bond futures
c. Long FRA, long T-bond futures
d. Short FRA, short T-bond futures

19. Sam Seel has a small portfolio of options. Since the options are currently in-the-money, he is considering the possibility of early exercise. Which of the following statements is correct?

a. It is never optimal to exercise European call options early.
b. It is best to exercise a put option when it is just in-the-money.
c. Early exercise of put options becomes more attractive when interest rates rise.
d. Early exercise of put options becomes more attractive when interest rates decline.

20. Portfolio A has an expected return of 8%, volatility of 20%, and beta of 0.5. Assume that the market has an expected return of 10% and volatility of 25%. Also assume a risk-free rate of 5% What is Jensen's alpha for portfolio A?

a. 0.5%
b. 1.0%
c. 10%
d. 15%

21. Half of the mortgages in a portfolio are considered subprime. The principal balance of half of the subprime mortgages and one-quarter of the non-subprime mortgages exceeds the value of the property used as collateral. If you randomly select a mortgage from the portfolio for review and its principal balance exceeds the value of the collateral, what is the probability that it is a subprime mortgage?

a. 1/4
b. 1/3
c. 1/2
d. 2/3

22. John Holt is managing a fixed-income portfolio worth USD 10 million. The duration of the portfolio today is 5.9 years and in six months it is expected to be 6.2 years. The 6-month Treasury bond futures contract is trading at USD 98.47. The bond that is expected to be cheapest-to-deliver has a duration of 4.0 years today and an expected duration of 4.8 years at the maturity of the futures contract. How many futures contracts should John short to hedge against changes in interest rates over the next six months? Each futures contract is for the delivery of USD 100,000 face value of bonds.

a. 125 contracts
b. 131 contracts
c. 150 contracts
d. 157 contracts

23. Which of the following are potential consequences 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 roles.
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

24. In comparison to the bottom-up approach to measuring operational risk exposure, the top-down approach would be most appropriate for which of the following:

a. Determining firm-wide economic capital levels
b. Designing risk reduction techniques at the business-unit level
c. Diagnosing specific weak points in a process
d. Incorporating changes in the risk environment

25. HedgeFund has been in existence for two years. Its average monthly return has been 6% with a standard deviation of 5%. HedgeFund 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 HedgeFund's monthly returns 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-Squared 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

Financial Risk Manager (FRM®) Examination

2012 Practice Exam

PART I

Answers

	a.	b.	c.	d.
1.	●	○	○	○
2.	○	○	○	●
3.	○	●	○	○
4.	○	○	○	●
5.	○	○	○	●
6.	○	○	○	●
7.	○	●	○	○
8.	○	○	○	●
9.	●	○	○	○
10.	○	○	○	●
11.	●	○	○	○
12.	○	○	●	○
13.	●	○	○	○
14.	○	○	○	●
15.	○	○	●	○

	a.	b.	c.	d.
16.	●	○	○	○
17.	○	○	●	○
18.	●	○	○	○
19.	○	○	●	○
20.	●	○	○	○
21.	○	○	○	●
22.	○	●	○	○
23.	○	●	○	○
24.	●	○	○	○
25.	○	○	○	●

Correct way to complete

1. ● ● ● ●

Wrong way to complete

1. ∅ ⊖ ✓ ⊗

Financial Risk Manager (FRM®) Examination

2012 Practice Exam

PART I

Explanations

1. You have been asked to estimate the VaR of an investment in Big Pharma Inc. The company's stock is trading at USD 23 and the stock has a daily volatility of 1.5%. Using the delta-normal method, the VaR at the 95% confidence level of a long position in an at-the-money put on this stock with a delta of -0.5 over a 1-day holding period is closest to which of the following choices?

   a. USD 0.28
   b. USD 0.40
   c. USD 0.57
   d. USD 2.84

Answer: a

Explanation: VaR = |delta| * 1.645 * sigma * S = 0.5 * 1.645 * 0.015 * 23 = 0.28. The delta of an at-the-money put is -0.5 and the absolute value of the delta is 0.5.

Topic: Valuation and Risk Models
Subtopic: Delta-normal valuation, full revaluation, historical simulation, Monte Carlo simulation methods
AIMS: Describe the delta-normal approach to calculating VaR for non-linear derivatives.
Reference: Linda Allen, Jacob Boudoukh and Anthony Saunders, *Understanding Market, Credit and Operational Risk: The Value at Risk Approach* (Oxford: Blackwell Publishing, 2004), Chapter 3

2. Alan bought a futures contract on a commodity on the New York Commodity Exchange on June 1. The futures price was USD 500 per unit and the contract size was 100 units per contract. Alan set up a margin account with initial margin of USD 2,000 per contract and maintenance margin of USD 1,000 per contract. The futures price of the commodity varied as shown below. What was the balance in Alan's margin account at end of June 5?

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June 5	468.80

   a. USD -1,120
   b. USD 0
   c. USD 880
   d. USD 1,710

Answer: d

Explanation:

(USD) Date	Daily Price	Gain (Loss)	Cumulative Gain (Loss)	Margin Balance	Margin Call
June 1	497.30	(270)	(270)	1,730	
June 2	492.70	(460)	(730)	1,270	
June 3	484.20	(850)	(1,580)	420	1,580
June 4	471.70	(1,250)	(2,830)	750	1,250
June 5	468.80	(290)	(3,120)	1,710	

The margin balance at the end of June 5 is USD 1,710. There is a margin call each time the margin account drops below the maintenance margin amount of USD 1,000. Each time there is a margin call, the balance has to be brought back to the initial margin level of USD 2,000.

Topic: Financial Markets and Products
Subtopic: Futures, forwards, swaps, and options
AIMS: Describe the rationale for margin requirements and explain how they work.
Reference: Hull, Options, *Futures and Other Derivatives, 7th edition*, Chapter 2

3. Gregory is analyzing the historical performance of two commodity funds tracking the Reuters/Jefferies-CRB® Index (CRB) as benchmark. He collated the data on the monthly returns and decided to use the information ratio (IR) to assess which fund achieved higher returns more efficiently and presented his findings.

	Fund I	Fund II	Benchmark returns
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Tracking error	0.344%	0.341%	0.000%

What is the information ratio for each fund and what conclusion can be drawn?

a. IR for Fund I = 0.212, IR for Fund II = 0.155; Fund II performed better as it has a lower IR.
b. IR for Fund I = 0.212, IR for Fund II = 0.155; Fund I performed better as it has a higher IR.
c. IR for Fund I = 0.248, IR for Fund II = 0.224; Fund I performed better as it has a higher IR.
d. IR for Fund I = 0.248, IR for Fund II = 0.224; Fund II performed better as it has a lower IR.

Answer: b

Explanation: The information ratio may be calculated by either a comparison of the residual return to residual risk, or the excess return to tracking error. The higher the IR, the better 'informed' the manager is at picking assets to invest in. Since neither residual return nor risk is given, only the latter is an option.
IR = $E(R_p - R_b)$/Tracking Error.
For Fund I: IR = 0.00073 / 0.00344 = 0 212; For Fund II: IR = 0 00053 / 0.00341 = 0.155

Topic: Foundation of Risk Management
Subtopic: Sharpe ratio and information ratio
AIMS: Compute and interpret tracking error, the information ratio, and the Sortino ratio.
Reference: Richard Grinold and Ronald Kahn, *Active Portfolio Management: A Quantitative Approach for Producing Superior Returns and Controlling Risk, 2nd Edition* (McGraw-Hill, 1999)

4. A trading portfolio consists of two bonds, A and B. Both have modified duration of three years and face value of USD 1000, but A is a zero-coupon bond and its current price is USD 900, and 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 1 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.

Answer: d

Explanation: Assuming parallel movements to the yield curve, the expected price change is:
$\Delta P = -P\Delta y * D$
where P is the current price or net present value
Δy is the yield change
D is duration
All else equal, a negative impact of yield curve move is stronger in absolute terms at the bond which is currently priced higher. Upward parallel curve movements makes bonds cheaper.

Topic: Valuation and Risk Models
Subtopic: DV01, duration and convexity, duration based hedging
AIMS: Define and compute the DV01 of a fixed income security given a change in yield and the resulting change in price.
Reference: Bruce Tuckman, *Fixed Income Securities, 2nd Edition*, Chapter 5

5. You have a portfolio of USD 50 million and you have to hedge it using index futures. The correlation coefficient between the portfolio and index futures being used is 0.65. The standard deviation of the portfolio is 7% and that of the hedging instrument is 6%. The price of the index futures is USD 150 and one contract size is 100 futures. Among the following positions, which position reduces the risk the most?

   a. Long 3364 futures contracts
   b. Short 3364 futures contracts
   c. Long 2527 futures contracts
   d. Short 2527 futures contracts

Answer: d

Explanation: The optimal hedge ratio is the product of the coefficient of correlation and the ratio of the standard deviations of the portfolio and the index futures, respectively. Computing the optimal hedge ratio:
$h = \rho(\sigma_s / \sigma_f)$ where ρ is the coefficient of correlation, and
σ_s and σ_f are standard deviations of portfolio and standard deviation of index futures, respectively.
h= 0.65 * (0.07/0.06) = 0.758
The number of futures contract to be shorted:
N= h * (Portfolio value)/ (Futures contract size)
N= 0.758 * 50000000/(150 * 100)
N= 2526.67 → 2527
Since you are long in the portfolio, you have to short the index futures to hedge it.

Topic: Financial Markets and Products
Subtopic: Minimum variance hedge ratio
AIMS: Define, compute and interpret the optimal number of futures contracts needed to hedge an exposure, including a "tailing the hedge" adjustment.
Reference: Hull, Options, *Futures and other Derivatives, 7th Edition*, Chapter 3—Hedging Strategies using Futures

6. An analyst gathered the following information about the return distributions for two portfolios during the same time period:

Portfolio	Skewness	Kurtosis
A	-1.6	1.9
B	0.8	3.2

The analyst states that the distribution for Portfolio A is more peaked than a normal distribution and that the distribution for Portfolio B has a long tail on the left side of the distribution. Which of the following is correct?

   a. The analyst's assessment is correct.
   b. The analyst's assessment is correct for Portfolio A and incorrect for portfolio B.
   c. The analyst's assessment is incorrect for Portfolio A but is correct for portfolio B.
   d. The analyst is incorrect in his assessment for both portfolios.

Answer: d

Explanation: The analyst's statement is incorrect in reference to either portfolio. Portfolio A has a kurtosis of less than 3, indicating that it is less peaked than a normal distribution (platykurtic). Portfolio B is positively skewed (long tail on the right side of the distribution).

Topic: Quantitative Analysis
Subtopic: Mean, standard deviation, correlation, skewness, and kurtosis
AIMS: Define, calculate and interpret the skewness and kurtosis of a random variable; Describe and identify a platykurtic and leptokurtic distribution; Define the skewness and kurtosis of a normally distributed random variable.
Reference: Damodar Gujarati, *Essentials of Econometrics, 3th Edition*, Chapter 3.

Common text for questions 7 and 8:
A risk manager for Bank XYZ, Mark, is considering writing a 6-month American put option on a non-dividend-paying stock ABC. The current stock price is USD 50 and the strike price of the option is USD 52. In order to find the no-arbitrage price of the option Mark uses a two-step binomial tree model. The stock price can go up or down by 20% each period. Mark's view is that the stock price has an 80% probability of going up each period and a 20% probability of going down. The annual risk-free rate is 12% with continuous compounding.

7. What is the risk-neutral probability of the stock price going up in a single step?

a. 34.5%
b. 57.6%
c. 65.5%
d. 80.0%

Answer: b

Explanation: Calculation follows: $P_{up} = \frac{e^{rt} - d}{u - d} = \frac{e^{0.12 * 3/12} - 0.8}{1.2 - 0.8} = 57.61\%$ $P_{down} = 1 - P_{up} = 42.39\%$

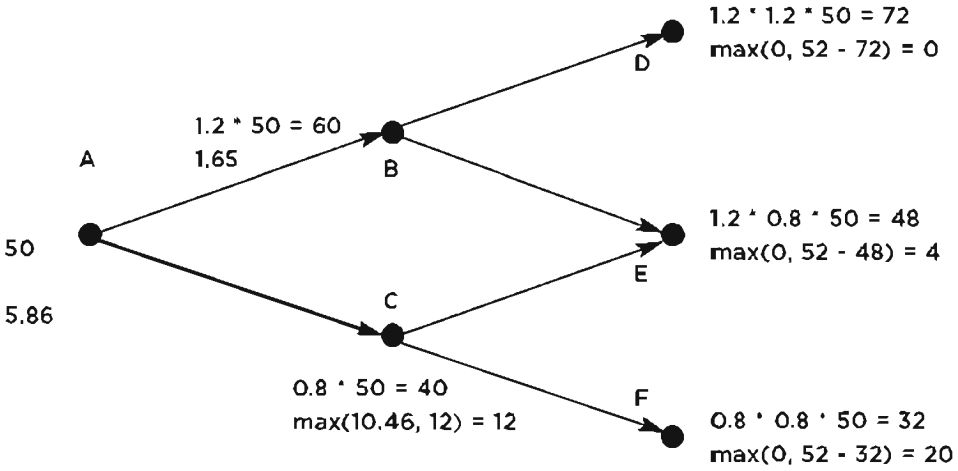
Topic: Valuation and Risk Models
Subtopic: Binomial trees
AIMS: Calculate the value of a European call or put option using the one-step and two-step binomial model.
Reference: John Hull, *Options, Futures, and Other Derivatives, 7th Edition* (Prentice Hall, 2009), Chapter 11.

8. The no-arbitrage price of the option is closest to:

a. USD 2.00
b. USD 2.93
c. USD 5.22
d. USD 5.86

Answer: d

Explanation: The risk neutral probability of an up move is 57.61% (calculated in the previous question).



The figure shows the stock price and the respective option value at each node. At the final nodes the value is calculated as max(0, K - S).
Node B: (0.5761 * 0 + 0.4239 * 4) * exp(-0.12 * 3/12) = 1.65, which is greater than the intrinsic value of the option at this node equal to max(0, 52 - 60)=0, so the option should not be exercised early at this node.
Node C: (0.5761 * 4 + 0.4239 * 20) * exp(-0.12 * 3/12) = 10.46, which is lower than the intrinsic value of the option at this node equal to max(0, 52 - 40) = 12, so the option should be exercised early at node C, and the value of the option at node C is 12.
Node A: (0.5761 * 1.65 + 0.4239 * 12) * exp(-0.12 * 3/12) = 5.86, which is greater than the intrinsic value of the option at this node equal to max(0, 52 - 50) = 2, so the option should not be exercised early at this node.

Topic: Valuation and Risk Models
Subtopic: Binomial trees
AIMS: Calculate the value of a European call or put option using the one-step and two-step binomial model.
Reference: John Hull, *Options, Futures, and Other Derivatives, 7th Edition* (Prentice Hall, 2009), Chapter 11

9. For non-dividend-paying stocks, according to put-call parity, the payoff on a long stock position can be synthetically created with:

a. a long call, a short put and a long position in a risk-free discount bond
b. a short call, a short put and a long position in a risk-free discount bond
c. a long call, a long put and a long position in a risk-free discount bond
d. a long call, a short put and a short position in a risk-free discount bond

Answer: a

Explanation: According to put-call parity: $S = C - P + Xe^{-rt}$

Topic: Financial Markets and Products
Subtopic: Futures, Forwards, Swaps, and Options
AIMS: Explain put-call parity and calculate, using put-call parity on a non-dividend paying stock, the value of a European and American option.
Reference: John Hull, *Options, Futures, and Other Derivatives, 7th Edition* (Pearson 2009), Chapter 9

10. Junaid Manzoor has been hired as head of risk management by KDB Asset Management, a small investment firm in Pakistan. Manzoor implements a risk measurement framework to gauge portfolio risk for the firm. Unfortunately, the methodology he implements for risk measurement has changed considerably in recent years and is no longer used internationally. Neither Manzoor nor anyone else at the firm is aware of the changes to risk measurement approaches. As a GARP member, has Junaid violated the GARP Code of Conduct?

a. No, this is not a violation of the GARP Code of Conduct because neither Manzoor nor the firm is aware of the changes to risk measurement approaches.
b. No, this is not a violation as the methodology worked when Manzoor took his FRM exams
c. This is only a violation of the GARP Code of Conduct if investment decisions are made based on Manzoor's risk reports
d. Yes, this is a violation of the GARP Code of Conduct.

Answer: d

Explanation: The GARP Code of Conduct states that GARP members should be familiar with current generally accepted risk management practices.

Topic: Foundations
Subtopic: Ethics
AIMS: Describe the responsibility of each GARP member with respect to professional integrity, ethical conduct, conflicts of interest, confidentiality of information and adherence to generally accepted practices in risk management
Reference: GARP Code of Conduct

11. 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.

Answer: a

Explanation: Decreasing the level of significance of the test decreases the probability of making a Type I error and hence makes it more difficult to reject the null when it is true However, the decrease in the chance of making a Type I error comes at the cost of increasing the probability of making a Type II error, because the null is rejected less frequently, even when it is actually false.

Topic: Quantitative Analysis
Subtopic: Linear regression and correlation, hypothesis testing
AIMS: Define, calculate and interpret Type I and Type II errors.
Reference: Damodar Gujarati, *Essentials of Econometrics, 3rd Edition* (McGraw-Hill, 2006)

12. Howard Freeman manages a portfolio of investment securities for a regional bank. The portfolio has a current market value equal to USD 6,247,000 with a daily variance of 0.0002. Assuming there are 250 trading days in a year and that the portfolio returns follow a normal distribution, the estimate of the annual VaR at the 95% confidence level is closest to which of the following?

a. USD 32,595
b. USD 145,770
c. USD 2,297,854
d. USD 2,737,868

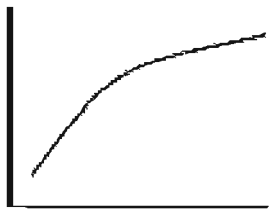
Answer: c

Explanation: Daily standard deviation = sqrt(0.0002) = 0.01414.
Annual VaR = 6,247,000 x sqrt(250) x 0.01414 x 1.645 = 2,297,854.

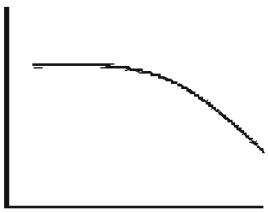
Topic: Valuation and Risk Models
Subtopic: Value-at-Risk (VaR)
AIMS: Explain and give examples of linear and non-linear derivatives.
Explain how to calculate VaR for linear derivatives.
Reference: Linda Allen, Jacob Boudoukh and Anthony Saunders, *Understanding Market, Credit and Operational Risk: The Value at Risk Approach* (Oxford: Blackwell Publishing, 2004), Chapter 3—Putting VaR to Work

13. An investor finds that the gold lease rate is 5% and the corresponding risk free rate is 6%. Under these conditions, which of the following charts of forward prices (y-axis) versus time (x-axis) best indicates the structure of the forward market for gold?

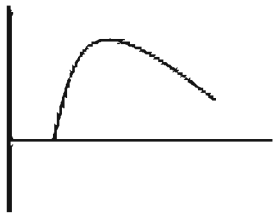
a.



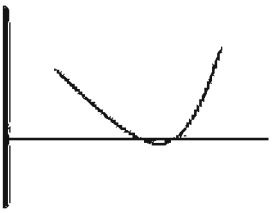
b.



c.



d.



Answer: a

Explanation: Forward price = Spot price * exp[(risk free rate – lease rate) * T]
Since lease rate is lower than the risk free rate, it will show a positive sloped forward curve.
"b" is a curve that indicates backwardation, and the other two choices both show a two-stage market structure which is not indicated in the question.

Topic: Financial Markets and Products
Subtopic: Commodity Derivatives, Cost of Carry, Lease Rate, Convenience Yield
AIMS: Define the lease rate and how it determines the no-arbitrage values for commodity forwards and futures, and explain the relationship between lease rates and contango, and lease rates and backwardation.
Reference: Robert McDonald, *Derivatives Markets* (Addison-Wesley, 2003), Chapter 6

14. A multiple choice exam has ten questions, with five choices per question. If you need at least three correct answers to pass the exam, what is the probability that you will pass simply by guessing?

a. 0.8%
b. 20.1%
c. 67.8%
d. 32.2%

Answer: d

Explanation: The probability of an event is between 0 and 1. If these are mutually exclusive events, the probability of individual occurrences are summed. This probability follows a binomial distribution with a p-parameter of 0.2 The probability of getting at least three questions correct is 1 - (p(0) + p(1) + p(2)) = 32.2%.

Topic: Quantitative Analysis
Subtopic: Probability Distributions
AIMS: Define the probability of an event.
Reference: Damodar Gujarati, *Essentials of Econometrics, 3rd Edition* (McGraw-Hill, 2006), Chapter 2—Review of Statistics: Probability and Probability Distributions

15. 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

Answer: *c*

Explanation: The 10 basis point shock to the 10-year yield is supposed to decline linearly to zero for the 20 year yield. Thus, the shock decreases by 1 basis point per year and will result in an increase of 6 basis points for the 14 year yield.

Topic: Valuation and Risk Models
Subtopic: Term Structure of Interest Rates
AIMS: Define, interpret, and apply a bond's yield-to-maturity (YTM) to bond pricing.
Reference: Bruce Tuckman, *Fixed Income Securities, 2nd Edition* (Hoboken, NJ: Wiley & Sons, 2002), Chapter 3—Yield to Maturity

16. All else held constant and assuming no change in the value of the underlying, what impact should an increase in interest rates have on the price of stock index futures?

a. Increase futures prices
b. Reduce futures prices
c. Have no impact on futures prices
d. Make futures prices same as spot

Answer: a

Explanation: The formula to compute futures price on a stock index future is: $F_0 = S * e^{(r-q)T}$
All else held constant if r rises, so should F.

Topic: Financial Markets and Products
Subtopic: Futures, Forwards, Swaps, and Options
AIMS: Calculate the forward price, given the underlying asset's price, with or without short sales and/or consideration to the income yield of the underlying asset. Describe an arbitrage argument in support of these prices.
Reference: John Hull, *Options, Futures, and Other Derivatives, 7th Edition* (Pearson 2009), Chapter 5

17. 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

Answer: c

Explanation: Besides eliminating flexibility within the firm, risk monitoring is costly so that at some point, tighter risk monitoring is not efficient. The effectiveness of risk monitoring and control depends crucially on an institution's culture and incentives. If risk is everybody's business in an organization, it is harder for pockets of risk to be left unobserved. If employees' compensation is affected by how they take risks, they will take risk more judiciously. The best risk models in a firm with poor culture and poor incentives will be much less effective than in a firm where the incentives of employees are better aligned with the risk-taking objectives of the firm.

Topic: Foundations of Risk Management
Subtopic: Risk Management Failures: What are They and When Do They Happen?
AIMS: Define the role of risk management and explain why a large financial loss is not necessarily a failure of risk management. Explain how firms can fail to take known and unknown risks into account in making strategic decisions.
Reference: Rene Stulz, "Risk Management Failures: What are They and When Do They Happen?" Fisher College of Business Working Paper Series (Oct 2008)

18. A hedge fund has invested USD 100 million in mortgage backed securities. The risk manager is concerned about prepayment risk if interest rates fall. Which of the following strategies is an effective hedge against the potential loss due to a drop in interest rates?

a. Short forward rate agreement (FRA), long T-bond futures
b. Long FRA, short T-bond futures
c. Long FRA, long T-bond futures
d. Short FRA, short T-bond futures

Answer: a

Explanation: When rates drop, the long position in the futures and the short position in the FRA both gain.

Topic: Valuation and Risk Models
Subtopic: Bond prices, spot prices, forward rates
AIMS: Define and describe reinvestment risk.
Reference: Bruce Tuckman, *Fixed Income Securities, 2nd Edition* (Hoboken, NJ: Wiley & Sons, 2002). Chapter 3—Yield to Maturity

19. Sam Seel has a small portfolio of options. Since the options are currently in-the-money, he is considering the possibility of early exercise. Which of the following statements is correct?

a. It is never optimal to exercise European call options early.
b. It is best to exercise a put option when it is just in-the-money.
c. Early exercise of put options becomes more attractive when interest rates rise.
d. Early exercise of put options becomes more attractive when interest rates decline.

Answer: c

Explanation: When interest rates rise, stock prices have a tendency to fall. This increases the value of a put option on a stock. All options benefit from high volatility.

Topic: Financial Markets and Products
Subtopic: American Options, Effects of Dividends, Early Exercise
AIMS: Discuss the effects dividends have on the put-call parity, the bounds of put and call option prices, and on the early exercise feature of American options.
Reference: John Hull, *Options, Futures, and Other Derivatives, 7th Edition* (Prentice Hall, 2009), Chapter 9—Properties of Stock Options

20. Portfolio A has an expected return of 8%, volatility of 20%, and beta of 0.5. Assume that the market has an expected return of 10% and volatility of 25%. Also assume a risk-free rate of 5%. What is Jensen's alpha for portfolio A?

a. 0.5%
b. 1.0%
c. 10%
d. 15%

Answer: a

Explanation: The Jensen measure of a portfolio, or Jensen's alpha, is computed as follows:
$\alpha_p = E(R_p) - R_F - \beta \times [E(R_M) - R_F]$
$= 8\% - 5\% - 0.5 \times (10\% - 5\%)$
$= 0.5\%$

Topic: Foundation of Risk Management
Subtopic: Market efficiency, equilibrium and the Capital Asset Pricing Model (CAPM), performance measurement and attribution
AIMS: Calculate, compare, and evaluate the Treynor measure, the Sharpe measure, and Jensen's alpha.
Reference: Noel Amenc and Veronique Le Sourd, *Portfolio Theory and Performance Analysis* (John Wiley & Sons, 2003), Chapter 4—The Capital Asset Pricing Model and Its Application to Performance Measurement

21. Half of the mortgages in a portfolio are considered subprime. The principal balance of half of the subprime mortgages and one-quarter of the non-subprime mortgages exceeds the value of the property used as collateral. If you randomly select a mortgage from the portfolio for review and its principal balance exceeds the value of the collateral, what is the probability that it is a subprime mortgage?

a. 1/4
b. 1/3
c. 1/2
d. 2/3

Answer: d

Explanation: Assume: A = event that the loan is subprime
B = event that the face value of the loan exceeds that the property
P(A) = ½
P(A') = 1/2
P(B|A) = ½
P(B|A') = 1/4
P(A|B) = P(B|A)*P(A)/[P(B|A)*P(A) + P(B|A')*P(A')]
P(A|B) = (1/2 * 1/2)/(1/2 * 1/2 + 1/4 * 1/2) = (1/4) / (1/4 + 1/8) = (1/4)/(3/8) = 8/12 = 2/3

Topic: Quantitative Analysis.
Subtopic: Probability distributions
AIMS: Define the Bayes' Theorem and apply Bayes' formula to determine the probability of an event.
Reference: Damodar Gujarati, *Essentials of Econometrics, 3rd Edition* (McGraw-Hill, 2006), Chapter 2

22. John Holt is managing a fixed-income portfolio worth USD 10 million. The duration of the portfolio today is 5.9 years and in six months it is expected to be 6.2 years. The 6-month Treasury bond futures contract is trading at USD 98.47. The bond that is expected to be cheapest-to-deliver has a duration of 4.0 years today and an expected duration of 4.8 years at the maturity of the futures contract. How many futures contracts should John short to hedge against changes in interest rates over the next six months? Each futures contract is for the delivery of USD 100,000 face value of bonds.

a. 125 contracts
b. 131 contracts
c. 150 contracts
d. 157 contracts

Answer: b

Explanation: The correct number of futures contracts to short is computed as follows:
10,000,000 * 6.2 / (.9847 * 100,000 * 4.8) = 131.17

Topic: Financial Markets and Products
Subtopic: Minimum Variance Hedge Ratio
AIMS: Calculate the duration-based hedge ratio and describe a duration-based hedging strategy using interest rate futures
Reference: John Hull, *Options, Futures, and Other Derivatives, 7th Edition* (Prentice Hall, 2009), Chapter 6—Interest Rate Futures

23. Which of the following are potential consequences 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 roles.
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

Answer: b

Explanation: According to the GARP Code of Conduct, violation(s) of the Code may result in the temporary suspension or permanent removal of the GARP Member from GARP's Membership roles, and may also include temporarily or permanently removing from the violator the right to use or refer to having earned the FRM designation or any other GARP granted designation, following a formal determination that such a violation has occurred.

Topic: Foundations of Risk Management
Subtopic: Ethics
AIMS: Describe the potential consequences of violating the GARP Code of Conduct.
Reference: GARP Code of Conduct, Applicability and Enforcement section

24. In comparison to the bottom-up approach to measuring operational risk exposure, the top-down approach would be most appropriate for which of the following:

a. Determining firm-wide economic capital levels
b. Designing risk reduction techniques at the business-unit level
c. Diagnosing specific weak points in a process
d. Incorporating changes in the risk environment

Answer: a

Explanation: Top-down operational risk measurement techniques may be appropriate for the determination of overall economic levels for the firm. However, top-down operational risk techniques tend to be of little use in designing procedures to reduce operational risk in any particularly vulnerable area of the firm. That is, they do not incorporate any adjustment for the implementation of operational risk controls, nor can they advise management about specific weak points in the production process. They over-aggregate the firm's processes and procedures and are thus poor diagnostic tools. Top-down techniques are also backward looking and cannot incorporate changes in the risk environment that might affect the operational loss distribution over time.

Topic: Valuation and Risk Models.
Subtopic: Applications of VaR for market, credit and operational risk
AIMS: Compare and contrast top-down and bottom-up approaches to measuring operational risk.
Reference: Linda Allen, Jacob Boudoukh and Anthony Saunders, *Understanding Market, Credit and Operational Risk: The Value at Risk Approach* (Oxford: Blackwell Publishing, 2004), Chapter 5

25. HedgeFund has been in existence for two years. Its average monthly return has been 6% with a standard deviation of 5%. HedgeFund 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 HedgeFund's monthly returns 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-Squared 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

Answer: d

Explanation: The correct test is:

Null Hypothesis	Alternative Hypothesis	Critical Region, reject the null if:
$\sigma^2 = 4\%^2 = .0016$	$\sigma^2 > .0016$	$\frac{(24-1)(.05)\ \hat{}\ 2}{(.04)\ \hat{}\ 2} > \chi^2_{2.5,24-1} \rightarrow 36 > 38$

Therefore, you would not reject the null hypothesis. A chi-square test is a statistical hypothesis test whereby the sampling distribution of the test statistic is a chi-squared distribution when the null hypothesis is true.

Topic: Quantitative Analysis
Subtopic: Statistical Inference and Hypothesis Testing.
AIMS: Describe and interpret the chi-square test of significance and the F-test of significance.
Reference: Damodar Gujarati, *Essentials of Econometrics, 3rd Edition* (McGraw-Hill, 2006), Chapter 5

Financial Risk Manager (FRM®) Examination

2012 Practice Exam

PART II

Answer Sheet

	a.	b.	c.	d.
1.	○	○	○	○
2.	○	○	○	○
3.	○	○	○	○
4.	○	○	○	○
5.	○	○	○	○
6.	○	○	○	○
7.	○	○	○	○
8.	○	○	○	○
9.	○	○	○	○
10.	○	○	○	○
11.	○	○	○	○
12.	○	○	○	○
13.	○	○	○	○
14.	○	○	○	○
15.	○	○	○	○

	a.	b.	c.	d.
16.	○	○	○	○
17.	○	○	○	○
18.	○	○	○	○
19.	○	○	○	○
20.	○	○	○	○
21.	○	○	○	○
22.	○	○	○	○
23.	○	○	○	○
24.	○	○	○	○
25.	○	○	○	○

Correct way to complete

1. ● ● ● ●

Wrong way to complete

1. 

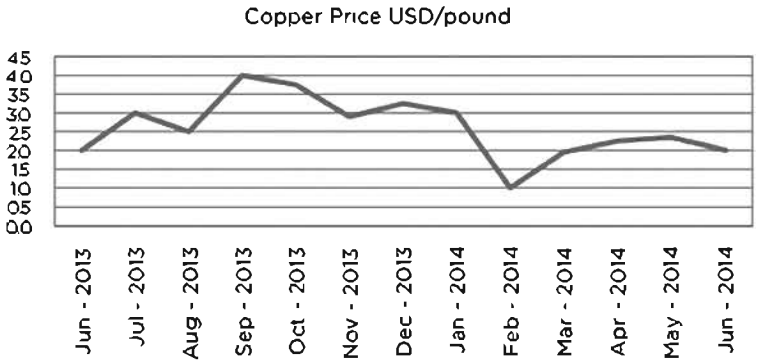
Financial Risk Manager (FRM®) Examination

2012 Practice Exam

PART II

Questions

1. In an effort to hedge some of your portfolio's commodity exposure, you purchased a look-back put on 100,000 pounds of copper for the period from June 30, 2009 through June 30, 2010. The price of copper over this period is shown in the chart below. What was the payoff at expiration of this option?



a. USD 0
b. USD 100,000
c. USD 200,000
d. USD 300,000

2. Which of the following statements about correlation and copula are correct?

i. Copula enables the structures of correlation between variables to be calculated separately from their marginal distributions.
ii. Transformation of variables does not change their correlation structure.
iii. Correlation can be a useful measure of the relationship between variables drawn from a distribution without a defined variance.
iv Correlation is a good measure of dependence when the measured variables are distributed as multivariate elliptical.

a. i and iv only
b. ii, iii, and iv only
c. i and iii only
d. ii and iv only

3. Which of the following about the duration of a mortgage-backed, interest-only security (IO) is correct?

a. An IO has positive duration.
b. An IO has negative duration.
c. An IO has exactly the same duration as a mortgage-backed security (MBS) with the same coupon.
d. An IO has exactly the same duration as a mortgage-backed, principal-only security stripped off the same MBS.

4. The Chief Risk Officer of Martingale Investments Group is planning a change in methodology for some of the risk management models used to estimate risk measures. His aim is to move from models that use the normal distribution of returns to models that use the distribution of returns implied by market prices. Martingale Group has a large long position in the German equity stock index DAX which has a volatility smile that slopes downward to the right. How will the change in methodology affect the estimate of expected shortfall (ES)?

a. ES with the updated models will be larger than the old estimate.
b. ES with the updated models will be smaller than the old estimate.
c. ES will remain unchanged.
d. Insufficient information to determine.

5. A portfolio manager owns a portfolio of options on a non-dividend paying stock RTX. The portfolio is made up of 10,000 deep in-the-money call options on RTX and 50,000 deep out-of-the money call options on RTX. The portfolio also contains 20,000 forward contracts on RTX. RTX is trading at USD 100. If the volatility of RTX is 30% per year, which of the following amounts would be closest to the 1-day VaR of the portfolio at the 95 percent confidence level, assuming 252 trading days in a year?

a. USD 932
b. USD 93,263
c. USD 111,122
d. USD 131,892

6. An analyst is using Moody's KMV model to estimate the distance to default of a large public firm, Shoos Inc., a firm that designs, manufactures and sells athletic shoes. The firm's capital structure consists of USD 40 million in short-term debt, USD 20 million in long-term debt, and there are one million shares of stock currently trading at USD 10 per share. The asset volatility is 20% per year. What is the normalized distance to default for Shoos Inc.?

a. 0.714
b. 1.430
c. 2.240
d. 5.000

7. You are evaluating the credit risk in a portfolio comprised of Loan A and Loan B. In particular, you are interested in the risk contribution of each of the loans to the unexpected loss of the portfolio. Given the information in the table below, and assuming that the correlation of default between Loan A and Loan B is 20%, what is the risk contribution of Loan A to the risk of the portfolio?

	Adjusted Exposure	Expected Default Frequency	Volatility of Expected Default Frequency	Loss Given Default	Volatility of Loss Given Default
Loan A	USD 3,000,000	1.5%	7.0%	30%	20%
Loan B	USD 2,000,000	3.5%	12.0%	45%	30%

a. USD 39,587
b. USD 62,184
c. USD 96,794
d. USD 120,285

8. A hedge fund is considering taking positions in various tranches of a collateralized debt obligation (CDO). The fund's chief economist predicts that the default probability will decrease significantly and that the default correlation will increase. Based on this prediction, which of the following is a good strategy to pursue?

a. Buy the senior tranche and buy the equity tranche.
b. Buy the senior tranche and sell the equity tranche.
c. Sell the senior tranche and sell the equity tranche.
d. Sell the senior tranche and buy the equity tranche.

9. Sacks Bank has many open derivative positions with Lake Investments. A description and current market values are displayed in the table below:

Positions	Market Price (USD)
Long swaptions	10 million
Long credit default swaps	-25 million
Short currency derivatives	25 million

In the event that Lake defaults, what would be the loss to Sacks if netting is used?

a. USD 5 million
b. USD 10 million
c. USD 25 million
d. USD 35 million

10. Mike Merton is the head of credit derivatives trading at an investment bank. He is monitoring a new credit default swap basket that is made up of 20 bonds, each with a 1% annual probability of default. Assuming the probability of any one bond defaulting is completely independent of what happens to other bonds in the basket, what is the probability that exactly one bond defaults in the first year?

a. 2.06%
b. 3.01%
c. 16.5%
d. 30.1%

11. The Basel Committee recommends that banks use a set of early warning indicators in order to identify emerging risks and potential vulnerabilities in its liquidity position. Which of the following are not early warning indicators of a potential liquidity problem?

i. Rapid asset growth
ii. Negative publicity
iii. Credit rating downgrade
iv. Increased asset diversification

a. ii and iii
b. iv only
c. i and iv
d. i, ii and iv

12. Using approved approaches, Barlop Bank has calculated the following values:

Risk-weighted assets for credit risk, RWA_c:	USD 47 million
Market risk capital requirement, CR_m:	USD 3.2 million
Operational risk capital requirement, CR_o:	USD 2.8 million

Assuming Tier 3 capital is USD 0, in which scenario below does Barlop Bank meet the Basel II minimum capital requirement?

(all figures in USD million)

	Tier 1 Capital	Tier 2 Capital	Deductions
a.	6.8	3.2	0.4
b.	6.2	4.8	0.8
c.	6.2	8.4	2.8
d.	4.8	6.2	0.0

13. Jeremy Park and Brian Larksen are both portfolio managers who hold identical long positions worth GBP 100 million in the FTSE 1000 index. To hedge their respective portfolios, Park shorts FTSE 1000 futures contracts while Larksen buys put options on the FTSE 1000. Who has a higher Liquidity-at-Risk (LaR) measure?

a. Larksen
b. Park
c. Both have the same LaR
d. Insufficient information to determine

14. Based on "Supervisory Guidance for Assessing Banks' Financial Instrument Fair Value Practices" issued by the Basel Committee, which of the following factors should be considered in determining whether the sources of fair values are reliable and relevant?

i. Frequency and availability of prices / quotes
ii. Maturity of the market
iii. Agreement of values with those generated by internal models
iv. Number of independent sources that produce the prices / quotes

a. i and ii only
b. iii and iv only
c. i, ii and iii only
d. i, ii, and iv only

15. Major Investments is an asset management firm with USD 25 billion under management. It owns 20% of the stock of a company. Major Investments' risk manager is concerned that, in the event the entire position needs to be sold, its size would affect the market price. His estimate of the price elasticity of demand is -0.5. What is the increase in Major Investments' Value-at-Risk estimate for this position if a liquidity adjustment is made?

a. 4%
b. 10%
c. 15%
d. 20%

16. Which of the following statements about convertible arbitrage hedge fund strategies is correct?

a. Credit risk plays only a minor role in convertible arbitrage hedge funds.
b. Investing in convertible arbitrage does not require an understanding of liquidity considerations as the market for convertible securities is sufficiently liquid today
c. Gamma trading entails significant directional exposure to the equity markets.
d. Re-hedging after a large gain yields trading gains for a typical hedged position in convertible arbitrage hedge funds.

17. You are evaluating the performance of Valance, an equity fund designed to mimic the performance of the Russell 2000 Index. Based upon the information provided below, what is the best estimate of the tracking error of Valance relative to the Russell 2000 Index?

- Annual volatility of Valance: 35%
- Annual volatility of the Russell 2000 Index: 40%
- Correlation between Valance and the Russell 2000 Index: 0.90

a. 3.1%
b. 17.5%
c. 39.6%
d. 53.2%

18. Consider a USD 1 million portfolio with an equal investment in two funds, Alpha and Omega, with the following annual return distributions:

Fund	Expected Return	Volatility
Alpha	5%	20%
Omega	7%	25%

Assuming the returns follow the normal distribution and that there are 252 trading days per year, what is the maximum possible daily 95% Value-at-Risk (VaR) estimate for the portfolio?

a. USD 16,587
b. USD 23,316
c. USD 23,459
d. USD 32,973

19. Which of the following statements about the impact of rising home prices on mortgages is incorrect?

a. Negative convexity limits mortgage price appreciation.
b. Higher prepayment penalties increase the payout to banks in the event mortgagors refinance to "cash out" on their equity
c. The expected life of a mortgage with a low teaser rate increases as the size of the step-up rate increases.
d. Expected losses decrease as the value of mortgage collateral increases.

20. A simplified version of New Pavonia Bank is shown below. Which of the following statements about the bank is correct?

Assets (USD)	Liabilities (USD)	
100,000,000	Deposits: Repos: Long Term Debt: Equity:	40,000,000 30,000,000 22,000,000 8,000,000
Total Assets: **100,000,000**	**Total Liabilities and Equity:**	**100,000,000**

a. New Pavonia Bank clearly meets its Basel II capital requirements.
b. The risks that threaten New Pavonia Bank are on the asset side because it has diversified its sources of financing.
c. A bank such as New Pavonia Bank could have been threatened during the crisis if there was strong information asymmetry about the value of the securities it used for repos.
d. Deposit runs are the most likely type of run that could threaten New Pavonia Bank.

Financial Risk Manager (FRM®) Examination

2012 Practice Exam

PART II

Answers

	a.	b.	c.	d.
1.	○	○	●	○
2.	●	○	○	○
3.	○	●	○	○
4.	●	○	○	○
5.	○	●	○	○
6.	○	●	○	○
7.	○	●	○	○
8.	○	○	○	●
9.	○	●	○	○
10.	○	○	●	○
11.	○	●	○	○
12.	○	●	○	○
13.	○	●	○	○

	a.	b.	c.	d.
14.	○	○	○	●
15.	○	●	○	○
16.	○	○	○	●
17.	○	●	○	○
18.	○	●	○	○
19.	○	○	●	○
20.	○	○	●	○

Correct way to complete

1.	●	●	●	●

Wrong way to complete

1.	∅	⊖	✓	✗

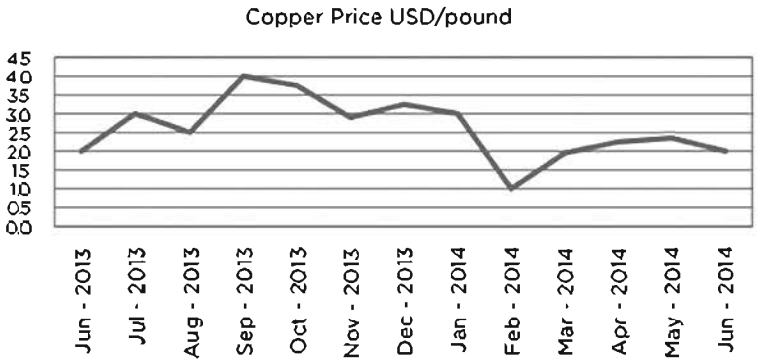
Financial Risk Manager (FRM®) Examination

2012 Practice Exam

PART II

Explanations

1. In an effort to hedge some of your portfolio's commodity exposure, you purchased a look-back put on 100,000 pounds of copper for the period from June 30, 2009 through June 30, 2010. The price of copper over this period is shown in the chart below. What was the payoff at expiration of this option?



a. USD 0
b. USD 100,000
c. USD 200,000
d. USD 300,000

Answer: c

Explanation: Look-back options are options which the holder can buy/sell the underlying asset at the lowest/highest price achieved during the life of the option. A put look-back option is the option to sell at the highest price. The payoffs from look-back options depend on the maximum or minimum price reached during the life of the option.

The payoff of a look-back put is the difference between the maximum price of the underlying asset over the time period covered by the option (USD 4), less the price at expiration (USD 2):

100,000 * (USD 4 – USD 2) = USD 200,000

Topic: Market Risk Measurement and Management
Subtopic: Exotic Options
AIMS: List and describe the characteristics and pay-off structures of look-back options.
Reference: John Hull: *Options, Futures, and Other Derivatives, 7th Edition* (New York: John Wiley, 2009), Chapter 24: Exotic Options

2. Which of the following statements about correlation and copula are correct?

i. Copula enables the structures of correlation between variables to be calculated separately from their marginal distributions.
ii. Transformation of variables does not change their correlation structure.
iii. Correlation can be a useful measure of the relationship between variables drawn from a distribution without a defined variance.
iv. Correlation is a good measure of dependence when the measured variables are distributed as multivariate elliptical.

a. i and iv only
b. ii, iii, and iv only
c. i and iii only
d. ii and iv only

Answer: a

Explanation: "i" is true Using the copula approach, we can calculate the structures of correlation between variables separately from the marginal distributions. "iv" is also true. Correlation is a good measure of dependence when the measured variables are distributed as multivariate elliptical.

"ii" is false. The correlation between transformed variables will not always be the same as the correlation between those same variables before transformation. Data transformation can sometimes alter the correlation estimate. "iii" is also false. Correlation is not defined unless variances are finite.

Topic: Market Risk Measurement and Management
Subtopic: Modeling Dependence: Correlations and Copulas—Copulas and Tail Dependence
AIMS: Explain the drawbacks of using correlation to measure dependence Describe how copulas provide an alternative measure of dependence.
Reference: Kevin Dowd: *Measuring Market Risk, 2nd Edition* (West Sussex, England: John Wiley, 2005), Chapter 5: Modeling Dependence: Correlations and Copulas

3. Which of the following about the duration of a mortgage-backed, interest-only security (IO) is *correct*?

a. An IO has positive duration.
b. An IO has negative duration.
c. An IO has exactly the same duration as a mortgage-backed security (MBS) with the same coupon.
d. An IO has exactly the same duration as a mortgage-backed, principal-only security stripped off the same MBS.

Answer: b

Explanation: The IO holder benefits from rising rates. If rates are rising, prepays slow. Thus, IOs have negative duration and can be used for hedging purposes. An IO's price moves in the same direction as interest rate changes, implying negative duration. An MBS has positive duration, as it is inversely proportional to interest rate changes. Likewise, a PO has positive duration, as it is inversely proportional to interest rate changes.

Topic: Market Risk Measurement and Management
Subtopic: Mortgages and Mortgage-Backed Securities
AIMS: Discuss the impact of interest rates and prepayments on different portions of CMOs, IO and PO strips.
Reference: Bruce Tuckman: *Fixed Income Securities: Tools for Today's Markets, 2nd Edition* (Hoboken, NJ: John Wiley, 2002), Chapter 21: Mortgage-Backed Securities

4. The Chief Risk Officer of Martingale Investments Group is planning a change in methodology for some of the risk management models used to estimate risk measures. His aim is to move from models that use the normal distribution of returns to models that use the distribution of returns implied by market prices. Martingale Group has a large long position in the German equity stock index DAX which has a volatility smile that slopes downward to the right. How will the change in methodology affect the estimate of expected shortfall (ES)?

a. ES with the updated models will be larger than the old estimate.
b. ES with the updated models will be smaller than the old estimate.
c. ES will remain unchanged.
d. Insufficient information to determine.

Answer: a

Explanation: A volatility smile is a common graphical shape that results from plotting the strike price and implied volatility of a group of options with the same expiration date. Since the volatility smile is downward sloping to the right, the implied distribution has a fatter left tail compared to the lognormal distribution of returns. This means that an extreme decrease in the DAX has a higher probability of occurrence under the implied distribution than the lognormal. The ES will therefore be larger when the methodology is modified.

Topic: Market Risk Measurement and Management
Subtopic: Volatility Smiles and Volatility Term Structures
AIMS: Explain and calculate expected shortfall (ES), and compare and contrast VaR and ES. Relate the shape of the volatility smile (or skew) to the shape of the implied distribution of the underlying asset price
References: Kevin Dowd: *Measuring Market Risk, 2nd Edition* (John Wiley, 2005), Chapter 3: Estimating Market Risk Measures: An Introduction and Overview, and John Hull: *Options, Futures, and Other Derivatives, 7th Edition* (New York: John Wiley, 2009), Chapter 18: Volatility Smiles

5. A portfolio manager owns a portfolio of options on a non-dividend paying stock RTX. The portfolio is made up of 10,000 deep in-the-money call options on RTX and 50,000 deep out-of-the money call options on RTX. The portfolio also contains 20,000 forward contracts on RTX. RTX is trading at USD 100. If the volatility of RTX is 30% per year, which of the following amounts would be closest to the 1-day VaR of the portfolio at the 95 percent confidence level, assuming 252 trading days in a year?

a. USD 932
b. USD 93,263
c. USD 111,122
d. USD 131,892

Answer: b

Explanation: We need to map the portfolio to a position in the underlying stock RTX. A deep in-the-money call has a delta of approximately 1, a deep out-of-the-money call has delta of approximately 0 and forwards have a delta of 1. The net portfolio has a delta of about 30,000 and is approximately gamma neutral. The 1-day VaR estimate at 95 percent confidence level is computed as follows:

$\alpha \times S \times \Delta \times \sigma \times \text{sqrt}(1/T) = 1.645 \times 100 \times 30{,}000 \times 0.30 \times .\text{sqrt}(1/252) = 93{,}263$

Topic: Market Risk Measurement and Management
Subtopic: VaR Mapping—Mapping Financial Instruments to Risk Factors
AIMS: Describe the method of mapping forwards, commodity forwards, forward rate agreements, and interest rate swaps. Describe the method of mapping options.
Reference: Philippe Jorion: *Value at Risk: The New Benchmark for Managing Financial Risk, 3rd Edition* (New York: McGraw-Hill, 2007), Chapter 11: VaR Mapping

6. An analyst is using Moody's KMV model to estimate the distance to default of a large public firm, Shoos Inc., a firm that designs, manufactures and sells athletic shoes. The firm's capital structure consists of USD 40 million in short-term debt, USD 20 million in long-term debt, and there are one million shares of stock currently trading at USD 10 per share. The asset volatility is 20% per year. What is the normalized distance to default for Shoos Inc.?

a. 0.714
b. 1.430
c. 2.240
d. 5.000

Answer: b

Explanation: Moody's KMV model is a model for predicting private company defaults. It covers many geographic specific models, and each model reflects the unique lending, regulatory, and accounting practices of that region. Moody's KMV computes the normalized distance to default as:

$$DD = \frac{A - K}{A\sigma_A}$$

where

"K" (floor) is defined as the value of all short term liabilities (one year and under) plus one half of the book value of all long term debt:
40 million + 0.5 x 20 million = 50 million

"A" is the value of assets:
Market value of equity (1 million shares x 10/share = 10 million) plus the book value of all debt (60 million)
= 70 million

thus
$A\sigma_A$ = 20% x 70 million = 14 million

DD = (70 million – 50 million) / 14 = 1.429 standard deviations

Topic: Credit Risk Measurement and Management
Subtopic: Credit Risks and Credit Derivatives—Credit Spreads
AIMS: Discuss the fundamental differences between CreditRisk+, CreditMetrics and KMV credit portfolio models.
Reference: Rene Stulz: *Risk Management and Derivatives, 1st Edition* (South-Western, 2003), Chapter 18: Credit Risks and Credit Derivatives

7. You are evaluating the credit risk in a portfolio comprised of Loan A and Loan B. In particular, you are interested in the risk contribution of each of the loans to the unexpected loss of the portfolio. Given the information in the table below, and assuming that the correlation of default between Loan A and Loan B is 20%, what is the risk contribution of Loan A to the risk of the portfolio?

	Adjusted Exposure	Expected Default Frequency	Volatility of Expected Default Frequency	Loss Given Default	Volatility of Loss Given Default
Loan A	USD 3,000,000	1.5%	7.0%	30%	20%
Loan B	USD 2,000,000	3.5%	12.0%	45%	30%

a. USD 39,587
b. USD 62,184
c. USD 96,794
d. USD 120,285

Answer: b

Explanation: Risk contribution is a critical risk measure for assessing credit risk. The risk contribution of a risky assets "RC" to the portfolio unexpected loss, is defined as the incremental risk that the exposure of a single asset contributes to the portfolio's total risk. Mathematically:

$RC_A = (UL_A^2 + \rho \times UL_A \times UL_B)/UL_P$

$UL = V \times \text{sqrt}(EDF \times VAR_{LGD} + LGD^2 \times VAR_{EDF})$

therefore:

$UL_A = 3{,}000{,}000 \times \text{sqrt}(1.5\% \times 20\%^2 + 30\%^2 \times 7\%^2) = 96{,}793.59$
$UL_B = 2{,}000{,}000 \times \text{sqrt}(3.5\% \times 30\%^2 + 45\%^2 \times 12\%^2) = 155{,}769.06$
$UL_P = \text{sqrt}(96793.59^2 + 155{,}769.06^2 + 2 \times 20\% \times 96{,}793.59 \times 155{,}769.06) = 199{,}158.17$

$RC_A = (96{,}793.59^2 + 20\% \times 96{,}793.59 \times 155{,}769.06) / 199{,}158.17 = 62{,}184.19$

Topic: Credit Risk Measurement and Management
Subtopic: Portfolio Effects: Risk Contribution and Unexpected Losses—Expected and Unexpected Losses
AIMS: Define, calculate and interpret expected and unexpected portfolio loss.
Reference: Michael Ong: *Internal Credit Risk Models: Capital Allocation and Performance Measurement* (London: Risk Books, 1999), Chapter 6: Portfolio Effects: Risk Contributions and Unexpected Losses

8. A hedge fund is considering taking positions in various tranches of a collateralized debt obligation (CDO). The fund's chief economist predicts that the default probability will decrease significantly and that the default correlation will increase. Based on this prediction, which of the following is a good strategy to pursue?

a. Buy the senior tranche and buy the equity tranche
b. Buy the senior tranche and sell the equity tranche.
c. Sell the senior tranche and sell the equity tranche.
d. Sell the senior tranche and buy the equity tranche.

Answer: d

Explanation: The decrease in probability of default would increase the value of the equity tranche. Also, a default of the equity tranche would increase the probability of default of the senior tranche, due to increased correlation, reducing its value. Thus, it is better to go long the equity tranche and short the senior tranche.

Topic: Credit Risk Measurement and Management
Subtopic: Credit Derivatives—Default and Default-time Correlations
AIMS: Describe asset backed securities including collateralized debt obligations (CDOs) and explain tranches role of correlation in valuing CDOs.
Reference: John Hull: *Options, Futures, and Other Derivatives, 7th Edition* (New York: Pearson, 2009), Chapter 23: Credit Derivatives

9. Sacks Bank has many open derivative positions with Lake Investments. A description and current market values are displayed in the table below:

Positions	Market Price (USD)
Long swaptions	10 million
Long credit default swaps	-25 million
Short currency derivatives	25 million

In the event that Lake defaults, what would be the loss to Sacks if netting is used?

a. USD 5 million
b. USD 10 million
c. USD 25 million
d. USD 35 million

Answer: b

Explanation: Netting means that the payments between the two counterparties are netted out. so that only a net payment has to be made. With netting, Sacks is not required to make the payout of 25 million. Hence the loss will be reduced to:

35 million - 25 million = 10 million

Topic: Credit Risk Measurement and Management
Subtopic: Credit Risk – Risk Mitigation Techniques
AIMS: Describe the following credit mitigation techniques: netting.
Reference: John Hull: *Options, Futures, and Other Derivatives, 7th Edition* (New York: Pearson, 2009), Chapter 22: Credit Risk

10. Mike Merton is the head of credit derivatives trading at an investment bank. He is monitoring a new credit default swap basket that is made up of 20 bonds, each with a 1% annual probability of default. Assuming the probability of any one bond defaulting is completely independent of what happens to other bonds in the basket, what is the probability that exactly one bond defaults in the first year?

a. 2.06%
b. 3.01%
c. 16.5%
d. 30.1%

Answer: c

Explanation: $C_1^{20} p^1 (1 - p)^{19} = 20 \times 0.01 \times (1 - 0.01)^{19} = 0.1652$

Topic: Credit Risk Measurement and Management
Subtopic: Credit Derivatives—Probability of Default, Loss Given Default and Recovery Rates
AIMS: Compute the value of a CDS, given unconditional default probabilities, survival probabilities, market yields, recovery rates and cash flows
Reference: John Hull: *Options, Futures, and Other Derivatives, 7th Edition* (New York: Pearson, 2009), Chapter 23: Credit Derivatives

11. The Basel Committee recommends that banks use a set of early warning indicators in order to identify emerging risks and potential vulnerabilities in its liquidity position. Which of the following are not early warning indicators of a potential liquidity problem?

i Rapid asset growth
ii. Negative publicity
iii. Credit rating downgrade
iv. Increased asset diversification

a. ii and iii
b. iv only
c. i and iv
d. i, ii and iv

Answer: b

Explanation: Rapid asset growth, negative publicity and credit rating downgrade are all early warnings of a potential liquidity problem. Increased asset diversification is not an early warning indicator of liquidity

Topic: Operational Risk Measurement and Management
Subtopic: Liquidity Risk
AIMS: Describe the principles involved in the governance of liquidity risk, the measurement and management of liquidity risk and public disclosure.
Reference: Principles of Sound Liquidity Risk Management and Supervision" (Basel Committee on Banking Supervision Publication, September 2008)

12. Using approved approaches, Barlop Bank has calculated the following values:

Risk-weighted assets for credit risk, RWA_c:	USD 47 million
Market risk capital requirement, CR_m:	USD 3.2 million
Operational risk capital requirement, CR_o:	USD 2.8 million

Assuming Tier 3 capital is USD 0, in which scenario below does Barlop Bank meet the Basel II minimum capital requirement?

	(all figures in USD million) Tier 1 Capital	Tier 2 Capital	Deductions
a.	6.8	3.2	0.4
b.	6.2	4.8	0.8
c.	6.2	8.4	2.8
d.	4.8	6.2	0.0

Answer: b

Explanation: The total risk-weighted assets are:
$RWA_t = RWA_c + 12.5 \times (CR_m + CR_o) = 47 + 12.5 \times (3.2 + 2.8) = \text{USD } 122 \text{ million}$

Eligible regulatory capital is:
RC = Tier 1 + Tier 2 – Deductions

In addition, Tier 2 capital must be less than or equal to Tier 1 capital.
Minimum capital requirement is:
$RC / RWA_t >= 8\%$.

In this case, RC >= 0.08 x 122 = 9.76
RC = 6.8 + min(3.2, 6.8) – 0.4 = 9.6 (Fails to meet the minimum capital requirement)
RC = 6.2 + min(4.8, 6.2) – 0.8 = 10.2 (Meets the minimum capital requirement)
RC = 6.2 + min(8.4, 6.2) – 2.8 = 9.6 (Fails to meet the minimum capital requirement)
RC = 4.8 + min(6.2, 4.8) – 0.0 = 9.6 (Fails to meet the minimum capital requirement)

Topic: Operational and Integrated Risk Management
Subtopic: Regulation—Basel II Accord
AIMS: Define in the context of Basel II and calculate:
Capital ratio and capital charge
Risk weights and risk-weighted assets
Tier 1 capital, Tier 2 capital and Tier 3 capital
Reference: "Basel II: International Convergence of Capital Measurement and Capital Standards: A Revised Framework—Comprehensive Version" (Basel Committee on Banking Supervision Publication, June 2006)

13. Jeremy Park and Brian Larksen are both portfolio managers who hold identical long positions worth GBP 100 million in the FTSE 1000 index. To hedge their respective portfolios, Park shorts FTSE 1000 futures contracts while Larksen buys put options on the FTSE 1000. Who has a higher Liquidity-at-Risk (LaR) measure?

a. Larksen
b. Park
c. Both have the same LaR
d. Insufficient information to determine

Answer: b

Explanation: The futures positions are exposed to margin calls in the event that the FTSE 1000 increases Park, with the short futures position, is thus exposed more to liquidity risk (cash flow risk). The Park portfolio, hedged with the short futures contract, will thus have the higher LaR.

Topic: Operational and Integrated Risk Management
Subtopic: Estimating Liquidity Risks
AIMS: Describe Liquidity at Risk (LaR) and discuss the factors that affect future cash flows.
Reference: Kevin Dowd: *Measuring Market Risk, 2nd Edition* (John Wiley, 2005). Chapter 14: Estimating Liquidity Risks

14. Based on "Supervisory Guidance for Assessing Banks' Financial Instrument Fair Value Practices" issued by the Basel Committee, which of the following factors should be considered in determining whether the sources of fair values are reliable and relevant?

i. Frequency and availability of prices / quotes
ii. Maturity of the market
iii. Agreement of values with those generated by internal models
iv. Number of independent sources that produce the prices / quotes

a. i and ii only
b. iii and iv only
c. i, ii and iii only
d. i, ii, and iv only

Answer: d

Explanation: Agreement with internally generated values is not necessary or relevant. The other three factors should be considered in determining the reliability and relevancy of the sources of fair values.

Topic: Operational and Integrated Risk Management
Subtopic: Regulation—Fair Value
Reference: "Supervisory Guidance for Assessing Bank's Financial Instrument Fair Value Practices" (Basel Committee on Banking Supervision, April 2009).

15. Major Investments is an asset management firm with USD 25 billion under management. It owns 20% of the stock of a company. Major Investments' risk manager is concerned that, in the event the entire position needs to be sold, its size would affect the market price. His estimate of the price elasticity of demand is -0.5. What is the increase in Major Investments' Value-at-Risk estimate for this position if a liquidity adjustment is made?

a. 4%
b. 10%
c. 15%
d. 20%

Answer: b

Explanation: What is needed is a liquidity adjustment that reflects the response of the market to a possible trade. The formula to use is the ratio of LVaR to VaR:

$$\frac{\text{LVaR}}{\text{VaR}} = 1 - \frac{\Delta P}{P} = 1 - \eta \frac{\Delta N}{N}$$

The ratio of LVaR to VaR depends on the elasticity of demand η and the size of the trade, relative to the size of the market ($\Delta N/N$).

We are given:
dN/N = .2
and that the price elasticity is -0.5.
Thus dP/P = elasticity x dN/N = -0.1
Therefore LVaR/VaR = 1 - dP/P = 1 + 0.1 = 1.1
The liquidity adjustment increases the VaR by 10%.

Topic: Operational and Integrated Risk Management
Subtopic: Estimating Liquidity Risks
AIMS: Discuss Endogenous Price approaches to LVaR, its motivation and limitations
Reference: Kevin Dowd: *Measuring Market Risk, 2nd Edition* (John Wiley, 2005), Chapter 14: Estimating Liquidity Risks

16. Which of the following statements about convertible arbitrage hedge fund strategies is correct?

a. Credit risk plays only a minor role in convertible arbitrage hedge funds.
b. Investing in convertible arbitrage does not require an understanding of liquidity considerations as the market for convertible securities is sufficiently liquid today
c. Gamma trading entails significant directional exposure to the equity markets.
d. Re-hedging after a large gain yields trading gains for a typical hedged position in convertible arbitrage hedge funds.

Answer: d

Explanation: Re-hedging after significant moves of the underlying stock price is the essence of gamma trading. Credit risk plays an important role in the risk profile of convertible arbitrage hedge funds. Liquidity considerations are essential. Ignorance of this risk can lead to devastating losses as the 2008 financial crisis showed. Gamma trading means frequent re-hedging of directional exposure after market moves.

Topic: Risk Management and Investment Management
Subtopic: Individual Hedge Fund Strategies – Risks of Specific Strategies
AIMS: Describe the underlying characteristics, sources of returns and risk exposures of various hedge fund strategies including convertible arbitrage strategies.
Reference: Lars Jaeger: *Through the Alpha Smoke Screens: A Guide to Hedge Fund Returns* (New York: Euromoney Institutional Investor Books, 2005), Chapter 5: Individual Hedge Fund Strategies

17. You are evaluating the performance of Valance, an equity fund designed to mimic the performance of the Russell 2000 Index. Based upon the information provided below, what is the best estimate of the tracking error of Valance relative to the Russell 2000 Index?

- Annual volatility of Valance: 35%
- Annual volatility of the Russell 2000 Index: 40%
- Correlation between Valance and the Russell 2000 Index: 0.90

a. 3.1%
b. 17.5%
c. 39.6%
d. 53.2%

Answer: b

Explanation:

$\omega^2 = \sigma(p - B)^2$
$= \sigma(p)^2 + \sigma(B)^2 - 2 \times \sigma(p) \times \sigma(B) \times \rho$
$= 0.35^2 + 0.4^2 - 2 \times 0.35 \times 0.4 \times 0.9 = 0.0305$
$\omega = 17.5\%$

where
p = portfolio returns
B = benchmark returns
ρ = correlation between benchmark and portfolio

Topic: Risk Management and Investment Management
Subtopic: VaR and Risk Budgeting in Investment Management—Risk decomposition and performance attribution
AIMS: Define and calculate tracking error
Reference: Philippe Jorion: *Value-at-Risk: The New Benchmark for Managing Financial Risk, 3rd Edition* (New York: McGraw-Hill, 2007), Chapter 17: VaR and Risk Budgeting in Investment Management

18. Consider a USD 1 million portfolio with an equal investment in two funds, Alpha and Omega, with the following annual return distributions:

Fund	Expected Return	Volatility
Alpha	5%	20%
Omega	7%	25%

Assuming the returns follow the normal distribution and that there are 252 trading days per year, what is the maximum possible daily 95% Value-at-Risk (VaR) estimate for the portfolio?

a. USD 16,587
b. USD 23,316
c. USD 23,459
d. USD 32,973

Answer: b

Explanation: This question tests that the candidate understands correlation in calculating portfolio VaR. From the table, we can get daily volatility for each fund:

Fund Alpha volatility: $0.20 / 252^{0.5} = 1.260\%$
Fund Omega volatility: $0.25 / 252^{0.5} = 1.575\%$

Portfolio variance:
$0.5^2 * 0.01259^2 + 0.5^2 * 0.01574^2 + 2 \times 0.5 \times 0.5 \times 0.01259 \times 0.01574 \times \rho$
Portfolio volatility = (portfolio variance)$^{0.5}$
Portfolio volatility is least when $\rho = -1 \rightarrow$ portfolio volatility = 0.1575%
Portfolio volatility is greatest when $\rho = 1 \rightarrow$ portfolio volatility = 1.4175%
Therefore, 95% VaR maximum is $1.645 \times 0.014175 \times 1{,}000{,}000$ = USD23,316

Topic: Risk Management and Investment Management
Subtopic: Portfolio Risk: Analytical Methods—Risk Decomposition and Performance Attribution
AIMS: Compute diversified VaR, individual VaR, and undiversified VaR of a portfolio.
Reference: Philippe Jorion: *Value-at-Risk: The New Benchmark for Managing Financial Risk, 3rd Edition* (New York: McGraw-Hill, 2007), Chapter 7: Portfolio Risk: Analytical Methods

19. Which of the following statements about the impact of rising home prices on mortgages is incorrect?

a. Negative convexity limits mortgage price appreciation.
b. Higher prepayment penalties increase the payout to banks in the event mortgagors refinance to "cash out" on their equity
c. The expected life of a mortgage with a low teaser rate increases as the size of the step-up rate increases.
d. Expected losses decrease as the value of mortgage collateral increases.

Answer: c

Explanation: Low teaser rates with high step-ups increase the desire of those who can refinance to do so, if home prices rise. Thus, the expected life of mortgages is shorter if home prices rise.

Topic: Current Issues in Financial Markets
AIMS: List differences between prime and subprime mortgages and borrowers.
Reference: Gary Gorton: "The Panic of 2007," (August 2008)

20. A simplified version of New Pavonia Bank is shown below. Which of the following statements about the bank is correct?

Assets (USD)	Liabilities (USD)	
100,000,000	Deposits: Repos: Long Term Debt: Equity:	40,000,000 30,000,000 22,000,000 8,000,000
Total Assets: **100,000,000**	**Total Liabilities** **and Equity:**	100,000,000

a. New Pavonia Bank clearly meets its Basel II capital requirements.
b. The risks that threaten New Pavonia Bank are on the asset side because it has diversified its sources of financing.
c. A bank such as New Pavonia Bank could have been threatened during the crisis if there was strong information asymmetry about the value of the securities it used for repos.
d. Deposit runs are the most likely type of run that could threaten New Pavonia Bank.

Answer: c

Explanation: Information about the securities' values is asymmetric, meaning that the current holders have better information than potential buyers. There is not enough information in the problem to determine if the bank meets its Basel II capital requirements. Also, a run on repos is possible.

Topic: Current Issues in Financial Markets
AIMS: Explain how the ABX information together with the lack of information about the location of risks led to a loss in confidence on the part of banks.
Reference: Gary Gorton: "The Panic of 2007," (August 2008)

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