Financial Risk Manager (FRM®) Examination

2010 Practice Exam

PART I / PART II
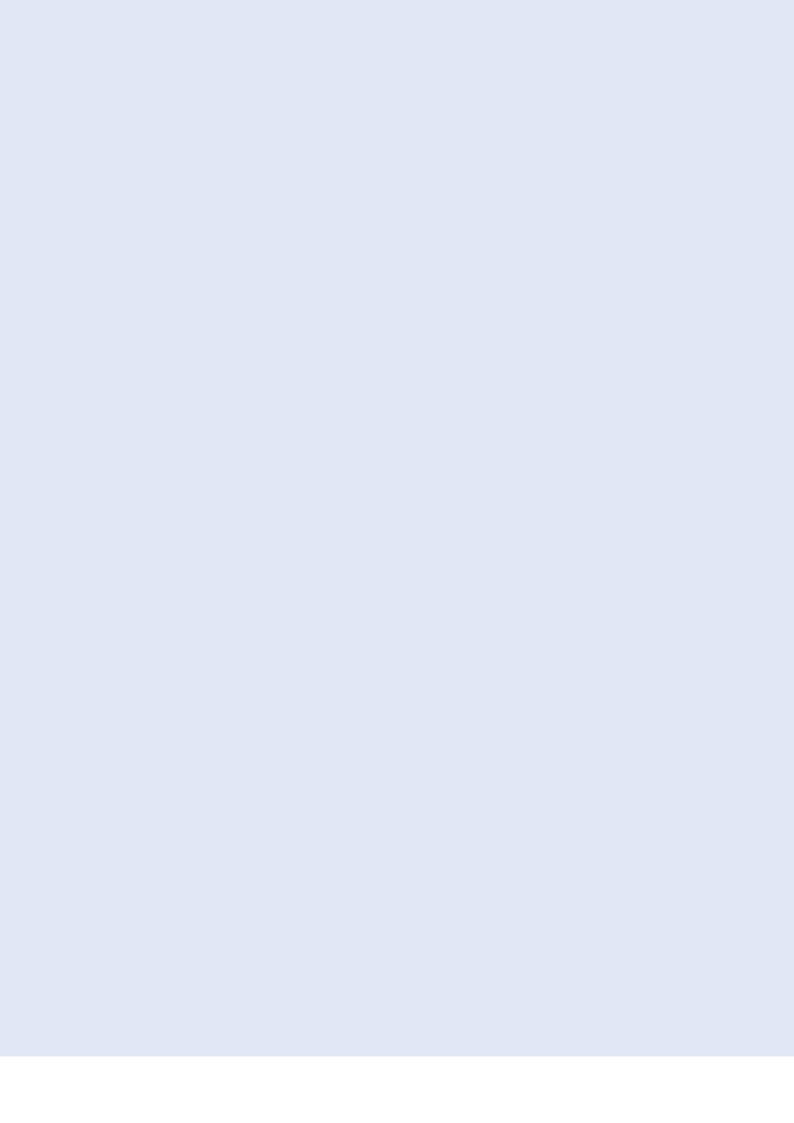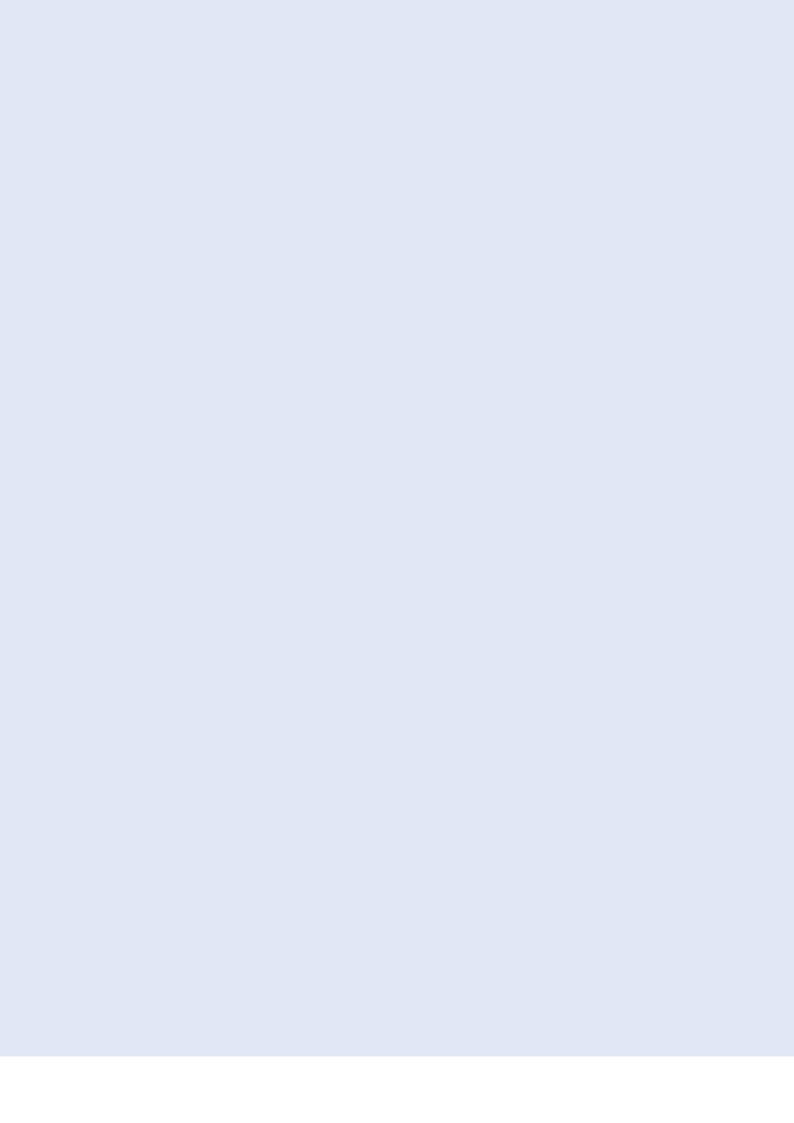
GARP

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 2010 FRM Practice Exams I and II have been developed to aid candidates in their preparation for the FRM Examination in November 2010. These practice exams are based on a sample of questions from the 2009 FRM Examination and are representative of the questions that will be in the 2010 FRM Examination. Wherever necessary and possible, questions, answers and references have been updated to better reflect the topics and core readings listed in the *2010 FRM Examination Study Guide*.

The 2010 FRM Practice Exam I for Part I and the 2010 FRM Practice Exam II for Part II each contain 40 multiple-choice questions. Note that the 2010 FRM Examination will consist of a morning and afternoon session, each containing 70 multiple-choice questions. The practice exams were designed to be shorter to allow candidates to calibrate their preparedness without being overwhelming.

The 2010 FRM Practice Exam for Part I does not necessarily cover all topics to be tested in the 2010 FRM Examination. For a complete list of topics and core readings, candidates should refer to the *2010 FRM Examination Study Guide*. 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

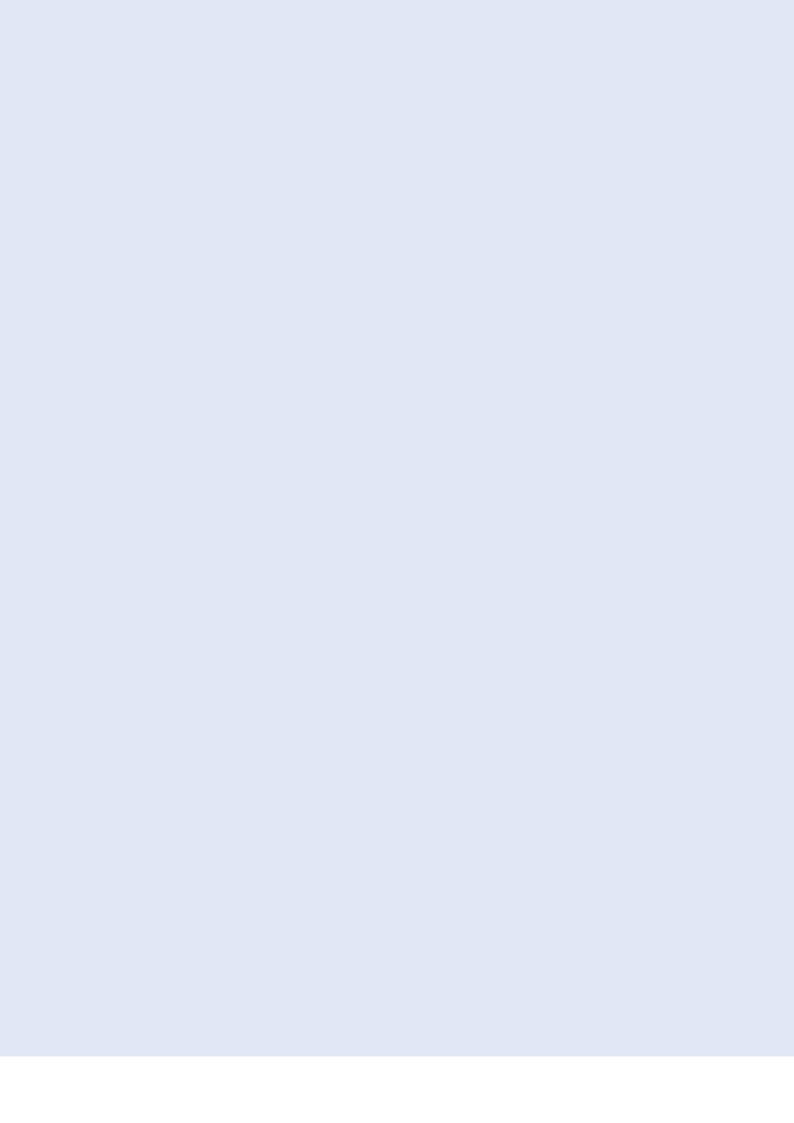To maximize the effectiveness of the practice exams, candidates are encouraged to follow these recommendations:

1. Plan a date and time to take each practice exam. Set dates appropriately to give sufficient study/review time for the practice exam and 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) calculator or a Hewlett Packard 12C (including the HP 12C Platinum) 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.
   - Pass/fail status for the actual exam is based on the distribution of scores from all candidates, so use your scores only to gauge your own progress and preparedness.

Financial Risk Manager (FRM®) Examination

2010 Practice Exam

PART I

2010 FRM PRACTICE EXAM PART I: ANSWER SHEET

	a.	b.	c.	d.		a.	b.	c.	d.
1.	○	○	○	○	23.	○	○	○	○
2.	○	○	○	○	24.	○	○	○	○
3.	○	○	○	○	25.	○	○	○	○
4.	○	○	○	○	26.	○	○	○	○
5.	○	○	○	○	27.	○	○	○	○
6.	○	○	○	○	28.	○	○	○	○
7.	○	○	○	○	29.	○	○	○	○
8.	○	○	○	○	30.	○	○	○	○
9.	○	○	○	○	31.	○	○	○	○
10.	○	○	○	○	32.	○	○	○	○
11.	○	○	○	○	33.	○	○	○	○
12.	○	○	○	○	34.	○	○	○	○
13.	○	○	○	○	35.	○	○	○	○
14.	○	○	○	○	36.	○	○	○	○
15.	○	○	○	○	37.	○	○	○	○
16.	○	○	○	○	38.	○	○	○	○
17.	○	○	○	○	39.	○	○	○	○
18.	○	○	○	○	40.	○	○	○	○
19.	○	○	○	○					
20.	○	○	○	○					
21.	○	○	○	○					
22.	○	○	○	○					

Correct way to complete

1. ● ● ● ●

Wrong way to complete

1. ⊘ ⊖ ✓ ⊗

1. Which of the following statements about simulation is invalid?

    a. The historical simulation approach is a nonparametric method that makes no specific assumption about the distribution of asset returns.
    b. When simulating asset returns using Monte Carlo simulation, a sufficient number of trials must be used to ensure simulated returns are risk neutral.
    c. Bootstrapping is an effective simulation approach that naturally incorporates correlations between asset returns and non-normality of asset returns, but does not generally capture autocorrelation of asset returns.
    d. Monte Carlo simulation can be a valuable method for pricing derivatives and examining asset return scenarios.

2. Portfolio Q has a beta of 0.7 and an expected return of 12.8%. The market risk premium is 5.25%. The risk-free rate is 4.85%. Calculate Jensen's Alpha measure for Portfolio Q.

    a. 7.67%
    b. 2.70%
    c. 5.73%
    d. 4.27%

3. A corporation is faced with the decision to choose between the two following projects:

Project	Investment	Perpetual Annual Cash Flow	Cash Flow at Risk
A	100	20	50
B	80	55	200

    Assuming that there is no systematic risk and the projects are mutually exclusive, under what circumstances would project A be selected over project B?

    a. Project A should never be chosen because it requires a larger initial investment and generates lower perpetual annual cash flows.
    b. Project A could be preferred over Project B if Project A's cash flows are negatively correlated with the firm's existing cash flows while the cash flows of Project B are highly positively correlated with the firm's existing cash flows.
    c. Project A should be chosen if the opportunity cost of funds is low, and Project B should be chosen otherwise.
    d. Project A should be chosen if the net present value of the project is positive.

4.   If the lease rate of commodity A is less than the risk-free rate, what is the market structure of commodity A?

    a. Backwardation
    b. Contango
    c. Flat
    d. Inversion

5.   Sarah is a risk manager responsible for the fixed income portfolio of a large insurance company. The portfolio contains a 30-year zero coupon bond issued by the US Treasury (STRIPS) with a 5% yield. What is the bond's DV01?

    a. 0.0161
    b. 0.0665
    c. 0.0692
    d. 0.0694

6.   Currently, shares of ABC Corp. trade at USD 100. The monthly risk neutral probability of the price increasing by USD 10 is 30%, and the probability of the price decreasing by USD 10 is 70%. What are the mean and standard deviation of the price after 2 months if price changes on consecutive months are independent?

	Mean	Standard Deviation
a.	70	11.32
b.	70	12.96
c.	92	11.32
d.	92	12.96

7. Which of the following statements about the ordinary least squares regression model (or simple regression model) with one independent variable are correct?

    i.   In the ordinary least squares (OLS) model, the random error term is assumed to have zero mean and constant variance.

    ii.   In the OLS model, the variance of the independent variable is assumed to be positively correlated with the variance of the error term.

    iii. In the OLS model, it is assumed that the correlation between the dependent variable and the random error term is zero.

    iv. In the OLS model, the variance of the dependent variable is assumed to be constant.

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

8. 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 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

9. Which one of the following four statements about hypothesis testing holds true if the level of significance decreases from 5% to 1%?

    a. It becomes more difficult to reject a null hypothesis when it is actually true.
    b. The probability of making a type I error increases.
    c. The probability of making a type II error decreases.
    d. The failure to reject the null hypothesis when it is actually false decreases to 1%.

10. Mr. Black has been asked by a client to write a large put option on the S&P 500 index. The option has an exercise price and a maturity that are not available for options traded on exchanges. He, therefore, has to hedge the position dynamically. Which of the following statements about the risk of his position are not correct?

    a. He can make his portfolio delta neutral by shorting index futures contracts.
    b. There is a short position in an S&P 500 futures contract that will make his portfolio insensitive to both small and large moves in the S&P 500.
    c. A long position in a traded option on the S&P 500 will help hedge the volatility risk of the option he has written.
    d. To make his hedged portfolio gamma neutral, he needs to take positions in options as well as futures.

11. On March 13, 2008, William Tell, a fund manager for the Rossini fund, takes a short position in the March Treasury bond (T-bond) futures contract. He plans to deliver the cheapest-to-deliver Treasury bond with a coupon of 4.5% payable semi-annually on May 15 and November 15 (182 days between), a conversion factor of 1.3256, and a face value of USD 100,000. The delivery date is Friday, March 15 (121 days after November 15 coupon payment date). The settlement price for the cheapest-to-deliver Treasury bond on March 13 is 68 2/32. Which of the following is the best estimate of the invoice price?

    a. USD 90,118.87
    b. USD 91,719.53
    c. USD 92,367.75
    d. USD 95,619.47

12. The yield curve is upward sloping, and a portfolio manager has a long position in 10-year Treasury Notes funded through overnight repurchase agreements. The risk manager is concerned with the risk that market rates may increase further and reduce the market value of the position. What hedge could be put on to reduce the position's exposure to rising rates?

    a. Enter into a 10-year pay fixed and receive floating interest rate swap.
    b. Enter into a 10-year receive fixed and pay floating interest rate swap.
    c. Establish a long position in 10-year Treasury Note futures.
    d. Buy a call option on 10-year Treasury Note futures.

13. Jennifer Durrant is evaluating the existing risk management system of Silverman Asset Management. She is asked to match the following events to the corresponding type of risk. Identify each numbered event as a market risk, credit risk, operational risk, or legal risk event.

    Event
    1. Insufficient training leads to misuse of order management system.
    2. Credit spreads widen following recent bankruptcies.
    3. Option writer does not have the resources required to honor a contract.
    4. Credit swaps with counterparty cannot be netted because they originated in multiple jurisdictions.

    a. 1: legal risk, 2: credit risk, 3: operational risk, 4: credit risk
    b. 1: operational risk, 2: credit risk, 3: operational risk, 4: legal risk
    c. 1: operational risk, 2: market risk, 3: credit risk, 4: legal risk
    d. 1: operational risk, 2: market risk, 3: operational risk, 4: legal risk

14. Which one of the following four statements on models for estimating volatility is incorrect?

    a. In the RiskMetrics™ EWMA model, some positive weight is assigned to the long-run average variance rate.
    b. In the RiskMetrics™ EWMA model, the weights assigned to observations decrease exponentially as the observations become older.
    c. In the GARCH (1, 1) model, a positive weight is estimated for the long-run average variance rate.
    d. In the GARCH (1, 1) model, the weights estimated for observations decrease exponentially as the observations become older.

15. The table below gives the closing prices and yields of a particular liquid bond over the past few days.

Day	Price	Yield
Monday	106.3	4.25%
Tuesday	105.8	4.20%
Wednesday	106.1	4.23%

    What is the approximate duration of the bond?

    a. 18.8
    b. 9.4
    c. 4.7
    d. 1.9

16.

Bond	Yield	Maturity in Years	Standard Deviation of the Yield – Annual	Exposure
A	5%	2	5%	USD 25.00
B	3%	13	12%	USD 75.00

The correlation between the two returns is 0.25. From a risk management perspective, what is the gain from diversification for a VaR estimated at the 95% level for the next 10 days? Assume there are 250 trading days in a year.

a. 76,500
b. 283,000
c. 382,300
d. 1,413,000

17. Assume that a random variable follows a normal distribution with a mean of 100 and a standard deviation of 17.5. What is the probability that this random variable is between 82.5 and 135?

a. 68.0%
b. 81.9%
c. 82.8%
d. 95.0%

18. The following table gives the prices of two out of three US Treasury notes for settlement on August 30, 2008. All three notes will mature exactly one year later on August 30, 2009. Assume annual coupon payments and that all three bonds have the same coupon payment date.

Coupon	Price
2 7/8	98.40
4 1/2	?
6 1/4	101.30

Approximately what would be the price of the 4 1/2 US Treasury note?

a. 99.20
b. 99.40
c. 99.80
d. 100.20

19. A newly issued non-callable, fixed-rate bond with 30-year maturity carries a coupon rate of 5.5% and trades at par. Its duration is 15.33 years and its convexity is 321.03.Which of the following statements about this bond is true?

    a. If the bond were to start trading at a discount, its duration would decrease.
    b. If the bond were to start trading at a premium, its duration would decrease.
    c. If the bond were to start trading at a discount, its duration would not change.
    d. If the bond were to remain at par, its duration would increase as the bond aged.

20. 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 dollar VaR using the historical simulation method?

    a. USD 14.08mm
    b. USD 14.56mm
    c. USD 14.72mm
    d. USD 15.04mm

21. A market risk manager uses historical information on 1,000 days of profit/loss information to calculate a daily VaR at the 99th percentile, of USD 8 million. Loss observations beyond the 99th percentile are then used to estimate the conditional VaR. If the losses beyond the VaR level, in millions, are USD 9, USD 10, USD 11, USD 13, USD 15, USD 18, USD 21, USD 24, and USD 32, then what is the conditional VaR?

    a. USD 9 million
    b. USD 32 million
    c. USD 15 million
    d. USD 17 million

22. In looking at the frequency distribution of weekly crude oil price changes between 1984 and 2008, an analyst notices that the frequency distribution has a surprisingly large number of observations for extremely large positive price changes and a smaller number, but still a surprising one, of observations for extremely large negative price changes. The analyst provides you with the following statistical measures. Which measures would help you identify these characteristics of the frequency distribution?

    i.   Serial correlation of weekly price changes
    ii. Variance of weekly price changes
    iii. Skewness of weekly price changes
    iv. Kurtosis of weekly price changes

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

23. Let X and Y be two random variables representing the annual returns of two different portfolios. If E[X] = 3, E[Y] = 4 and E[XY] = 11, then what is Cov[X, Y]?

    a. -1
    b. 0
    c. 11
    d. 12

24. The current price of stock ABC is USD 42 and the call option with a strike at USD 44 is trading at USD 3. Expiration is in one year. The put option with the same exercise price and same expiration date is priced at USD 2. Assume that the annual risk-free rate is 10% and that there is a risk-free bond paying the risk-free rate that can be shorted costlessly. There are no transaction costs. Which of the following trading strategies will result in arbitrage profits?

    a. Long position in both the call option and the stock, and short position in the put option and risk-free bond.
    b. Long position in both the call option and the put option, and short position in the stock and risk-free bond.
    c. Long position in both the call option and risk-free bond, and short position in the stock and the put option.
    d. Long position in both the put option and the risk-free bond, and short position in the stock and the call option.

25. Nicholas is responsible for the asset and liability management of JerseyBeech Bank, a small retail bank with USD 300 million in interest-bearing assets that yield approximately 70 bp above LIBOR. The duration of the interest-bearing assets is 2.5 years. Due to the recent financial turmoil, the bank seeks to reduce potential negative impacts on earnings from adverse moves in interest rates. Thus, the bank decides to hedge 50% of its interest rate exposures using Treasury bond futures. Nicholas decides to use September T-bond futures that trade at 106-22 and will mature in three months; the cheapest-to-deliver bond associated with this contract is a 7-year, 10% coupon, with a current duration of 5 years. At the maturity of the futures contract, the duration of the bank's interest rate sensitive assets will not change; however, the duration of the cheapest-to-deliver bond will fall to 4.9.

How many contracts should Nicholas buy or sell?

- **a.** Buy 703 contracts.
- **b.** Sell 703 contracts.
- **c.** Buy 717 contracts.
- **d.** Sell 717 contracts.

26. Bonds issued by the XYZ Corp. are currently callable at par value and trade close to par. The bonds mature in 8 years and have a coupon of 8%. The yield on the XYZ bonds is 175 basis points over 8-year US Treasury securities, and the Treasury spot yield curve has a normal, rising shape. If the yield on bonds comparable to the XYZ bond decreases sharply, the XYZ bonds will most likely exhibit:

- **a.** negative convexity
- **b.** increasing modified duration
- **c.** increasing effective duration
- **d.** positive convexity

27. A risk analyst seeks to find out the credit-linked yield spread on a BB-rated, 2-year zero coupon bond issued by a multinational petroleum company. If the prevailing annual risk-free rate is 3%, the default rate for BB-rated bonds is 7% per year, and the loss given default is 60%, then the yield-to-maturity of the bond is:

- **a.** 2.57%
- **b.** 5.90%
- **c.** 7.45%
- **d.** 7.52%

28. Your supervisor is an expert in market and credit risk. He recruits you to manage the operational risk department. He would like to use VaR to measure the firm's operational risk and proposes that you use the same VaR framework previously developed for market and credit risk. Which of the following arguments is a valid argument for why it is difficult to estimate an operational VaR using the same framework as market and credit VaR?

    a. Market risk events are easier to map to risk factors than operational risk events.
    b. Quantitative methods for estimating operational risk VaR do not exist.
    c. Market and credit VaRs are estimated using only a frequency distribution, but operational VaR is estimated using both a frequency distribution and a severity distribution.
    d. Monte Carlo techniques cannot be used for an operational risk VaR because the underlying risk factors are not normally distributed.

29. One of the traders whose risk you monitor put on a carry trade where he borrows in yen and invests in some emerging market bonds whose performance is independent of yen. Which of the following risks should you not worry about?

    a. Unexpected devaluation of the yen.
    b. A currency crisis in one of the emerging markets the trader invests in.
    c. Unexpected downgrading of the sovereign rating of a country in which the trader invests.
    d. Possible contagion to emerging markets of a credit crisis in a major country.

30. John Flag, the manager of a USD 150 million distressed bond portfolio, conducts stress tests on the portfolio. The portfolio's annualized return is 12%, with an annualized return volatility of 25%. In the last two years, the portfolio encountered several days when the daily value change of the portfolio was more than 3 standard deviations. If the portfolio suffered a 4-sigma daily event, which of the following is the best estimate of the change in the value of this portfolio? Assume that there are 250 trading days in a year.

    a. USD 9.48 million
    b. USD 23.70 million
    c. USD 37.50 million
    d. USD 150 million

31. The current spot price of cotton is USD 0.7409 per pound. The cost of storing and insuring cotton is USD 0.0042 per pound per month payable at the beginning of every month. The risk-free rate is 5%. A 3-month forward contract trades at USD 0.7415 per pound. If there is an arbitrage opportunity, how would you capitalize on it to make a profit? Assume there are no restrictions on short selling cotton.

i.   short the futures contract
ii. borrow at the risk-free rate
iii. buy cotton at the spot price
iv. go long in the futures contract
v.   invest at the risk-free rate
vi. sell cotton at the spot price

a. There is no arbitrage opportunity here.
b. The arbitrage opportunity involves i, ii, and iii.
c. The arbitrage opportunity involves iv, v, and vi.
d. The arbitrage opportunity involves ii, iv, and vi.

32. There are many reasons why risk management increases shareholder wealth. Which of the following risk management policies is least likely to increase shareholder wealth?

a. Hedging strategies to lower the probability of financial distress and bankruptcy.
b. Risk management policies designed to reduce the probability of debt overhang.
c. Well-designed compensation structure for managers that sets incentives for managers to take appropriate risks.
d. Risk management policies designed to eliminate projects with high volatility.

33. In late 1993, Metallgesellschaft reported losses of approximately USD 1.5 billion in connection with the implementation of a hedging strategy in the oil futures market. In 1992, the company had begun a new strategy to sell petroleum to independent retailers, on a monthly basis, at fixed prices above the prevailing market price for periods of up to 5 and even 10 years. At the same time, Metallgesellschaft implemented a hedging strategy using a large number of short-term derivative contracts such as swaps and futures on crude oil, heating oil, and gasoline on several exchanges and markets. Its approach was to buy on the derivatives market exposure to one barrel of oil for each barrel it had committed to deliver. Because of its choice of a hedge ratio, the company suffered significant losses with its hedging strategy when oil market conditions abruptly changed to:

    a. Contango, which occurs when the futures price is above the spot price.
    b. Contango, which occurs when the futures price is below the spot price.
    c. Normal backwardation, which occurs when the futures price is above the spot price.
    d. Normal backwardation, which occurs when the futures price is below the spot price.

34. The current share price and daily volatility of a stock are USD 10 and 2%, respectively. Using the delta-normal approximation, the 95% VaR on a long at-the-money call on this stock over a one-day holding period is:

    a. USD 0.1645
    b. USD 0.3290
    c. USD 1.645
    d. USD 16.45

35. In country X, the probability that a letter sent through the postal system reaches its destination is 2/3. Assume that each postal delivery is independent of every other postal delivery, and assume that if a wife receives a letter from her husband, she will certainly mail a response to her husband. Suppose a man in country X mails a letter to his wife (also in country X) through the postal system. If the man does not receive a response letter from his wife, what is the probability that his wife received his letter?

    a. 1/3
    b. 3/5
    c. 2/3
    d. 2/5

36. Basis risk is a common problem faced by hedgers because the underlying and the hedging instrument may not always move in perfect correlation. Which of the following strategies has the least basis risk?

    a. Straddle strategy
    b. Hedging individual equities using index futures
    c. Stack and roll strategy
    d. Delta hedging strategy

37. Which one of the following four trading strategies limits the investor's upside potential and downside risk?

    a. A long position in a put combined with a long position in a stock.
    b. A short position in a put combined with a short position in a stock.
    c. Buying a call option on a stock with a certain strike price and selling a call option on the same stock with a higher strike price and the same expiration date.
    d. Buying a call and a put with the same strike price and expiration date.

38. Which of the following statements are correct about the early exercise of American options?

    i.   It is never optimal to exercise an American call option on a non-dividend-paying stock before the expiration date.
    ii. It can be optimal to exercise an American put option on a non-dividend-paying stock early.
    iii. It can be optimal to exercise an American call option on a non-dividend-paying stock early.
    iv. It is never optimal to exercise an American put option on a non-dividend-paying stock before the expiration date.

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

39. In 2006, UBS reported no exceedences on its daily 99% VaR. In 2007, UBS reported 29 exceedances. To test whether the VaR was biased, you consider using a binomial test. Assuming no serial correlation, 250 trading days, and an accurate VaR measure, you calculate the probability of observing n exceedances, for n = 0, 1, . . .

n	Prob(observing n exceedances)	n	Prob(observing n exceedances)
0	7.9%	5	6.8%
1	20.2%	6	2.8%
2	25.6%	7	1.0%
3	21.6%	8	0.3%
4	13.6%	9	0.1%

Which of the following statements is not correct?

a. At the 5% probability level, you cannot reject that the VaR was unbiased in 2006 using a binomial test.

b. The lack of exceedances in 2006 demonstrates that UBS failed to take into account the existence of fat tails in estimating the distribution of its market risk.

c. It is difficult to evaluate the implications of the lack of exceedances if the VaR is forecasted for a static portfolio and it is compared against the trading P&L.

d. At the 5% probability level, you can reject that the VaR was unbiased in 2007 using a binomial test.

40. An asset manager analyzes a position consisting of a put option sold on an underlying asset, which is a hedge fund pursuing a fixed income strategy. This hedge fund, which the asset manager does not own, reports daily returns to the asset manager. Due to the credit crisis, return volatility of the hedge fund has been increasing, which makes the manager nervous about the short option position. When the asset manager entered this trade, he set a guideline limiting the 95% 1-day VaR exposure of this trade to 1.0% of the fund's NAV. Assuming the hedge fund returns are normally distributed and that there are 250 trading days per year, what is the lowest level of annualized return volatility that exceeds the guideline?

a. Any volatility over 6%

b. Any volatility over 7%

c. Any volatility over 8%

d. Any volatility over 10%

2010 ERP PRACTICE EXAM PART I: CORRECT ANSWER SHEET

	a.	b.	c.	d.		a.	b.	c.	d.
1.	○	●	○	○	23.	●	○	○	○
2.	○	○	○	●	24.	○	○	●	○
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8.	○	●	○	○	30.	●	○	○	○
9.	●	○	○	○	31.	○	○	●	○
10.	○	●	○	○	32.	○	○	○	●
11.	○	●	○	○	33.	●	○	○	○
12.	●	○	○	○	34.	●	○	○	○
13.	○	○	●	○	35.	○	○	○	●
14.	●	○	○	○	36.	●	○	○	○
15.	○	●	○	○	37.	○	○	●	○
16.	○	●	○	○	38.	●	○	○	○
17.	○	●	○	○	39.	○	●	○	○
18.	○	○	●	○	40.	○	○	○	●
19.	●	○	○	○					
20.	○	●	○	○					
21.	○	○	○	●					
22.	○	○	●	○					

Correct way to complete

1. ● ● ● ●

Wrong way to complete

1. ⊘ ⊖ ✓ ✗

Financial Risk Manager (FRM®) Examination

2010 Practice Exam Answers and Explanations

PART I

1. Which of the following statements about simulation is invalid?

a. The historical simulation approach is a nonparametric method that makes no specific assumption about the distribution of asset returns.

b. When simulating asset returns using Monte Carlo simulation, a sufficient number of trials must be used to ensure simulated returns are risk neutral.

c. Bootstrapping is an effective simulation approach that naturally incorporates correlations between asset returns and non-normality of asset returns, but does not generally capture autocorrelation of asset returns.

d. Monte Carlo simulation can be a valuable method for pricing derivatives and examining asset return scenarios.

Answer: **b**

Explanation: Risk neutrality has nothing to do with sample size.

Topic: Quantitative Analysis
Subtopic: Simulation methods.
Reference: Jorion, chapter 12.

2. Portfolio Q has a beta of 0.7 and an expected return of 12.8%. The market risk premium is 5.25%. The risk-free rate is 4.85%. Calculate Jensen's Alpha measure for Portfolio Q.

a. 7.67%
b. 2.70%
c. 5.73%
d. 4.27%

Answer: **d**

Explanation: Jensen's alpha is defined by:
$E(R_P) - RF = \alpha_P + \beta_P(E(R_M) - RF)$ $\alpha_P = E(R_P) - RF - \beta_P(E(R_M) - RF) = 0.128 - 0.0485 - 0.7 * (0.0525 + 0.0485 - 0.0485) = 0.0427$
a. Incorrect. Forgets to subtract the risk-free rate for the excess market return.
b. Incorrect. Forgets to multiply the excess market return by beta.
c. Incorrect. Forgets to subtract the risk-free rate for both the excess market return and the excess portfolio return.
d. Correct.

Topic: Foundation of Risk Management
Subtopic: Market efficiency, equilibrium and CAPM.
Reference: Amenc and LeSourd, Chapter 4.

3. A corporation is faced with the decision to choose between the two following projects:

Project	Investment	Perpetual Annual Cash Flow	Cash Flow at Risk
A	100	20	50
B	80	55	200

Assuming that there is no systematic risk and the projects are mutually exclusive, under what circumstances would project A be selected over project B?

a. Project A should never be chosen because it requires a larger initial investment and generates lower perpetual annual cash flows.

b. Project A could be preferred over Project B if Project A's cash flows are negatively correlated with the firm's existing cash flows while the cash flows of Project B are highly positively correlated with the firm's existing cash flows.

c. Project A should be chosen if the opportunity cost of funds is low, and Project B should be chosen otherwise.

d. Project A should be chosen if the net present value of the project is positive.

Answer: **b**

Explanation: Project A should be chosen only if the cash flow at risk of the project has low or negative correlation with the other projects the company currently has or plans. The overall cash flow position of the firm has to be evaluated as a result.

Topic: Foundations of Risk Management
Subtopic: Creating value with risk management
Reference: Stulz, chapter 3

4. If the lease rate of commodity A is less than the risk-free rate, what is the market structure of commodity A?

    a. Backwardation
    b. Contango
    c. Flat
    d. Inversion

Answer: **b**

Explanation:
1. Contango occurs when futures prices are higher than current spot, so in this case the risk-free rate is greater than the lease rate.
2. Backwardation occurs when futures prices are less than spot, so in this case the lease rate is greater than risk-free rate. So, if the lease rate is less than the risk-free rate, the futures price is above the current spot price.

Topic: Financial Markets and Products
Subtopic: Derivatives on commodities
Reference: MacDonald, Chapter 6

5. Sarah is a risk manager responsible for the fixed income portfolio of a large insurance company. The portfolio contains a 30-year zero coupon bond issued by the US Treasury (STRIPS) with a 5% yield. What is the bond's DV01?

    a. 0.0161
    b. 0.0665
    c. 0.0692
    d. 0.0694

Answer: **b**

Explanation: The DV01 of a zero-coupon is
$$DV01 = 30 / 100 \ (1 + y/2)^{2T+1} \ 100 \ (1 + 5\%/2)^{61} = 0.0665$$

Topic: Valuation and Risk Models
Subtopic: DV01, duration and convexit
Reference: Tuckman, Chapter 5

6. Currently, shares of ABC Corp. trade at USD 100. The monthly risk neutral probability of the price increasing by USD 10 is 30%, and the probability of the price decreasing by USD 10 is 70%. What are the mean and standard deviation of the price after 2 months if price changes on consecutive months are independent?

	Mean	Standard Deviation
a.	70	11.32
b.	70	12.96
c.	92	11.32
d.	92	12.96

Answer: **d**

Explanation: Develop a 2 step tree.
Mean = 9% (120) + 42% (100) + 49% (80) = 92
Variance = 9% $(120 - 92)^2$ + 42% $(100 - 92)^2$ + 49% $(80 - 92)^2$ = 168
Thus, standard deviation = 12.96

Topic: Valuation and Risk Models
Subtopic: Binomial Trees
Reference: John C. Hull, Options, Futures, and Other Derivatives, 6th Edition (New York: Prentice Hall, 2006).

7. Which of the following statements about the ordinary least squares regression model (or simple regression model) with one independent variable are correct?

 i. In the ordinary least squares (OLS) model, the random error term is assumed to have zero mean and constant variance.
 ii. In the OLS model, the variance of the independent variable is assumed to be positively correlated with the variance of the error term.
 iii. In the OLS model, it is assumed that the correlation between the dependent variable and the random error term is zero.
 iv. In the OLS model, the variance of the dependent variable is assumed to be constant.

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

 Answer: **c**

Explanation:
i. Is correct. In Simple Linear Regression model, the random error term is assumed to be stationary. It means that the Variance of random error term must be constant, or by using another term: it is assumed that there is no heteroskedasticity in linear regression model.
ii. Is incorrect. In Simple Linear Regression model, the independent variable and the error term have constant variances.
iii. Is incorrect. The dependent variable is allowed to be correlated with the error term.
iv. Is correct. In Simple Linear Regression model, the variance of the dependent variable is assumed to be constant. Thus, the correct option is option C.

Topic: Quantitative Analysis.
Subtopic: Linear regression.
Reference: Gujarati, chapter 7, pp. 140-145.

8.   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 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

Answer: **b**

Explanation:
a.   is incorrect. The denominator of the z-test statistic is standard error instead of standard deviation. If the denominator takes the value of standard deviation 4.5, instead of standard error 4.5/sqrt(81), the z-test statistic computed will be z = 0.29, which is incorrect.
b.   is correct. The population variance is known and the sample size is large (>30). The test statistics is: z = (46.3-45)/(4.5/(sqrt(81)) = 2.60. Decision rule: reject Ho if zcomputed > zcritical. Therefore, reject the null hypothesis because the computed test statistics of 2.60 exceeds the critical z-value of 2.33.
c.   is incorrect because z-test (instead of t-test) should be used for sample size (81) >= 30
d.   is incorrect because z-test (instead of t-test) should be used for sample size (81) >= 30

Topic: Quantitative Analysis
Subtopic: Hypothesis testing
Reference: Damodar N. Gujarati, Essentials of Econometrics, 3rd ed., (New York: McGraw-Hill, 2006)

9. Which one of the following four statements about hypothesis testing holds true if the level of significance decreases from 5% to 1%?

    a. It becomes more difficult to reject a null hypothesis when it is actually true.
    b. The probability of making a type I error increases.
    c. The probability of making a type II error decreases.
    d. The failure to reject the null hypothesis when it is actually false decreases to 1%.

Answer: **a**

Explanation: Type I error: The rejection of the null hypothesis when it is actually true.
Type II error: The failure to reject the null hypothesis when it is actually false. The significance level is the probability of making a type I error.
a.   is correct. Decreasing the probability level makes it more difficult to reject the null when it is true.
b.   is incorrect. Decreases the probability of making a type I error.
c.   is incorrect. All else being equal, the decrease in the probability of making a Type I error comes at the cost of increasing the probability of making a Type II error.
d.   is incorrect. Increases the probability of making a Type II error, in other words, the probability of failing to reject the null hypothesis when it is actually false decreased

Topic: Quantitative Analysis
Subtopic: Hypothesis testing
Reference: Damodar N Gujarati, Essentials of Econometrics, 3rd Edition.

10. Mr. Black has been asked by a client to write a large put option on the S&P 500 index. The option has an exercise price and a maturity that are not available for options traded on exchanges. He, therefore, has to hedge the position dynamically. Which of the following statements about the risk of his position are not correct?

  a. He can make his portfolio delta neutral by shorting index futures contracts.
  b. There is a short position in an S&P 500 futures contract that will make his portfolio insensitive to both small and large moves in the S&P 500.
  c. A long position in a traded option on the S&P 500 will help hedge the volatility risk of the option he has written.
  d. To make his hedged portfolio gamma neutral, he needs to take positions in options as well as futures.

Answer: **b**

Explanation: The short index futures makes the portfolio delta neutral. It does not help with large moves, though.

Topic: Valuation and Risk Models
Subtopic: Greeks
Reference: Hull, Chapter 17.

11. On March 13, 2008, William Tell, a fund manager for the Rossini fund, takes a short position in the March Treasury bond (T-bond) futures contract. He plans to deliver the cheapest-to-deliver Treasury bond with a coupon of 4.5% payable semiannually on May 15 and November 15 (182 days between), a conversion factor of 1.3256, and a face value of USD 100,000. The delivery date is Friday, March 15 (121 days after November 15 coupon payment date). The settlement price for the cheapest-to-deliver Treasury bond on March 13 is 68 2/32. Which of the following is the best estimate of the invoice price?

    a. USD 90,118.87
    b. USD 91,719.53
    c. USD 92,367.75
    d. USD 95,619.47

Answer: **b**

The invoice is based on a settlement price of 68 2/32 or 68.0625. The accrued interest is calculated on the basis of the number of days since the last coupon payment date, November 15, and the delivery date, March 15. That is 121. During the current six-month period between coupon payment dates, November 15 to May 15, there are 182 days. Thus the accrued interest on USD 100,000 face value of the bond is 121/182 * USD 100,000 * 0.045/2 = USD 1,495.88

Explanation: The invoice price is USD 100,000 * 0.680625 * 1.3256 + USD 1,495.88 = 91,719.53

Topic: Financial Markets and Products
Subtopic: Cheapest to deliver bond, conversion factors
Reference: Bruce Tuckman, Fixed Income Securities, 2nd Edition.

12. The yield curve is upward sloping, and a portfolio manager has a long position in 10-year Treasury Notes funded through overnight repurchase agreements. The risk manager is concerned with the risk that market rates may increase further and reduce the market value of the position. What hedge could be put on to reduce the position's exposure to rising rates?

   a. Enter into a 10-year pay fixed and receive floating interest rate swap.
   b. Enter into a 10-year receive fixed and pay floating interest rate swap.
   c. Establish a long position in 10-year Treasury Note futures.
   d. Buy a call option on 10-year Treasury Note futures.

   Answer: **a**

Explanation:
a.   is correct. An increase in rates will increase the value of the hedge position and offset the loss in value from the Bond position.
b.   is incorrect. An increase in rates will decrease the value of the hedge position and add to the loss in value from the Bond position.
c.   is incorrect. An increase in rates will decrease the value of the futures position and add to the loss in value from the Bond position.
d.   is incorrect. An increase in rates (all else equal), will decrease the value of the call option and add to the loss in value from the Bond position.

Topic: Financial Markets and Products
Subtopic: Futures, forwards, swaps and options
Reference: John Hull, Options, Futures, and Other Derivatives, 6th Edition (New York: Prentice Hall, 2006) Chapter 7 – Swaps

13. Jennifer Durrant is evaluating the existing risk management system of Silverman Asset Management. She is asked to match the following events to the corresponding type of risk. Identify each numbered event as a market risk, credit risk, operational risk, or legal risk event.

Event
1. Insufficient training leads to misuse of order management system.
2. Credit spreads widen following recent bankruptcies.
3. Option writer does not have the resources required to honor a contract.
4. Credit swaps with counterparty cannot be netted because they originated in multiple jurisdictions.

   a. 1: legal risk, 2: credit risk, 3: operational risk, 4: credit risk
   b. 1: operational risk, 2: credit risk, 3: operational risk, 4: legal risk
   c. 1: operational risk, 2: market risk, 3: credit risk, 4: legal risk
   d. 1: operational risk, 2: market risk, 3: operational risk, 4: legal risk

   Answer: **c**

Explanation: a, b and d are incorrect. c is correct.
1. Insufficient training leads to misuse of order management system is an example of operational risk.
2. Widening of credit spreads represents an increase in market risk.
3. An option writer not honoring the obligation in a contract is a credit risk event.
4. When a contract is originated in multiple jurisdictions leading to problems with enforceability, there is legal risk.

Topic: Foundations of Risk Management
Subtopic: Creating value with risk management, risk management failures
Reference: Jorion, "Value at Risk", Chapter 1

14. Which one of the following four statements on models for estimating volatility is incorrect?

    a. In the RiskMetrics™ EWMA model, some positive weight is assigned to the long-run average variance rate.

    b. In the RiskMetrics™ EWMA model, the weights assigned to observations decrease exponentially as the observations become older.

    c. In the GARCH (1, 1) model, a positive weight is estimated for the long-run average variance rate.

    d. In the GARCH (1, 1) model, the weights estimated for observations decrease exponentially as the observations become older.

Answer: **a**

Explanation:

a.   is incorrect. The RiskMetrics model does not involve the long-run average variance rate in updating volatility, in other words, the weight assigned to the long-run average variance rate is zero.

b.   is correct. In the RiskMetrics model, the weights assigned to observations decrease exponentially as the observations become older.

c.   is correct. In the GARCH (1, 1) model, some positive weight is assigned to the long-run average variance rate.

d.   is correct. In the GARCH (1, 1) model, the weights assigned to observations decrease exponentially as the observations become older.

Topic: Quantitative Analysis
Subtopic: EWMA, GARCH models
Reference: Hull, Chapter 21.

15.   The table below gives the closing prices and yields of a particular liquid bond over the past few days.

Day	Price	Yield
Monday	106.3	4.25%
Tuesday	105.8	4.20%
Wednesday	106.1	4.23%

What is the approximate duration of the bond?

a.   18.8
b.   9.4
c.   4.7
d.   1.9

Answer: **b**

Explanation: The duration can be approximated from the price changes.
$(106.3 - 105.8)/106.3/.0005 = 9.4$
$(106.3 - 106.1)/106.3/.0002 = 9.4$

Topic: Valuation and Risk Models
Subtopic: DV01, duration and convexity
Reference: Tuckman, chapter 5

16.

Bond	Yield	Maturity in Years	Standard Deviation of the Yield – Annual	Exposure
A	5%	2	5%	USD 25.00
B	3%	13	12%	USD 75.00

The correlation between the two returns is 0.25. From a risk management perspective, what is the gain from diversification for a VaR estimated at the 95% level for the next 10 days? Assume there are 250 trading days in a year.

a. 76,500
b. 283,000
c. 382,300
d. 1,413,000

Answer: **b**

Explanation:
1. Calculate the undiversified VaR
   VaR_{undiv} = 1.645 * 5%*√(10/250) * 25 + 1.645 * 12% √10/250 *75 = 0.4113 + 2.9610 = 3.3723
2. Calculate the diversified VaR
   1.645 √0.25 ^{2} * 5% ^{2} + 0.75 2 * 12% + 2 * 0.25 * 0.75 * 5% * 12% * 0.25 * √(10/250) * 100 = 1.645 * 0.0939 * √10/250 * 100 = 3.0893
3. Difference is 0.283

Topic: Valuation and Risk Models
Subtopic: VaR for fixed income securities
Reference: Allen, Boudoukh, Saunders, Understanding market, Credit and Operational Risk: The Value at Risk Approach, Chapters 2, 3

17. Assume that a random variable follows a normal distribution with a mean of 100 and a standard deviation of 17.5. What is the probability that this random variable is between 82.5 and 135?

    a. 68.0%
    b. 81.9%
    c. 82.8%
    d. 95.0%

Answer: **b**

Explanation:
Prob $(-1*\sigma < X < 2*\sigma) = (1 - 0.0228) - 0.1587 = 0.8185$

a.   is incorrect. Almost 68% of the observations will be within the interval from one standard deviations below the mean to one standard deviations above the mean, which is within the interval [100 − 17.5; 100 + 17.5].

b.   is correct. 82.5 = 100 − 17.5 and 135 = 100 + 2 * 17.5. So, the percentage is 34% on the left hand side of the mean, plus 95%/2 on the right hand side of the mean.

c.   is incorrect. Almost 95% of the items will lie within the interval from two standard deviations below the means to two standard deviations above the mean, that is within the interval [100 − 2 *17.5;100 + 2 * 17.5].

d.   is incorrect. This answer assumes wrongly that 97.5% of the observations will be within [100 − 2 * 17.5;100 + 2 * 17.5].

Topic: Quantitative analysis
Subtopic: Probability Distributions
Reference: Damodar N Gujarati, Essentials of Econometrics, 3rd Edition (New York: McGraw-Hill, 2006), chapter 4, pp. 80-84.

18. The following table gives the prices of two out of three US Treasury notes for settlement on August 30, 2008. All three notes will mature exactly one year later on August 30, 2009. Assume annual coupon payments and that all three bonds have the same coupon payment date.

Coupon	Price
2 7/8	98.40
4 1/2	?
6 1/4	101.30

Approximately what would be the price of the 4 1/2 US Treasury note?

a. 99.20
b. 99.40
c. 99.80
d. 100.20

Answer: **c**

Explanation: $2.875\% * x + 6.25\% * (1 - x) = 4.5\%$ X = 52%
The portfolio that has cash flows identical to the 4 1/2 bond consists of 52% of the 2 7/8 and 48% of the 6 1/4 bonds. As this portfolio has cash flows identical to the 4 1/2 bond, precluding arbitrage, the price of the portfolio should equal to 52% * 98.4 + 48% * 101.30 or 99.80

Topic: Valuation and Risk Models
Subtopic: Bond prices, spot rates, forward rates
Reference: Tuckman, Chapter 1

19. A newly issued non-callable, fixed-rate bond with 30-year maturity carries a coupon rate of 5.5% and trades at par. Its duration is 15.33 years and its convexity is 321.03.Which of the following statements about this bond is true?

   a. If the bond were to start trading at a discount, its duration would decrease.
   b. If the bond were to start trading at a premium, its duration would decrease.
   c. If the bond were to start trading at a discount, its duration would not change.
   d. If the bond were to remain at par, its duration would increase as the bond aged.

   Answer: **a**

Explanation:
a. is correct. At higher interest rates, the bond/price relationship is closer to linear than it is when rates are low. So, the new duration would be lower than 15. Alternatively, one can think of duration as a weighted average of the times when cash flows are made, where the weights are the percentage of the total value of the bond. When rates rise, the present values associated with the later payments are relatively smaller and the duration falls.
b. is incorrect because it is the exact opposite of a, the correct answer.
c. is incorrect. It fails to recognize the logic stated in a.
d. is incorrect because duration is mainly a function of duration and, all else constant, duration would decrease as the bond's maturity shortened.

Topic: Valuation and Risk Models
Subtopic: Duration and convexity
Reference: Bruce Tuckman, Fixed Income Securities, 2nd edition, Chapter 5

20. 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 dollar VaR using the historical simulation method?

    a. USD 14.08mm
    b. USD 14.56mm
    c. USD 14.72mm
    d. USD 15.04mm

Answer: **b**

Explanation: VaR = 1.82% * 800 = 14.56 million

Topic: Valuation and Risk Models
Subtopic: Value-at-Risk—Historic simulation
Reference: Allen, Boudoukh, Saunders: chapter 2,3.

21. A market risk manager uses historical information on 1,000 days of profit/loss information to calculate a daily VaR at the 99th percentile, of USD 8 million. Loss observations beyond the 99th percentile are then used to estimate the conditional VaR. If the losses beyond the VaR level, in millions, are USD 9, USD 10, USD 11, USD 13, USD 15, USD 18, USD 21, USD 24, and USD 32, then what is the conditional VaR?

    a. USD 9 million
    b. USD 32 million
    c. USD 15 million
    d. USD 17 million

Answer: **d**

Explanation:
a. is incorrect. This is the minimum.
b. is incorrect. This is the maximum.
c. is incorrect. This is the median.
d. is correct. Conditional VaR is the "mean" of the losses beyond the VaR level.

Topic: Valuation and Risk Models
Subtopic: Value-at-Risk—Definition and methods
Reference: Allen, Boudoukh, Saunders: chapter 2,3.

22. In looking at the frequency distribution of weekly crude oil price changes between 1984 and 2008, an analyst notices that the frequency distribution has a surprisingly large number of observations for extremely large positive price changes and a smaller number, but still a surprising one, of observations for extremely large negative price changes. The analyst provides you with the following statistical measures. Which measures would help you identify these characteristics of the frequency distribution?

i. Serial correlation of weekly price changes
ii. Variance of weekly price changes
iii. Skewness of weekly price changes
iv. Kurtosis of weekly price changes

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

Answer: **c**

Explanation: The question considers a skewed leptokurtic distribution. To measure the magnitude of these skewed tails, the analyst needs to consider both the skewness and kurtosis

Topic: Quantitative Analysis
Subtopic: Mean, standard deviation, skewness and kurtosis
Reference: Damodar N. Gujarati, Essentials of Econometrics, 3rd ed., (New York: McGraw-Hill, 2006) 3rd chapter

23. Let X and Y be two random variables representing the annual returns of two different portfolios. If E[X] = 3, E[Y] = 4 and E[XY] = 11, then what is Cov[X, Y]?

    a. -1
    b. 0
    c. 11
    d. 12

Answer: **a**

Explanation: We can rewrite Cov[X, Y] as E[XY] − E[X]E[Y]. Then, Cov[X, Y] = 11 − 3 * 4 = -1.
a.   is correct because the above formula was used correctly, E[XY] - E[X]E[Y].
b.   is incorrect because it assumes zero covariance, which is false when above the formula is used.
c.   is incorrect because the product of the 2 expectations of X and Y was not subtracted from the joint expectation E[XY].
d.   is incorrect because the covariance is not the product of the 2 expectations of X and Y.

Topic: Quantitative Analysis
Subtopic: Mean, standard deviation, skewness and kurtosis
Reference: Damodar N. Gujarati, Essentials of Econometrics, 3rd ed., (New York: McGraw-Hill, 2006) 3rd chapter, p. 59.

24. The current price of stock ABC is USD 42 and the call option with a strike at USD 44 is trading at USD 3. Expiration is in one year. The put option with the same exercise price and same expiration date is priced at USD 2. Assume that the annual risk-free rate is 10% and that there is a risk-free bond paying the risk-free rate that can be shorted costlessly. There are no transaction costs. Which of the following trading strategies will result in arbitrage profits?

    a. Long position in both the call option and the stock, and short position in the put option and risk-free bond.
    b. Long position in both the call option and the put option, and short position in the stock and risk-free bond.
    c. Long position in both the call option and risk-free bond, and short position in the stock and the put option.
    d. Long position in both the put option and the risk-free bond, and short position in the stock and the call option.

Answer: **c**

Explanation:
a.   is incorrect as this would not yield arbitrage profit
b.   is incorrect as this would not yield arbitrage profit
c.   is correct
    The put call parity relation is: stock + put = pv(strike) + call
    Therefore for no arbitrage opportunity the following relation should hold 42 + 2 = (44/1.10) + 3 But 44 > 43
    Therefore there is an arbitrage opportunity. The arbitrage profit is 44 − 43 = 1 by taking a long position in call and buying the risk-free bond and going short on the stock and the put.
d.   is incorrect as this would not yield arbitrage profit

Topic: Financial Markets and Products
Subtopic: Derivatives on equities
Reference: John Hull, Options, Futures and other Derivatives, Chapter 9

25. Nicholas is responsible for the asset and liability management of JerseyBeech Bank, a small retail bank with USD 300 million in interest-bearing assets that yield approximately 70 bp above LIBOR. The duration of the interest-bearing assets is 2.5 years. Due to the recent financial turmoil, the bank seeks to reduce potential negative impacts on earnings from adverse moves in interest rates. Thus, the bank decides to hedge 50% of its interest rate exposures using Treasury bond futures. Nicholas decides to use September T-bond futures that trade at 106-22 and will mature in three months; the cheapest-to-deliver bond associated with this contract is a 7-year, 10% coupon, with a current duration of 5 years. At the maturity of the futures contract, the duration of the bank's interest rate sensitive assets will not change; however, the duration of the cheapest-to-deliver bond will fall to 4.9.

    How many contracts should Nicholas buy or sell?

    a. Buy 703 contracts.
    b. Sell 703 contracts.
    c. Buy 717 contracts.
    d. Sell 717 contracts.

    Answer: **d**

Explanation: N = Exposure to hedge * Duration of assets to be hedged
Price of futures contract * Duration of futures contract = 150 mil * 2.5 = 375 mil = 375
717 contracts 106 22/32 * 0.1 mil * 4.9 106.6875 * 0.1 mil * 4.9 0.52276875
Since he is long in the asset, he should sell 717 contracts. The answer with 703 contracts comes from not using the duration at the maturity of the futures contract.

Topic: Financial Markets and Products
Subtopic: Futures, forwards, swaps and options
Reference: John Hull, Options, Futures, and Other Derivatives, 6th Edition (New York: Prentice Hall, 2006), Chapter 6 – Interest Rate Futures

26. Bonds issued by the XYZ Corp. are currently callable at par value and trade close to par. The bonds mature in 8 years and have a coupon of 8%. The yield on the XYZ bonds is 175 basis points over 8-year US Treasury securities, and the Treasury spot yield curve has a normal, rising shape. If the yield on bonds comparable to the XYZ bond decreases sharply, the XYZ bonds will most likely exhibit:

    a. negative convexity
    b. increasing modified duration
    c. increasing effective duration
    d. positive convexity

Answer: **a**

Explanation:
a.   is correct. As yields in the market declines, the probability that the call option will get exercised increases. The issuer will not necessarily exercise the call option as soon as the market yield drops below the coupon rate. Yet the value of the embedded call option increases causing the price to reduce relative to an otherwise comparable option free bond. This is negative convexity.
b.   is incorrect. Modified duration does not take into account the effect of embedded options.
c.   is incorrect. As the interest rates decline, the call option becomes more valuable therefore effective duration may decrease because the expected cash flows can decrease.
d.   is incorrect. When interest rates decline below the coupon rate, callable bonds show negative convexity.

Topic: Financial Markets and Products
Subtopic: Corporate bonds
Reference: Frank Fabozzi, The Handbook of Fixed Income Securities, 7th edition, Chapter 13.

27. A risk analyst seeks to find out the credit-linked yield spread on a BB-rated, 2-year zero coupon bond issued by a multinational petroleum company. If the prevailing annual risk-free rate is 3%, the default rate for BB-rated bonds is 7% per year, and the loss given default is 60%, then the yield-to-maturity of the bond is:

a. 2.57%
b. 5.90%
c. 7.45%
d. 7.52%

Answer: **c**

Explanation: The correct answer using the formula

$$(1 + r_{fr})^T = (1 + r*)^T \left[(1 - \pi)^T + f\left(1 - (1 - \pi)^T\right) \right]$$

$$(1 + 3\%)^2 = (1 + r*)^2 \left[(1 - 7\%)^2 + 40\%\left(1 - (1 - 7\%)^2\right) \right]$$

$$(1 + 3\%)^2 = (1 + r*)^2 \left[0.93^2 + 40\%\left(1 - (0.93)^2\right) \right]$$

$$(1 + r*)^2 = \frac{1.0609}{0.93^2 + 40\%\left(1 - (0.93)^2\right)} = \frac{1.0609}{0.8649 + 40\% * 0.1351}$$

$$(1 + r*)^2 = \frac{1.0609}{0.8649 + 40\% * 0.1351} = \frac{1.0609}{0.9189}$$

$$r* = \sqrt{\frac{1.0609}{0.9189}} - 1 = 7.45\%$$

a.   using r_{fr} instead of r*
b.   uses LGD instead of RR
c.   correct
d.   fails to adjust for time horizon (i.e, T = 1)

Topic: Valuation and Risk Models
Reference: Arnaud de Servigny and Olivier Renault, Measuring and Managing Credit Risk

28. Your supervisor is an expert in market and credit risk. He recruits you to manage the operational risk department. He would like to use VaR to measure the firm's operational risk and proposes that you use the same VaR framework previously developed for market and credit risk. Which of the following arguments is a valid argument for why it is difficult to estimate an operational VaR using the same framework as market and credit VaR?

    a. Market risk events are easier to map to risk factors than operational risk events.
    b. Quantitative methods for estimating operational risk VaR do not exist.
    c. Market and credit VaRs are estimated using only a frequency distribution, but operational VaR is estimated using both a frequency distribution and a severity distribution.
    d. Monte Carlo techniques cannot be used for an operational risk VaR because the underlying risk factors are not normally distributed.

    Answer: **a**

Explanation:
a.   is correct. Operational losses are not easy to map to risk factors.
b.   is incorrect. Operational VaR can be calculated.
c.   is incorrect. Operational VaR is calculated by both severity and frequency distribution.
d.   is incorrect. Monte Carlo techniques can be used for other distributions than the normal distribution.

Topic: Valuation and Risk Models
Subtopic: Applications of Var for market, credit and operational risks
Reference: Allen, Boudoukh, and Saunders, Understanding Market, Credit and Operational Risk, Chapter 5

29. One of the traders whose risk you monitor put on a carry trade where he borrows in yen and invests in some emerging market bonds whose performance is independent of yen. Which of the following risks should you not worry about?

    a. Unexpected devaluation of the yen.
    b. A currency crisis in one of the emerging markets the trader invests in.
    c. Unexpected downgrading of the sovereign rating of a country in which the trader invests.
    d. Possible contagion to emerging markets of a credit crisis in a major country.

    Answer: **a**

Explanation: A devaluation would result in a gain to the trader because he is short yen.

Topic: Financial Markets and Products
Subtopic: Foreign exchange risk
Reference: Saunders, Cornett, Financial Institutions Management: A Risk Management Approach, 6th Edition, Chapter 14.

30. John Flag, the manager of a USD 150 million distressed bond portfolio, conducts stress tests on the portfolio. The portfolio's annualized return is 12%, with an annualized return volatility of 25%. In the last two years, the portfolio encountered several days when the daily value change of the portfolio was more than 3 standard deviations. If the portfolio suffered a 4-sigma daily event, which of the following is the best estimate of the change in the value of this portfolio? Assume that there are 250 trading days in a year.

    a. USD 9.48 million
    b. USD 23.70 million
    c. USD 37.50 million
    d. USD 150 million

Answer: **a**

Explanation: Daily volatility is equal to 0.25 x $\sqrt{1/250}$ = 0.0158. A 4-sigma event therefore implies a loss equal to 4 x 0.0158 x 150 = 9,486,832.
b.   Calculates the daily volatility and multiplies the volatility with the value of the portfolio.
c.   Multiplies the portfolio value by its annual volatility, or divides the portfolio value by 4.
d.   Attempts the short-cut of reducing the portfolio value by 4 times 25%, which is 100%, i.e, the value of the portfolio.

Topic: Valuation and Risk Models
Subtopic: Stress testing and scenario analysis
Reference: Jorion, Value-at-Risk, 3rd edition, Chapter 14.

31. The current spot price of cotton is USD 0.7409 per pound. The cost of storing and insuring cotton is USD 0.0042 per pound per month payable at the beginning of every month. The risk-free rate is 5%. A 3-month forward contract trades at USD 0.7415 per pound. If there is an arbitrage opportunity, how would you capitalize on it to make a profit? Assume there are no restrictions on short selling cotton.

i.   short the futures contract
ii.   borrow at the risk-free rate
iii. buy cotton at the spot price
iv.   go long in the futures contract
v.   invest at the risk-free rate
vi.   sell cotton at the spot price

a. There is no arbitrage opportunity here.
b. The arbitrage opportunity involves i, ii, and iii.
c. The arbitrage opportunity involves iv, v, and vi.
d. The arbitrage opportunity involves ii, iv, and vi.

Answer: **c**

Explanation:
a.   is incorrect as there exists an arbitrage opportunity on account of price differentials.
b.   is incorrect. As the futures price is lower than the observed price (future spot price), you need to long the futures and not short it.
c.   is correct because such a strategy results in profit, as shown below.
      The future spot price is USD 0.7428: [0.7409 e 0.05 * (3/12)] + [0.0042 (1+0.05/12)3 + 0.0042 (1+0.05/12)2 + 0.0042 (1+0.05/12)] = 0.7301 + 0.0127 = USD 0.7428
      The futures price is USD 0.7415, which is lower than USD 0.7428. Hence you need to buy the futures, sell cotton spot and invest the funds in a risk-free bond so as to obtain a riskless profit of USD 0.0013 per pound.
d.   is incorrect because borrowing and buying cotton spot do not result in a profit.

Topic: Financial Markets and Products
Subtopic: Futures, forwards, swaps and options
Reference: John C. Hull, Options, Futures & Other Derivatives, 6th edition.

32. There are many reasons why risk management increases shareholder wealth. Which of the following risk management policies is least likely to increase shareholder wealth?

    a. Hedging strategies to lower the probability of financial distress and bankruptcy.
    b. Risk management policies designed to reduce the probability of debt overhang.
    c. Well-designed compensation structure for managers that sets incentives for managers to take appropriate risks.
    d. Risk management policies designed to eliminate projects with high volatility.

Answer: **d**

Explanation: The first three are examples of where risk management can increase firm value. The last one is invalid because reducing volatility per se could just eliminate projects with extremely high payoffs.

Topic: Foundations of Risk Management
Subtopic: Creating value with risk management
Reference: Stulz, Chapter 3.

33. In late 1993, Metallgesellschaft reported losses of approximately USD 1.5 billion in connection with the implementation of a hedging strategy in the oil futures market. In 1992, the company had begun a new strategy to sell petroleum to independent retailers, on a monthly basis, at fixed prices above the prevailing market price for periods of up to 5 and even 10 years. At the same time, Metallgesellschaft implemented a hedging strategy using a large number of short-term derivative contracts such as swaps and futures on crude oil, heating oil, and gasoline on several exchanges and markets. Its approach was to buy on the derivatives market exposure to one barrel of oil for each barrel it had committed to deliver. Because of its choice of a hedge ratio, the company suffered significant losses with its hedging strategy when oil market conditions abruptly changed to:

   a. Contango, which occurs when the futures price is above the spot price.
   b. Contango, which occurs when the futures price is below the spot price.
   c. Normal backwardation, which occurs when the futures price is above the spot price.
   d. Normal backwardation, which occurs when the futures price is below the spot price.

   Answer: **a**

Explanation: Oil prices fell in the fall of 1993 because of OPEC's problems adhering to its production quotas, so the market changed into one of contango so c and d are incorrect. In contango, the futures price is above the spot price and as a result Metallgesellchaft incurred losses on its short-dated long futures contracts so b is incorrect and a is correct.

Topic: Foundations of Risk Management
Subtopic: Case studies
Reference: Steven Allen, "Financial Risk Management: A practitioners Guide", Chapter 4 – Financial Disasters.

34. The current share price and daily volatility of a stock are USD 10 and 2%, respectively. Using the delta-normal approximation, the 95% VaR on a long at-the-money call on this stock over a one-day holding period is:

  a. USD 0.1645
  b. USD 0.3290
  c. USD 1.645
  d. USD 16.45

Answer: **a**

Explanation: This question requires candidates to know the formula for the delta-normal VaR approximation, and also to know that the delta of an at-the-money call is 0.5. VaR = 0.5 x 1.645 x 0.02 x 10 = 0.1645

a.   the correct answer.
b.   uses a delta of 1.
c.   confuses the decimal point.
d.   uses 2 instead of 2% for the volatility.

Topic: Valuation and Risk Models
Subtopic: Value-at-Risk—delta normal valuation
Reference: Jorion, Value-at-Risk, 3rd edition

35. In country X, the probability that a letter sent through the postal system reaches its destination is 2/3. Assume that each postal delivery is independent of every other postal delivery, and assume that if a wife receives a letter from her husband, she will certainly mail a response to her husband. Suppose a man in country X mails a letter to his wife (also in country X) through the postal system. If the man does not receive a response letter from his wife, what is the probability that his wife received his letter?

    a. 1/3
    b. 3/5
    c. 2/3
    d. 2/5

Answer: **d**

Explanation: A = Event that the wife receives the man's letter
B = Event that the man does not receive a response from his wife
We need to find $P(A|B)$. First, we know $P(A) = 2/3$. To get $P(B)$, note that there are three possible scenarios.
1. His letter does not get to his wife → probability is 1/3.
2. Her response letter does not get to him → 2/9 (= 2/3 * 1/3, probability that she gets his letter times the probability that her letter gets lost)
3. Her response letter does get to him → 4/9 (= 2/3 * 2/3, probability that she gets his letter times the probability that her letter gets to him).
   He does not receive a response in scenarios 1 and 2, so $P(B) = 5/9$
   Next, we also know $P(B|A) = 1/3$ (if she receives the letter, she responds and so he only does not get a response if the letter is lost which happens with probability 1/3)
   Then, by Bayes' rule, $P(A|B) = P(B|A) * P(A) / P(B) = (1/3) * (2/3) / (5/9) = 2/5$

Topic: Quantitative Analysis
Subtopic: Probability distributions
Reference: Damodar N Gujarati, Essentials of Econometrics, 3rd Edition

36. Basis risk is a common problem faced by hedgers because the underlying and the hedging instrument may not always move in perfect correlation. Which of the following strategies has the least basis risk?

   a. Straddle strategy
   b. Hedging individual equities using index futures
   c. Stack and roll strategy
   d. Delta hedging strategy

   Answer: **a**

Explanation: A straddle involves buying a call and a put for the same underlying at a given strike price. There is no basis risk. The other strategies have basis risk.

Topic: Financial Markets and Products
Subtopic: Futures, forwards, swaps and options
Reference: McDonald, chapter 6.

37. Which one of the following four trading strategies limits the investor's upside potential and downside risk?

   a. A long position in a put combined with a long position in a stock.
   b. A short position in a put combined with a short position in a stock.
   c. Buying a call option on a stock with a certain strike price and selling a call option on the same stock with a higher strike price and the same expiration date.
   d. Buying a call and a put with the same strike price and expiration date.

   Answer: **c**

Explanation: Long position in a put combined with long position in a stock could limit only the downside risk; A is incorrect. Short position in a put combined with short position in a stock could limit only the upside risk; B is incorrect. Buying a call option on a stock with a certain strike price and selling a call option on the same stock with a higher strike price and the same expiration date could limit both the upside and downside risk; C is correct. Buying a call and put with the same strike price and expiration date could limit only the downside risk; D is incorrect.

Topic: Financial Markets and Products
Subtopic: Derivatives on fixed-income securities, interest rates, foreign exchange, equities, and commodities
Reference: John Hull, Options, Futures, and Other Derivatives, 7th edition.

38. Which of the following statements are correct about the early exercise of American options?

i.   It is never optimal to exercise an American call option on a non-dividend-paying stock before the expiration date.
ii. It can be optimal to exercise an American put option on a non-dividend-paying stock early.
iii. It can be optimal to exercise an American call option on a non-dividend-paying stock early.
iv. It is never optimal to exercise an American put option on a non-dividend-paying stock before the expiration date.

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

Answer: **a**

Explanation: There are no advantages to exercising early if the investor plans to keep the stock for the remaining life of the call option, because the early exercise would sacrifice the interest that would be earned if the strike price is paid out later on expiration date after the early exercise, the investor may suffer the risk that the stock price will fall below the strike price as the stock pays no dividend, the early exercise will earn no income from the stock. So it is never optimal to exercise an American call option on a non-dividend-paying stock before the expiration date. At any given time during its life, a put option should always be exercised early if it is sufficiently deep in the money. So it can be optimal to exercise an American put option on a non-dividend-paying stock early. As a result, answer A is correct.

Topic: Financial Markets and Products
Subtopic: American Options, effects of dividends, early exercise
Reference: John Hull, Options, Futures, and Other Derivatives, 6th Edition, Chapter 9

39. In 2006, UBS reported no exceedences on its daily 99% VaR. In 2007, UBS reported 29 exceedances. To test whether the VaR was biased, you consider using a binomial test. Assuming no serial correlation, 250 trading days, and an accurate VaR measure, you calculate the probability of observing n exceedances, for n = 0, 1, . . .

n	Prob(observing n exceedances)	n	Prob(observing n exceedances)
0	7.9%	5	6.8%
1	20.2%	6	2.8%
2	25.6%	7	1.0%
3	21.6%	8	0.3%
4	13.6%	9	0.1%

Which of the following statements is not correct?

a. At the 5% probability level, you cannot reject that the VaR was unbiased in 2006 using a binomial test.
b. The lack of exceedances in 2006 demonstrates that UBS failed to take into account the existence of fat tails in estimating the distribution of its market risk.
c. It is difficult to evaluate the implications of the lack of exceedances if the VaR is forecasted for a static portfolio and it is compared against the trading P&L.
d. At the 5% probability level, you can reject that the VaR was unbiased in 2007 using a binomial test.

Answer: **b**

Explanation: A and D are correct. Using 250 days in a year, the binomial test rejects for 2006 at the 8% level and for 2006 at less than the 1% level. C is correct since the trading P&L includes intra-day trading as well as market-making income. B is wrong since exceedances alone tell us nothing about the existence of fat tails.

Topic: Valuation and Risk Models
Subtopic: Value-at-Risk definition and methods
Reference: Allen, Boudoukh, Saunders, Understanding Market, Credit and Operational Risk, chapters 2, 3.

40. An asset manager analyzes a position consisting of a put option sold on an underlying asset, which is a hedge fund pursuing a fixed income strategy. This hedge fund, which the asset manager does not own, reports daily returns to the asset manager. Due to the credit crisis, return volatility of the hedge fund has been increasing, which makes the manager nervous about the short option position. When the asset manager entered this trade, he set a guideline limiting the 95% 1-day VaR exposure of this trade to 1.0% of the fund's NAV. Assuming the hedge fund returns are normally distributed and that there are 250 trading days per year, what is the lowest level of annualized return volatility that exceeds the guideline?

    a. Any volatility over 6%
    b. Any volatility over 7%
    c. Any volatility over 8%
    d. Any volatility over 10%

Answer: **d**

Explanation: 95% 1-day VAR of the Fund should not exceed 1.0% on Fund's NAV
From this we can conclude that (assuming there are 250 trading days in the calendar year):
1-day VAR = 1.645 * Annualized Volatility * sqrt (1/250) * FundNAV < 1% * FundNAV
Therefore: Annualized Volatility < 1% * sqrt(250) / 1.645 Volatility < 9.61%
So the officer will be nervous if the volatility of the returns of the fund were to increase over 10% and not otherwise.

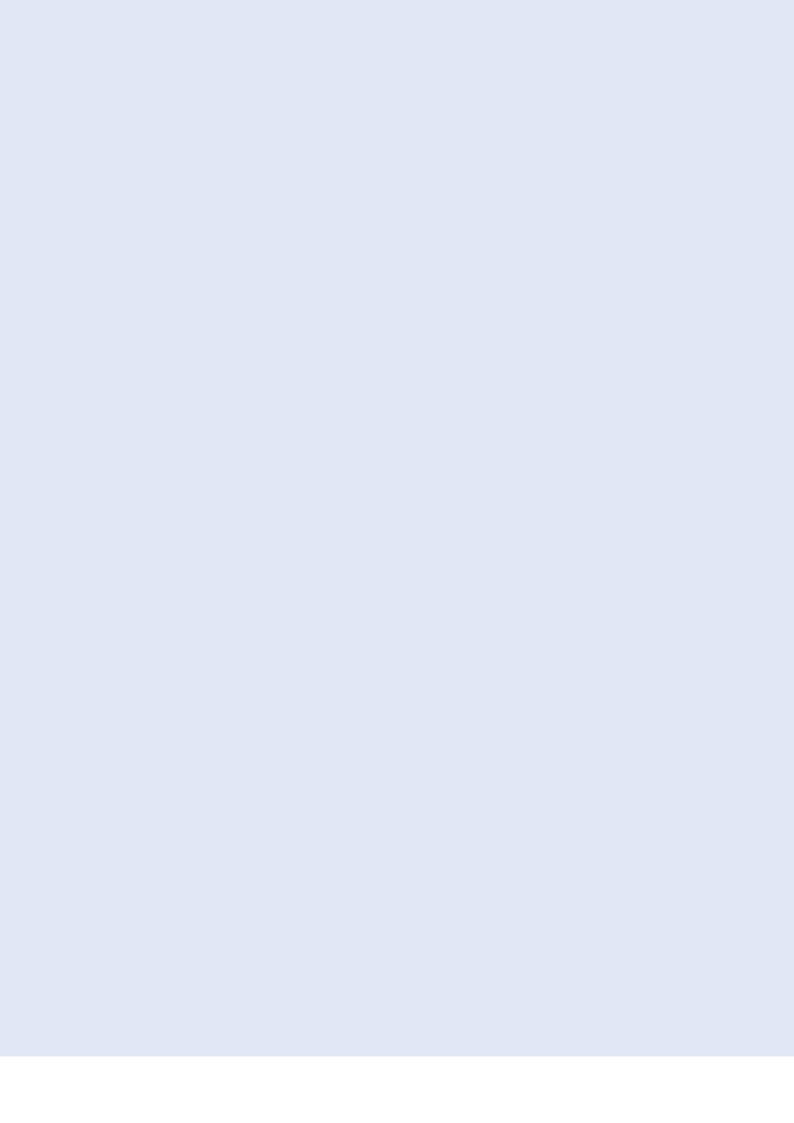**Topic:** Risk Management and Investment Management
Subtopic: Setting Risk Limits
Reference: Jorion, Chapter 7.

Financial Risk Manager (FRM®) Examination

2010 Practice Exam

PART II

2010 FRM PRACTICE EXAM PART II: ANSWER SHEET

	a.	b.	c.	d.		a.	b.	c.	d.
1.	○	○	○	○	23.	○	○	○	○
2.	○	○	○	○	24.	○	○	○	○
3.	○	○	○	○	25.	○	○	○	○
4.	○	○	○	○	26.	○	○	○	○
5.	○	○	○	○	27.	○	○	○	○
6.	○	○	○	○	28.	○	○	○	○
7.	○	○	○	○	29.	○	○	○	○
8.	○	○	○	○	30.	○	○	○	○
9.	○	○	○	○	31.	○	○	○	○
10.	○	○	○	○	32.	○	○	○	○
11.	○	○	○	○	33.	○	○	○	○
12.	○	○	○	○	34.	○	○	○	○
13.	○	○	○	○	35.	○	○	○	○
14.	○	○	○	○	36.	○	○	○	○
15.	○	○	○	○	37.	○	○	○	○
16.	○	○	○	○	38.	○	○	○	○
17.	○	○	○	○	39.	○	○	○	○
18.	○	○	○	○	40.	○	○	○	○
19.	○	○	○	○					
20.	○	○	○	○					
21.	○	○	○	○					
22.	○	○	○	○					

Correct way to complete
1. ● ● ● ●

Wrong way to complete
1. ⊘ ⊖ ✓ ⊗

1. You are the risk manager of a pension fund. You are asked to evaluate how the correlation among hedge funds and between hedge funds and other asset classes, respectively, has evolved over time. Which of the following statements are correct?

    a. In recent years, correlations between hedge fund strategies have increased, while correlations of hedge funds with broad market indices have decreased.
    b. In recent years, correlations between hedge fund strategies have increased, and correlations of hedge funds with broad market indices have also increased.
    c. In recent years, correlations between hedge fund strategies have decreased, and correlations of hedge funds with broad market indices have also decreased.
    d. In recent years, correlations between hedge fund strategies have decreased, while correlations of hedge funds with broad market indices have increased.

2. Which of the following is not a drawback of the Basel II Foundation Internal Ratings Based (IRB) approach?

    a. Probabilities of default (PDs) and losses given default (LGDs) are assumed to be uncorrelated.
    b. Asset correlations decrease with increasing PDs.
    c. The portfolio of the financial institution is assumed to be infinitely granular.
    d. The approach uses a single risk factor portfolio model instead of a multiple risk factor model.

3. The Basel II risk weight function for the Internal Ratings Based Approach (IRB) is based on the Asymptotic Single Risk Factor (ASRF) model, under which the system-wide risks that affect all obligors are modeled with only one systematic risk factor. The major reason for using the ASRF is:

    a. The model should not depend on the granularity of the portfolio.
    b. The model should be portfolio invariant so that the capital required for any given loan depends only on the risk of that loan and does not depend on the portfolio it is added to.
    c. The model should not be portfolio invariant and the capital required for any given loan should not depend on the risk of other loans.
    d. The model corresponds to the one-year Value at Risk at a 99.9% confidence level.

4. FASB 140, "Accounting for Transfers and Servicing of Financial Assets and Extinguishment of Liabilities," sets out standards for qualified SPEs (QSPEs).Which of the following is not a requirement under FASB 140 that an SPE must satisfy in order to receive the QSPE designation?

    a. The SPE must be demonstrably different from the originator and any affiliates of the originator.
    b. The SPE cannot use derivatives.
    c. Sale and disposition of assets in the QSPE must be defined in the deal documents and may never be discretionary.
    d. Sale and disposition of passive financial assets and passive derivatives in the QSPE must be defined in the deal documents and may never be discretionary.

5. You are asked to mark to market a book of plain vanilla stock options. The trader is short deep out-of-money options and long at-the-money options. There is a pronounced smile for these options. The trader's bonus increases as the value of his book increases. Which approach should you use to mark the book?

    a. Use the implied volatility of at-the-money options because the estimation of the volatility is more reliable.
    b. Use the average of the implied volatilities for the traded options for which you have data because all options should have the same implied volatility with Black-Scholes and you don't know which one is the right one.
    c. For each option, use the implied volatility of the most similar option traded on the market.
    d. Use the historical volatility because doing so corrects for the pricing mistakes in the option market.

6. As a risk practitioner, Leo realizes that model risk can never be eliminated, although he may find some ways to protect against it. Which of the following measures help reduce model risk?

    i.   All else equal, choose the model with the fewest parameters.
    ii. Have regularly scheduled model reviews that involve careful back-testing and stress-testing.
    iii. Identify and evaluate key model assumptions, and ignore small but persistent problems.
    iv. Validate the model using simple problems for which answers are independently known.

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

7. Randy Bartell has collected operational loss data to calibrate frequency and severity distributions. Generally, he regards all data points as a sample from an underlying distribution and therefore gives each data point the same weight or probability in the statistical analysis. However, external loss data is inherently biased. Which of the following biases is not typically associated with external loss data?

    a. Data capture bias
    b. Scale bias
    c. Truncation bias
    d. Omitted-variable bias

8. Mortgage-backed securities (MBS) are a class of securities where the underlying is a pool of mortgages. Assume that the mortgages are insured, so that they do not have default risk. The mortgages have prepayment risk because the borrower has the option to repay the loan early (at any time) usually due to favorable interest rate changes. From an investor's point of view, a mortgage-backed security is equivalent to holding a long position in a non-prepayable mortgage pool and which of the following?

    a. A long American call option on the underlying pool of mortgages.
    b. A short American call option on the underlying pool of mortgages.
    c. A short European put option on the underlying pool of mortgages.
    d. A long American put option on the underlying pool of mortgages.

9. You are a risk manager for a hedge fund. You are told that the TED spread increased sharply. Which of the following statements best describes the change in your situation?

    a. An increase in the TED spread indicates that the US Federal Reserve will push interest rates up, so the duration of the portfolios should be reduced.
    b. An increase in the TED spread indicates a bigger gap between the Fed Funds rate and Treasuries, so that the US Federal Reserve will choose to increase liquidity in the markets, which will increase prices of securities as demand will increase.
    c. An increase in the TED spread could indicate greater concerns about bank solvency, so that you should review your counterparty exposures and possibly hedge some exposure to banks.
    d. An increase in the TED spread could indicate more willingness of banks to lend since they get paid more for lending, so that we should use the opportunity to renegotiate lines of credit.

10. According to the Basel II Accord,

"At the discretion of their national authority, banks may also use a third tier of capital (Tier 3), consisting of short-term subordinated debt for the sole purpose of meeting a proportion of the capital requirements for," which of the following?

    a. Market risk charges only
    b. Credit risk charges only
    c. Market risk and credit risk charges
    d. All types of risk charges

11. Unexpected loss (UL) represents the standard deviation of losses, and expected loss (EL) represents the average losses over the same time horizon. Further define LGD as expected loss given default and EDF as expected default frequency. Which of the following statements are true?

    i.   EL increases linearly with increasing EDF.
    ii. EL is often higher than UL.
    iii. With increasing EDF, UL increases at a much faster rate than EL.
    iv. The lower the LGD, the higher the percentage loss for both the EL and UL.

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

12. Suppose that you want to estimate the implied default probability for a BB-rated discount corporate bond.

    • The T-bond (a risk-free bond) yields 12% per year.
    • The one-year BB-rated discount bond yields 15.8% per year.
    • The two-year BB-rated discount bond yields 18% per year.

If the recovery rate on a BB-rated bond is expected to be 0%, and the marginal default probability in year one is 5%, which of the following is the best estimate of the risk-neutral probability that the BB-rated discount bond defaults within the next two years?

    a. 6.85%
    b. 3.28%
    c. 9.91%
    d. 10.14%

13. A credit manager overseeing the structured credit book of a bank works on identifying the frictions in the securitization process that caused the recent subprime mortgage crisis in the United States. Of the following frictions in the securitization process, which one was not a cause of the subprime crisis?

    a. Frictions between the mortgagor and the originator: predatory lending.
    b. Frictions between the originator and the arranger: predatory borrowing and lending.
    c. Frictions between the servicer and asset manager: moral hazard.
    d. Frictions between the asset manager and investor: principal-agent conflict.

14. Paul sells a put option on HRTB stock with a time to expiration of 6 months, a strike price of USD 125, an underlying asset price of USD 98, implied volatility of 20% and a risk-free rate of 4%. What is Paul's credit exposure from this transaction?

    a. USD 0.00
    b. USD 0.38
    c. USD 1.75
    d. USD 24.90

15. Which of the following approaches can be used to compute regulatory capital under the internal ratings-based (IRB) approach for securitization exposures under the Basel II framework?

    i. Ratings-Based Approach (RBA)
    ii. Supervisory Formula (SF)
    iii. Internal Assessment Approach (IAA)
    iv. Internal Models Approach (IMA)

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

16. The following statements concern differences between market and operational risk VaR models. Which of the following statements is false?

    a. Market risk models are primarily driven by historical data, whereas operational risk models often incorporate more qualitative information.

    b. Market risk VaR estimates a specific quantile of the loss distribution, whereas operational risk VaR estimates the frequency of specific losses.

    c. Backtesting is generally a more useful form of validation for market risk models than for operational risk models.

    d. The time horizon over which VaR is evaluated differs between market and operational risk models.

17. The bank's trading book consists of the following two assets:

Asset	Annual Return	Volatility of Annual Return	Value
A	10%	25%	100
B	20%	20%	50

Correlation (A, B) 0.2
How would the daily VaR at 99% level change if the bank sells 50 worth of asset A and buys 50 worth of asset B? Assume there are 250 trading days in a year.

    a. 0.2286

    b. 0.4581

    c. 0.7705

    d. 0.7798

18. Joan Berkeley is an investment analyst for a U.S.-based pension fund that considers adding a large capitalization equity mutual fund to its asset mix. To assess these funds better, Joan conducts detailed quantitative analysis on four mutual funds that claim to be large-capitalization funds. The quantitative results are shown in Exhibits 1 and 2.

Exhibit 1: Style Analysis Results for the Four Funds

	Andromeda	Borealis	Crux	Draco
Russell 1000 Value Index (large-cap)	98%	10%	34%	69%
Russell 1000 Growth Index (large-cap)	0%	78%	5%	22%
Russell 2000 Value Index (small-cap)	2%	1%	28%	9%
Russell 2000 Growth Index (small-cap)	0%	11%	33%	0%
Total	100%	100%	100%	100%
R2	99.0%	89.7%	85.5%	67.5%

Exhibit 2: Performance Measurement of the Four Funds

	Benchmark S&P 500	Andromeda	Borealis	Crux	Draco
Annual return (gross)	6.8%	7%	7.3%	7.9%	8.5%
Sharpe ratio	0.42	0.47	0.49	0.46	0.47
Treynor ratio	0.34	0.36	0.34	0.32	0.38
Tracking error	—	8%	8.6%	9.1%	9.5%

Based on the above results, Joan made several comments. Which of the following statements is least likely to be correct?

a. Andromeda is a passively managed fund.
b. The pension fund should invest in the Borealis fund because it has the highest Sharpe ratio.
c. Crux's investment style has drifted to small-capitalization.
d. Draco has the highest Information Ratio.

19. In examining some of the features of a two-asset credit portfolio, consisting of two correlated credits, credit A and credit B, let the following notation be given:

    - RC_A, RC_B is the risk contribution of credit A and credit B, respectively.
    - EL_P, EL_A, EL_B is the expected loss of a portfolio consisting of credits A and B, credit A, and credit B, respectively.
    - UL_P, UL_A, UL_B is the unexpected loss of a portfolio consisting of credits A and B, credit A, and credit B, respectively.

    Using the notation above and assuming that the two assets' defaults are correlated, which of the following equations is correct?

    a. $EL_P = EL_A + EL_B$
    b. $UL_P = UL_A + UL_B$
    c. $UL_P > RC_A + RC_B$
    d. $RC_A + RC_B > UL_A + UL_B$

20. Widget, Inc., is considering an investment in a new business line. The company calculates the RAROC for the new business line to be 12%. Suppose the risk-free rate is 5%, the expected rate of return on the market is 11.0%, and the systematic risk of the company is 1.5. If the company only invests in new businesses for which the ARAROC (adjusted RAROC) exceeds the expected excess rate of return on the market, what return will this new business earn for Widget, Inc.?

    a. 0.0%
    b. 12.0%
    c. 4.7%
    d. 6.0%

21. Redhat is a small bank whose only business line is retail banking. With the Basel II Standardized Approach for calculating operational risk capital charges, the beta factors for each business line are given in the following table:

Business Line	Beta Factor
Corporate finance	18%
Trading and sales	18%
Retail banking	12%
Commercial banking	15%
Payment and settlement	18%
Agency services	15%
Asset management	12%
Retail brokerage	12%

Assuming Redhat is eligible to choose any Basel II approach for operational risk, which Basel II approach will minimize Redhat's operational risk capital charge?

a. Basic Indicator Approach.
b. Standardized Approach.
c. Foundation Internal Ratings-Based Approach (FIRB).
d. Both the Basic Indicator Approach and the Standardized Approach have the same operational risk charge for Redhat.

22. In a synthetic CDO,

a. The SPV gains credit exposure by buying securities.
b. The SPV gains credit exposure by selling credit default swaps.
c. The SPV gains credit exposure by buying credit default swaps.
d. The SPV gains credit exposure by selling risk-free bonds.

23. Consider the following two asset portfolios:

Asset	Position Value (in thousands of USD)	Return Standard Deviation (%)	Beta
A	400	3.60	0.5
B	600	8.63	1.2
Portfolio	1,000	5.92	1.0

Calculate the component VaR of asset A and marginal VaR of asset B, respectively, at 95% confidence level?

a. USD 21,773 and 0.1306
b. USD 21,773 and 0.1169
c. USD 19,477 and 0.1169
d. USD 19,477 and 0.1306

24. Which of the options below properly classifies each model risk error into a model risk category?

Model Risks
- Risk 1: Failure to consider a sufficient number of trials in a Monte Carlo simulation.
- Risk 2: Use of the mid-quote price rather than the bid price to value long positions in financial instruments.
- Risk 3: Failure to fully account for time-variation of volatility.

Model Risk Categorization
- Implementation risk
- Incorrect model calibration
- Incorrect model application

a. Risk 1 = Incorrect model calibration, Risk 2 = Implementation risk, Risk 3 = Incorrect model calibration
b. Risk 1 = Implementation risk, Risk 2 = Incorrect model application, Risk 3 = Incorrect model calibration
c. Risk 1 = Incorrect model application, Risk 2 = Implementation risk, Risk 3 = Incorrect model calibration
d. Risk 1 = Incorrect model application, Risk 2 = Implementation risk, Risk 3 = Implementation risk

25. Looking at a risk report, Mr.Woo finds that the options book of Ms. Yu has only long positions and yet has a negative delta. He asks you to explain how that is possible. What is a possible explanation?

    a. The book has a long position in up-and-in call options.
    b. The book has a long position in binary options.
    c. The book has a long position in up-and-out call options.
    d. The book has a long position in down-and-out call options.

26. John Grea has just been appointed the CFO of a bank and wants to construct a composite risk picture following a "building block" approach that aggregates risk at three successive levels in his organization.
    • Level I: Aggregates the standalone risks within a single risk factor.
    • Level II: Aggregates risk across different risk factors within a single business line.
    • Level III: Aggregates risk across different business lines.

    However, he understands that there might be different degrees of diversification benefits for each level. Empirically, which level in the "building block" approach has the greatest degree of diversification benefit?

    a. Level I — single risk factor level
    b. Level II — single business line level
    c. Level III — different business lines level
    d. The degree of diversification benefits are the same for each level

27. The capital structure of HighGear Corporation consists of two parts: one 5-year zero-coupon bond with a face value of USD 100 million and the rest is equity. The current market value of the firm's assets (MVA) is USD 130 million and the expected rate of change of the firm's value is 25%. The firm's assets have an annual volatility of 30%. Assume that firm value is log-normally distributed with constant volatility. The firm's risk management division estimates the distance to default (in terms of number of standard deviations) using the Merton Model, or

$$\frac{\left(\frac{FV_B}{MV_A}\right) - \left(\delta - \frac{1}{2}\sigma_A^2\right)T}{\sigma_A T^{0.5}}$$

Given the distance to default, the estimated risk-neutral default probability is:

a. 2.74%
b. 12.78%
c. 12.79%
d. 30.56%

28. There are different commercially available credit risk models. These models exhibit significant differences as well as similarities. Which of the following models builds on transition probabilities determined by macro factors?

a. CreditMetrics
b. KMV's PortfolioManager
c. CreditRisk+
d. CreditPortfolioView

29. John Smith is a bank supervisor responsible for the oversight of Everbright Group, a large banking conglomerate. Everbright Group now determines its credit risk profile according to the foundation IRB approach and assesses operational risk according to the standardized approach as described in the Basel II Capital Accord. Which of the following are specific issues that should be addressed as part of Smith's supervisory review process of Everbright Group?

    i.   Review the bank's internal control systems.
    ii. Check compliance with transparency requirements as described in Pillar 3 of Basel II Accord.
    iii. Make sure that the bank estimates for LGD and EAD for its corporate loans are in compliance with supervisory estimates.
    iv. Evaluate the impact of interest rate risk by assessing the impact of a 200 basis point interest rate shock to the bank's capital position.

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

30. Silo Bank begins its risk measurement process by calculating VaR for market, credit, and operational risk individually, and then aggregates the three measures to produce a firm-wide VaR. Correlation between risk types is a key input for calculating firm-wide VaR. Which of the following statements about correlation are valid?

    i.   When market and credit risks involve securities issued by firms such as bonds, warrants, and stocks, correlation estimates for market and credit risk can be derived using equity returns if Merton's model for the pricing of debt holds.
    ii. If correlations between highly adverse market, credit, and operational outcomes are high, there is diversification across risk categories and therefore the firm-wide VaR is substantially less than the sum of the market, credit, and operational risk VaRs.
    iii. With non-normal distributions, the use of correlations estimated using historical data from a stable period may not adequately capture how extreme returns for one type of risk are related to extreme returns of another type of risk.

    a. i, ii and iii
    b. i only
    c. ii and iii only
    d. None of the statements are valid.

31. The Trading Desk of Global Bank PLC presents its risk manager with a potential trade. The trade is to provide support through a bank guarantee to the AAA tranche issued by a Special Purpose Vehicle (SPV). The SPV's assets are restricted to residential mortgage loans that have been sold by other originating banks into the pool, making the bond issued by the SPV an RMBS. As far as the bank knows, no further relationship is known to exist between the originating banks and the SPV issuing the AAA tranche of the RMBS in question. As a risk manager, the first decision is to evaluate the potential for counterparty risk in this transaction. Taking into account that no additional external credit enhancements are available here, which party involved in the complex securitization transaction would expose Global Bank PLC to counterparty risk?

    a. There is only counterparty exposure with the regional banks that originated the mortgages that are securitized in the SPV because in providing the bank guarantee to the AAA tranche on this RMBS, Global Bank PLC is exposed to the credit quality of these banks.

    b. There is counterparty exposure to both the regional banks and the SPV issuing the RMBS, and any default in either would directly affect Global Bank PLC.

    c. There is only counterparty exposure to the SPV because if the mortgages in the SPV were to default, the SPV would not be able to continue to make payments.

    d. There is no counterparty exposure as the bank guarantee to be provided by Global Bank PLC is only a contingent exposure.

32. A credit risk manager of Esta Bank is reviewing the credit risk of a EUR 400,000 loan to KidCo, which is a subsidiary of Pattern Inc. Assume that KidCo will default if Pattern Inc. defaults, but Pattern Inc. will not necessarily default if KidCo defaults. If Pattern Inc. has a 1-year probability of default of 1% and KidCo has a 1-year probability of default of 5% given that Pattern Inc. does not default, what is the probability that KidCo defaults in the next year?

    a. 5.00%
    b. 6.00%
    c. 5.95%
    d. 4.95%

33. The spread on a one-year BBB-rated bond relative to the risk-free treasury of similar maturity is 1.4%. It is estimated that the contribution to this spread by all noncredit factors (e.g., liquidity risk, taxes) is 0.4%. Assuming the loss given default rate for the underlying credit is 40%, what is, approximately, the implied default probability for this bond?

    a. 1.67%
    b. 2.33%
    c. 3.50%
    d. 2.50%

34. The following table lists the default probabilities for an A-rated issue by a company facing the risk of imminent downgrade.

Year	Default Probability
1	0.300%
2	0.450%
3	0.550%

Assume that defaults, if they take place, only happen at the end of the year. Based on the information in the table above, calculate the cumulative default rate at the end of each of the next three years.

    a. 0.300%, 0.750%, 1.300%
    b. 0.300%, 0.150%, 0.250%
    c. 0.300%, 0.749%, 1.295%
    d. 0.300%, 0.449%, 0.548%

35. Which of the following statements are true?

i. Hedge fund manager compensation is often symmetric (i.e., a dollar of gain has the opposite impact on compensation as a dollar of loss), while the compensation of mutual fund managers is almost always asymmetric.
ii. Leverage obtained through lines of credit increases the risk of a hedge fund more than leverage obtained by issuing debt, because unexpected cancellation of a line of credit by a lender during troubled times can force a fund to liquidate its positions in illiquid markets.
iii. A hedge fund investor should pay performance-based compensation to the manager for producing alpha, but should not pay performance-based compensation to a hedge fund manager who has done well because the fund invests in risk factors that mirror the performance of his style or strategy, and the style or strategy has performed well.
iv. The lack of hedge fund transparency is particularly problematic for investors with fiduciary responsibilities such as pension fund managers, and to secure funding from these investors, hedge fund managers often have to provide more information to these investors.

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

36. Which of the following statements does not identify a potential factor that played a role in the subprime crisis?

    a. Many products offered to subprime borrowers were very complex and subject to misunderstanding and/or misrepresentation.
    b. Credit ratings were assigned to subprime MBS with significant error. Even though the rating agencies publicly disclosed their rating criteria for subprime, investors lacked the ability to evaluate the efficacy of these models.
    c. Existing investment mandates often distinguished between structured and corporate ratings, forcing asset managers to evaluate structured debt issues and corporate debt issues with the same credit rating but different coupons.
    d. Without due diligence by the asset manager, the arranger's incentives to conduct its own due diligence are reduced.

37. Which of the following instruments has or have the most potential counterparty credit risk when the final exchange draws near maturity?

    i.   An FX forward contract in which the bank will pay USD 1.1 million and receive EUR 0.77 million on December 1, 2008.

    ii.   A EUR 10 million interest rate swap with one remaining payment due December 1, 2008, in which the bank pays EURIBOR + 1.0% and receives 4.5%.

    iii. A cross-currency swap with final payments due December 1, 2008, in which the bank pays 5% annually on a notional USD 1.1 million and receives 10% annually on a notional value of EUR 0.7 million.

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

38. You have a long position in a digital call option – an option that is also called cash-or-nothing – on shares in Global Enterprises. The digital call has a strike price of USD 20 with one year remaining to expiration. Assume that the shares currently trade at USD 22 and annual return volatility of Global Enterprises shares is 15%. Which of the following sensitivities would be associated with this option?

    i.   Delta is positive.
    ii.   Gamma is positive.
    iii. Vega is negative.
    iv. Vega is positive.

Which statements are true?

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

39. The Merton model is used to predict default. It builds on several very strong assumptions and its applicability is hampered by practical difficulties. Which of the following statements does not correctly identify limiting assumptions or practical difficulties of using the model?

    a. The Merton Model relies on a simplistic capital structure consisting of only one debt issue.
    b. The Merton Model asset value volatility cannot be estimated because firm value does not trade.
    c. The Merton Model assumes that debt does not pay a coupon while most publicly-trade debt is coupon debt.
    d. The Merton Model assumes a constant riskless interest rate.

40. The current yield-to-maturity on a 1-year zero coupon bond with a face value of 1,000 is 3%. There is an equal probability that, in the coming 6 months, the yield will either increase or decrease by 50 bp, respectively (to 2.5% and 3.5%, respectively). Using this information, what is the expected discounted value of the zero-coupon bond?

    a. 969.45
    b. 970.67
    c. 982.80
    d. 985.23

2010 FRM PRACTICE EXAM PART II: CORRECT ANSWER SHEET

	a.	b.	c.	d.		a.	b.	c.	d.
1.	○	●	○	○	23.	○	○	●	○
2.	○	●	○	○	24.	○	○	●	○
3.	○	●	○	○	25.	○	○	●	○
4.	○	●	○	○	26.	●	○	○	○
5.	○	○	●	○	27.	●	○	○	○
6.	○	○	●	○	28.	○	●	○	○
7.	○	○	○	●	29.	○	○	●	○
8.	○	●	○	○	30.	○	●	○	○
9.	○	○	●	○	31.	○	○	●	○
10.	●	○	○	○	32.	○	○	●	○
11.	○	○	●	○	33.	○	○	○	●
12.	○	○	●	○	34.	○	○	●	○
13.	○	○	●	○	35.	○	●	○	○
14.	●	○	○	○	36.	○	○	●	○
15.	○	●	○	○	37.	○	○	●	○
16.	○	●	○	○	38.	○	●	○	○
17.	○	●	○	○	39.	○	●	○	○
18.	○	●	○	○	40.	○	●	○	○
19.	●	○	○	○					
20.	●	○	○	○					
21.	○	●	○	○					
22.	○	●	○	○					

Correct way to complete

1. ● ● ● ●

Wrong way to complete

1. ⊘ ⊖ ✓ ⊗

Financial Risk Manager (FRM®) Examination

2010 Practice Exam Answers and Explanations

PART II

1. You are the risk manager of a pension fund. You are asked to evaluate how the correlation among hedge funds and between hedge funds and other asset classes, respectively, has evolved over time. Which of the following statements are correct?

    a. In recent years, correlations between hedge fund strategies have increased, while correlations of hedge funds with broad market indices have decreased.

    b. In recent years, correlations between hedge fund strategies have increased, and correlations of hedge funds with broad market indices have also increased.

    c. In recent years, correlations between hedge fund strategies have decreased, and correlations of hedge funds with broad market indices have also decreased.

    d. In recent years, correlations between hedge fund strategies have decreased, while correlations of hedge funds with broad market indices have increased.

    Answer: **b**

Explanation: In recent years, correlations between hedge fund strategies have increased, and correlations of hedge funds with broad market indices have also increased.

Topic: Risk Management and Investment Management
AIMS:
Reference: René M. Stulz, "Hedge Funds: Past, Present and Future".

2. Which of the following is not a drawback of the Basel II Foundation Internal Ratings Based (IRB) approach?

a. Probabilities of default (PDs) and losses given default (LGDs) are assumed to be uncorrelated.
b. Asset correlations decrease with increasing PDs.
c. The portfolio of the financial institution is assumed to be infinitely granular.
d. The approach uses a single risk factor portfolio model instead of a multiple risk factor model.

Answer: **b**

Explanation:

a. Incorrect. This is a drawback of the Basel II prescribed IRB model as there can exist correlation between the PDs and LGDs which is not considered in the Basel model

b. Correct. This is NOT a drawback of the Basel II prescribed IRB model as the higher the PD, the higher the idiosyncratic (individual) risk components of a borrower. The default risk depends less on the overall state of the economy and more on individual risk drivers

c. Incorrect. This is a drawback of the Basel II prescribed IRB model as the portfolio of the financial institutions need not be completely granular

d. Incorrect. This is a drawback of the Basel II prescribed IRB model as there can be many systematic risk factor affecting the exposure instead of one single risk factor

Topic: Operational and Integrated Risk Management
Subtopic: Regulation and Basel II Accord
Reference: "An Explanatory Note on the Basel II IRB Risk Weight Functions" (Basel Committee on Banking Supervision Publication, July 2005)

3. The Basel II risk weight function for the Internal Ratings Based Approach (IRB) is based on the Asymptotic Single Risk Factor (ASRF) model, under which the system-wide risks that affect all obligors are modeled with only one systematic risk factor. The major reason for using the ASRF is:

a. The model should not depend on the granularity of the portfolio.

b. The model should be portfolio invariant so that the capital required for any given loan depends only on the risk of that loan and does not depend on the portfolio it is added to.

c. The model should not be portfolio invariant and the capital required for any given loan should not depend on the risk of other loans.

d. The model corresponds to the one-year Value at Risk at a 99.9% confidence level.

Answer: **b**

Explanation:

a. Is incorrect since granularity though an issue, is not the major factor here since the model assumes infinitely granular portfolios.

b. Portfolio invariance is the only correct option above for the use of the ASRF in the Basel II model.

c. This statement is incorrect but put here to confuse unprepared candidates.

d. This statement is not correct since the model is based on a VaR minus Expected Loss approach to computing capital to cover Unexpected Losses (UL) under credit risk exposures.

Type of question: Operational and Integrated Risk Management.
Subtopic: Regulation and Basel II Accord
Reference: An Explanatory Note on the Basel II IRB Risk Weight Functions (Basel Committee on Banking Supervision Publication, July 2005).

4. FASB 140, "Accounting for Transfers and Servicing of Financial Assets and Extinguishment of Liabilities," sets out standards for qualified SPEs (QSPEs).Which of the following is not a requirement under FASB 140 that an SPE must satisfy in order to receive the QSPE designation?

    a. The SPE must be demonstrably different from the originator and any affiliates of the originator.
    b. The SPE cannot use derivatives.
    c. Sale and disposition of assets in the QSPE must be defined in the deal documents and may never be discretionary.
    d. Sale and disposition of passive financial assets and passive derivatives in the QSPE must be defined in the deal documents and may never be discretionary.

    Answer: **b**

Explanation: The SPE may hold only passive financial assets and passive derivatives for hedging.
Statement B is incorrect; all others are correct.

Topic: Credit Risk Measurement and Management
Subtopic: Securitization
Reference: Christopher L. Culp, Structured Finance and Insurance: The Art of Managing Capital and Risk Chapter 16 – Securitization

5. You are asked to mark to market a book of plain vanilla stock options. The trader is short deep out-of-money options and long at-the-money options. There is a pronounced smile for these options. The trader's bonus increases as the value of his book increases. Which approach should you use to mark the book?

    a. Use the implied volatility of at-the-money options because the estimation of the volatility is more reliable.
    b. Use the average of the implied volatilities for the traded options for which you have data because all options should have the same implied volatility with Black-Scholes and you don't know which one is the right one.
    c. For each option, use the implied volatility of the most similar option traded on the market.
    d. Use the historical volatility because doing so corrects for the pricing mistakes in the option market.

    Answer: **c**

Explanation: The prices obtained with C are the right ones because they correspond to prices at which you could sell or buy the options.

Topic: Market Risk Measurement and Management
Subtopic: Volatility smiles, Exotic Options
Reference: John Hull, Options, Futures, and Other Derivatives.

6. As a risk practitioner, Leo realizes that model risk can never be eliminated, although he may find some ways to protect against it. Which of the following measures help reduce model risk?

    i.   All else equal, choose the model with the fewest parameters.
    ii.   Have regularly scheduled model reviews that involve careful back-testing and stress-testing.
    iii. Identify and evaluate key model assumptions, and ignore small but persistent problems.
    iv. Validate the model using simple problems for which answers are independently known.

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

Answer: **c**

Explanation:

i.   is correct. First and foremost, practitioners should simply be aware of the model risk; It is true that unnecessary complexity is never a virtue in model selection.

ii.   is correct. Practitioners should evaluate model adequacy using stress tests and backtests; models should be recalibrated and re-estimated on a regular basis, and the methods used should be kept up to date.

iii.   is incorrect. Users should explicitly set out the key assumptions on which a model is based, evaluate the extent to which the model's results depend on these assumptions; But he should never ignore the small problems because small discrepancies are often good warning signals of larger problems.

iv.   is correct. It is always a good idea to check a model on simple problems to which one already knows the answer, and many problems can be distilled to simple special cases that have knows answers.

Topic: Operation and Integrated Risk Management
Subtopic: Model Risk
Reference: Kevin Dowd, Measuring Market Risk 2nd., (West Sussex:Wiley & Sons, 2005) Chapter 16

7. Randy Bartell has collected operational loss data to calibrate frequency and severity distributions. Generally, he regards all data points as a sample from an underlying distribution and therefore gives each data point the same weight or probability in the statistical analysis. However, external loss data is inherently biased. Which of the following biases is not typically associated with external loss data?

    a. Data capture bias
    b. Scale bias
    c. Truncation bias
    d. Omitted-variable bias

Answer: **d**

Explanation:

a.   is incorrect. Data capture bias – Data is usually captured with a systematic bias. This problem is particularly pronounced with publicly available data.

b.   is incorrect. Scale bias – Scalability refers to the fact that operational risk is dependent on the size of the bank, i.e. the scale of operations. A bigger bank is exposed to more opportunity for operational failures and therefore to a higher level of operational risk.

c.   is incorrect. Truncation bias – Banks collect data above certain thresholds. It is generally not possible to guarantee that these thresholds are uniform.

d.   is correct. Survivorship bias is not a problem that is typically associated only with external data collection.

Topic: Operational Risk Management/Data Collection Bias
Subtopic: Evaluating the performance of risk management systems
Reference: Falko Aue and Michael Kalkbrener, 2007, "LDA at Work", Deutsche Bank White Paper.

8. Mortgage-backed securities (MBS) are a class of securities where the underlying is a pool of mortgages. Assume that the mortgages are insured, so that they do not have default risk. The mortgages have prepayment risk because the borrower has the option to repay the loan early (at any time) usually due to favorable interest rate changes. From an investor's point of view, a mortgage-backed security is equivalent to holding a long position in a non-prepayable mortgage pool and which of the following?

    a. A long American call option on the underlying pool of mortgages.
    b. A short American call option on the underlying pool of mortgages.
    c. A short European put option on the underlying pool of mortgages.
    d. A long American put option on the underlying pool of mortgages.

    Answer: **b**

    Explanation: Prepayment risk is equivalent to an American call option because the borrower can repay at any time and the position is short because the option lies with the borrower.

    Topic: Market Risk Measurement and Management
    Subtopic: Mortgages and Mortgage Backed Securities
    Reference: Tuckman, Fixed Income Securities, Chapter 21.

9. You are a risk manager for a hedge fund. You are told that the TED spread increased sharply. Which of the following statements best describes the change in your situation?

    a. An increase in the TED spread indicates that the US Federal Reserve will push interest rates up, so the duration of the portfolios should be reduced.
    b. An increase in the TED spread indicates a bigger gap between the Fed Funds rate and Treasuries, so that the US Federal Reserve will choose to increase liquidity in the markets, which will increase prices of securities as demand will increase.
    c. An increase in the TED spread could indicate greater concerns about bank solvency, so that you should review your counterparty exposures and possibly hedge some exposure to banks.
    d. An increase in the TED spread could indicate more willingness of banks to lend since they get paid more for lending, so that we should use the opportunity to renegotiate lines of credit.

    Answer: **c**

    Topic: Credit Risk Measurement and Management
    Subtopic: Counterparty Risk
    Reference: "Studies on credit risk concentration: an overview of the issues and a synopsis of the results from the Research Task Force project" (Basel Committee on Banking Supervision Publication, November 2006).

10. According to the Basel II Accord,

"At the discretion of their national authority, banks may also use a third tier of capital (Tier 3), consisting of short-term subordinated debt for the sole purpose of meeting a proportion of the capital requirements for," which of the following?

   a. Market risk charges only
   b. Credit risk charges only
   c. Market risk and credit risk charges
   d. All types of risk charges

Answer: **a**

Explanation: Tier 3 capital can only be used to satisfy capital requirements resulting from market risk charges and cannot be applied to credit risk charges. Other choices are incorrect except choice A.

Topic: Operational and Integrated Risk Management
Subtopic: Basel II accord
Reference: "Basel II: International Convergence of Capital Measurement and Capital Standards: A Revised Framework – Comprehensive Version" (Basel Committee on Banking Supervision Publication, June 2006).

11. Unexpected loss (UL) represents the standard deviation of losses, and expected loss (EL) represents the average losses over the same time horizon. Further define LGD as expected loss given default and EDF as expected default frequency. Which of the following statements are true?

    i.   EL increases linearly with increasing EDF.
    ii.   EL is often higher than UL.
    iii. With increasing EDF, UL increases at a much faster rate than EL.
    iv. The lower the LGD, the higher the percentage loss for both the EL and UL.

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

Answer: **c**

Explanation: Over the same fixed horizon, we have the following equations:

$$EL = AE \times LGD \times EDF$$

$$UL = AE \times$$

AE – adjusted exposure at default

i.   is correct, EL increases linearly with increasing EDF

ii.   is incorrect, EL is often lower than UL(EL < UL)

iii.   is correct, UL increases much faster than EL with increasing EDF

iv.   is incorrect, the lower the LGD(the higher the recovery rate), the lower is the percentage loss for both EL and UL

Topic: Credit Risk Measurement and Management
Subtopic: Credit risk/expected loss/unexpected loss/LGD/EAD
Reference: Michael Ong, Internal Credit Risk Models: Capital Allocation and Performance Measurement, Chapter 6

12. Suppose that you want to estimate the implied default probability for a BB-rated discount corporate bond.

- The T-bond (a risk-free bond) yields 12% per year.
- The one-year BB-rated discount bond yields 15.8% per year.
- The two-year BB-rated discount bond yields 18% per year.

If the recovery rate on a BB-rated bond is expected to be 0%, and the marginal default probability in year one is 5%, which of the following is the best estimate of the risk-neutral probability that the BB-rated discount bond defaults within the next two years?

a. 6.85%
b. 3.28%
c. 9.91%
d. 10.14%

Answer: **c**

Explanation: $(1 + 0.12)^2 = PD * (1 + 0.18)^2 \rightarrow PD = 9.91\%$

Topic: Credit Risk Measurement and Management
Subtopic: Probability of Default
Reference: Hull; Opitions, Futures and Other Derivatives.

13. A credit manager overseeing the structured credit book of a bank works on identifying the frictions in the securitization process that caused the recent subprime mortgage crisis in the United States. Of the following frictions in the securitization process, which one was not a cause of the subprime crisis?

    a. Frictions between the mortgagor and the originator: predatory lending.
    b. Frictions between the originator and the arranger: predatory borrowing and lending.
    c. Frictions between the servicer and asset manager: moral hazard.
    d. Frictions between the asset manager and investor: principal-agent conflict.

Answer: **c**

Explanation:
a.   is incorrect. Frictions between the mortgagor and the originator: predatory lending – have been identified as key frictions that caused the subprime mortgage crisis.
b.   is incorrect. Frictions between the originator and the arranger: predatory borrowing and lending – have been identified as key frictions that caused the subprime mortgage crisis.
c.   is correct. Frictions between the servicer and asset manager or credit ratings agency: moral hazard – although important these frictions have not been identified as key frictions that caused the subprime mortgage crisis.
d.   is incorrect. Frictions between the asset manager and investor: principal-agent – have been identified as key frictions that caused the subprime mortgage crisis.

Topic: Credit Risk Measurement and Management
Subtopic: Securitization, Risk Mitigation
Reference: Adam Ashcroft and Til Schuermann, "Understanding the Securitization of Subprime Mortgage Credit", 2007

14. Paul sells a put option on HRTB stock with a time to expiration of 6 months, a strike price of USD 125, an underlying asset price of USD 98, implied volatility of 20% and a risk-free rate of 4%. What is Paul's credit exposure from this transaction?

    a. USD 0.00
    b. USD 0.38
    c. USD 1.75
    d. USD 24.90

Answer: **a**

Explanation: Selling a put option exposes you to zero credit risk as the premium is paid up front. The correct answer is therefore a. All the information necessary to price the option is provided but it is not necessary. The value of the put option is USD 24.90 (answer D) while the value of a call option with the same terms is USD 0.38 (Answer B). Answer C is the value of a call option with 1 year to expiration.

Topic: Credit Risk Measurement and Management
Subtopic: Counterparty Credit Risk.
Reference: Hull; Options, Futures and Other Derivatives.

15. Which of the following approaches can be used to compute regulatory capital under the internal ratings-based (IRB) approach for securitization exposures under the Basel II framework?

  i.   Ratings-Based Approach (RBA)
  ii. Supervisory Formula (SF)
  iii. Internal Assessment Approach (IAA)
  iv. Internal Models Approach (IMA)

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

  Answer: **b**

Explanation:
a.   Is incorrect since IAA is missing.
b.   Correct since the RBA, SF and IAA are the correct approaches.
c.   Is incorrect since RBA is missing and IMA is wrong since it is for Market Risk.
d.   Is incorrect since IMA is used for Market Risk.

Topic: Operational and Integrated Risk Management
Subtopic: Basel II accord
Reference: Basel II: International Convergence of Capital Measurement and Capital Standards: A Revised Framework – Comprehensive Version"

16. The following statements concern differences between market and operational risk VaR models. Which of the following statements is false?

    a. Market risk models are primarily driven by historical data, whereas operational risk models often incorporate more qualitative information.

    b. Market risk VaR estimates a specific quantile of the loss distribution, whereas operational risk VaR estimates the frequency of specific losses.

    c. Backtesting is generally a more useful form of validation for market risk models than for operational risk models.

    d. The time horizon over which VaR is evaluated differs between market and operational risk models.

Answer: **b**

Explanation:

a.   is true. Operational risk models often rely heavily on scenarios and other forms of judgment in addition to historical loss data. Operational risk models often incorporate more qualitative information.

b.   is false. Operational risk models do define VaR as a specific quantile of the loss distribution, typically either 99.9 or 99.97.

c.   is true. The high soundness standard typically used in operational risk models together with the limited time series of data available make backtesting of limited value.

d.   is true. Operational risk VaRs are typically calculated at a 1 year time horizon, whereas market risk VaRs are typically calculated at shorter horizons.

Topic: Operational and Integrated Risk Management
Subtopic: Correlations across market, credit and operational risk.
Reference: Nocco and Stulz, *Enterprise Risk Management: Theory and Practice.*

17. The bank's trading book consists of the following two assets:

Asset	Annual Return	Volatility of Annual Return	Value
A	10%	25%	100
B	20%	20%	50

Correlation (A, B) = 0.2

How would the daily VaR at 99% level change if the bank sells 50 worth of asset A and buys 50 worth of asset B? Assume there are 250 trading days in a year.

    a. 0.2286
    b. 0.4581
    c. 0.7705
    d. 0.7798

Answer: **b**

Explanation: The trade will decrease the VaR by 0.4581

Topic: Valuation and Risk Models
Subtopic: Value-at-Risk; definition and methods
Reference: Allen, Boudoukh, Saunders: chapter 2, 3

18. Joan Berkeley is an investment analyst for a U.S.-based pension fund that considers adding a large capitalization equity mutual fund to its asset mix. To assess these funds better, Joan conducts detailed quantitative analysis on four mutual funds that claim to be large-capitalization funds. The quantitative results are shown in Exhibits 1 and 2.

Exhibit 1: Style Analysis Results for the Four Funds

	Andromeda	Borealis	Crux	Draco
Russell 1000 Value Index (large-cap)	98%	10%	34%	69%
Russell 1000 Growth Index (large-cap)	0%	78%	5%	22%
Russell 2000 Value Index (small-cap)	2%	1%	28%	9%
Russell 2000 Growth Index (small-cap)	0%	11%	33%	0%
Total	100%	100%	100%	100%
R2	99.0%	89.7%	85.5%	67.5%

Exhibit 2: Performance Measurement of the Four Funds

	Benchmark S&P 500	Andromeda	Borealis	Crux	Draco
Annual return (gross)	6.8%	7%	7.3%	7.9%	8.5%
Sharpe ratio	0.42	0.47	0.49	0.46	0.47
Treynor ratio	0.34	0.36	0.34	0.32	0.38
Tracking error	—	8%	8.6%	9.1%	9.5%

Based on the above results, Joan made several comments. Which of the following statements is least likely to be correct?

a. Andromeda is a passively managed fund.
b. The pension fund should invest in the Borealis fund because it has the highest Sharpe ratio.
c. Crux's investment style has drifted to small-capitalization.
d. Draco has the highest Information Ratio.

Answer: **b**

Explanation: Choice a: The high R2 indicate low residuals, and the fund is probably being passively managed. Choice b: The Sharpe ratio is not the right metric in this context because a fund is added to an existing portfolio and the fund has to be a large cap fund. Choice c: Although Crux claims to be large-capitalization fund, its weight in Russell 2000 Value Index and Russell 2000 Growth Index sum up to over 60%. So style drifting occurs. Choice d: Information ratio = (fund return – S&P 500 return)/tracking error. Draco has the highest IR.

Topic: Risk Management and Investment Management
Subtopic: Risks of Specific Strategies
References: Lars Jaeger (ed), *The New Generation of Risk Management for Hedge Funds and Private Equity Investments* (London: Euromoney Institutional Investor, 2003), Chapter 27.

19. In examining some of the features of a two-asset credit portfolio, consisting of two correlated credits, credit A and credit B, let the following notation be given:

- RC_A, RC_B is the risk contribution of credit A and credit B, respectively.
- EL_P, EL_A, EL_B is the expected loss of a portfolio consisting of credits A and B, credit A, and credit B, respectively.
- UL_P, UL_A, UL_B is the unexpected loss of a portfolio consisting of credits A and B, credit A, and credit B, respectively.

Using the notation above and assuming that the two assets' defaults are correlated, which of the following equations is correct?

a. $EL_P = EL_A + EL_B$
b. $UL_P = UL_A + UL_B$
c. $UL_P > RC_A + RC_B$
d. $RC_A + RC_B > UL_A + UL_B$

Answer: **a**

Explanation:
a. is correct. Two different risky assets with average losses due to a credit event at some time during the analysis horizon have an aggregate average loss equal to the sum of the two average losses.
b. is incorrect. The unexpected loss of the portfolio is not equal to the sum of the individual unexpected losses of the risky assets that make up the aggregate portfolio due to (default) correlation. ULP = (ULA * ULA + ULB * ULB + 2 ULA * ULB *corr)0.5
c. is incorrect. The sum of all the risk contributions from all the assets in the portfolio is the portfolio unexpected loss; ULP = RCA + RCB
d. is incorrect. The portfolio unexpected loss is very much smaller than the sum of the individual unexpected losses due to the diversification effect. ULP = (ULA * ULA + ULB * ULB + 2 ULA * ULB *corr)0.5

Topic: Credit Risk Measurement and Management
Subtopic: Credit risk/portfolio expected loss/portfolio unexpected loss/risk contribution.
Reference: Michael Ong, Internal Credit Risk Models: Capital Allocation and Performance Measurement, Chapter 6

20. Widget, Inc., is considering an investment in a new business line. The company calculates the RAROC for the new business line to be 12%. Suppose the risk-free rate is 5%, the expected rate of return on the market is 11.0%, and the systematic risk of the company is 1.5. If the company only invests in new businesses for which the ARAROC (adjusted RAROC) exceeds the expected excess rate of return on the market, what return will this new business earn for Widget, Inc.?

    a. 0.0%
    b. 12.0%
    c. 4.7%
    d. 6.0%

Answer: **a**

Explanation:
a.   is correct. ARAROC=(12%-5%)/1.5=0.047=4.7% the expected excess rate of return on the market=11%-5%=6%. 4.7%< 6%. So as a rational company, it will reject the project, the contribution will be 0.
b.   is incorrect. There is no reason for 5%-4.7%=0.3%
c.   is incorrect 4.7% is ARAROC.
d.   is incorrect. 6% is the expected excess rate of return on the market.

Topic: Operational and Integrated Risk Management
Subtopic: Firm wide risk measurement and management
Reference: Michael Crouhy, Dan Galai, and Robert Mark, Risk Management (New York: McGraw-Hill, 2001), Chapter 14

21. Redhat is a small bank whose only business line is retail banking.With the Basel II Standardized Approach for calculating operational risk capital charges, the beta factors for each business line are given in the following table:

Business Line	Beta Factor
Corporate finance	18%
Trading and sales	18%
Retail banking	12%
Commercial banking	15%
Payment and settlement	18%
Agency services	15%
Asset management	12%
Retail brokerage	12%

Assuming Redhat is eligible to choose any Basel II approach for operational risk, which Basel II approach will minimize Redhat's operational risk capital charge?

  a. Basic Indicator Approach.
  b. Standardized Approach.
  c. Foundation Internal Ratings-Based Approach (FIRB).
  d. Both the Basic Indicator Approach and the Standardized Approach have the same operational risk charge for Redhat.

Answer: **b**

Explanation:
a. is incorrect. For all business lines, the Basic Indicator Approach uses a 15% Beta factor which is higher than retail banking beta factor of the Standardized approach.
b. is correct. Redhat's only business line is retail banking. Using the Standardized Approach will use a lower beta factor than Basic Indicator Approach.
c. is not correct FIRB and AIRB are credit risk capital approach.
d. is not correct because of above.

Topic: Operational and Integrated Risk Management
Subtopic: Economic 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).

22. In a synthetic CDO,

    a. The SPV gains credit exposure by buying securities.
    b. The SPV gains credit exposure by selling credit default swaps.
    c. The SPV gains credit exposure by buying credit default swaps.
    d. The SPV gains credit exposure by selling risk-free bonds.

Answer: **b**

Explanation:
a.   incorrect answer: This is the case in a cash CDO.
b.   correct answer: in this case the SPV is synthetically short protection
c.   incorrect answer: in this case the SPV is synthetically long protection
d.   incorrect answer: SPV sells credit protection and uses the funds to purchase risk-free bonds

Topic: Credit Risk Measurement and Management
Subtopic: Collateralized Debt Obligations
Reference: Culp, Chapters 17,18

23. Consider the following two asset portfolios:

Asset	Position Value (in thousands of USD)	Return Standard Deviation (%)	Beta
A	400	3.60	0.5
B	600	8.63	1.2
Portfolio	1,000	5.92	1.0

Calculate the component VaR of asset A and marginal VaR of asset B, respectively, at 95% confidence level?

   a. USD 21,773 and 0.1306
   b. USD 21,773 and 0.1169
   c. USD 19,477 and 0.1169
   d. USD 19,477 and 0.1306

Answer: **c**

Explanation: Diversified VAR (DVAR) = z * standard deviation * portfolio value
= 1.645 * 0.0592 * USD 1,000,000
= USD 97,384
Component VAR = DVAR * beta (A) * weight (A)
= USD 97,384 * 0.5 * 0.4
= USD 19,477
Marginal VAR = DVAR * beta (B) / portfolio value
= USD 97,384 * 1.2 / USD 1,000,000
= 0.1169

a.   Incorrect. Uses confidence level of 99%
b.   Incorrect. Uses undiversified VAR (= 400,000 * 0.036 * 1.645 + 600,000 * 0.0863 * 1.645)
c.   Correct.
d.   Incorrect. Uses VaR of asset A (400000 * 0.036 * 1.645) as component VAR of A, and uses weight instead of beta in marginal VAR calculation.

Topic: Risk Management and Investment Management
Subtopic: Portfolio Construction
Reference: Philippe Jorion, Value at Risk, 3rd Edition. Chapter 7

24. Which of the options below properly classifies each model risk error into a model risk category?

Model Risks
- Risk 1: Failure to consider a sufficient number of trials in a Monte Carlo simulation.
- Risk 2: Use of the mid-quote price rather than the bid price to value long positions in financial instruments.
- Risk 3: Failure to fully account for time-variation of volatility.

Model Risk Categorization
- Implementation risk
- Incorrect model calibration
- Incorrect model application

a. Risk 1 = Incorrect model calibration, Risk 2 = Implementation risk, Risk 3 = Incorrect model calibration
b. Risk 1 = Implementation risk, Risk 2 = Incorrect model application, Risk 3 = Incorrect model calibration
c. Risk 1 = Incorrect model application, Risk 2 = Implementation risk, Risk 3 = Incorrect model calibration
d. Risk 1 = Incorrect model application, Risk 2 = Implementation risk, Risk 3 = Implementation risk

Answer: **c**

Explanation: Implementation risk refers to model risk pertinent to implementation, it assumes the model is correctly specified and calibrated. It usually pertains to valuation errors, e.g. mark to market vs. mark to model, usage of mid-quote vs. bid-ask spread, hence it corresponds to Risk 2. Incorrect model calibration risk refers to model risk pertinent to non-calibration or inaccurate calibration of (usually correctly specified) models under changing circumstances. An example is unexpected rise in volatility, causing banks to experience higher losses than suggested under original risk models (past cases include LTCM, Natwest, BZW and Bank of Tokyo Mitsubishi cases), hence it corresponds to risk 3. Incorrect model application risk refers to model risk pertinent to improper application of a risk model. An example is consideration of an insufficient number of trials in a Monte Carlo simulation. The wrong answers A, B and D capture cases when candidates do not fully understand correct classification and application of model risks.

Topic: Operational and Integrated Risk Management
Subtopic: Implementation and Model Risk
Reference: Kevin Dowd, Measuring Market Risk, Chapter 16 – Model risk

25. Looking at a risk report, Mr.Woo finds that the options book of Ms. Yu has only long positions and yet has a negative delta. He asks you to explain how that is possible. What is a possible explanation?

    a. The book has a long position in up-and-in call options.
    b. The book has a long position in binary options.
    c. The book has a long position in up-and-out call options.
    d. The book has a long position in down-and-out call options.

Answer: **c**

Explanation: As the underlying assets' price increases the up-and-out call options become more vulnerable since they will cease to exist when the barrier is reached. Hence their price decreases. This is negative delta.

Topic: Market Risk Measurement and Management
Subtopic: Exotic Derivatives
Reference: John C. Hull, Options, Futures and Derivatives, 7th Edition.

26. John Grea has just been appointed the CFO of a bank and wants to construct a composite risk picture following a "building block" approach that aggregates risk at three successive levels in his organization.
- Level I: Aggregates the standalone risks within a single risk factor.
- Level II: Aggregates risk across different risk factors within a single business line.
- Level III: Aggregates risk across different business lines.

However, he understands that there might be different degrees of diversification benefits for each level. Empirically, which level in the "building block" approach has the greatest degree of diversification benefit?

    a. Level I — single risk factor level
    b. Level II — single business line level
    c. Level III — different business lines level
    d. The degree of diversification benefits are the same for each level

Answer: **a**

Explanation: Empirically, diversification effects are greatest within a single risk factor (Level I), decrease at the business line level (Level II), and are smallest across business lines (Level III).

Topic: Operational Risk Measurement and Management
Subtopic: Economic Capital and Risk Aggregation.
Reference: Andrew Kuritzkes, Til Schuermann and Scott M.Weiner. "Risk Measurement, Risk Management and Capital Adequacy in Financial Conglomerates."

27. The capital structure of HighGear Corporation consists of two parts: one 5-year zero-coupon bond with a face value of USD 100 million and the rest is equity. The current market value of the firm's assets (MVA) is USD 130 million and the expected rate of change of the firm's value is 25%. The firm's assets have an annual volatility of 30%. Assume that firm value is log-normally distributed with constant volatility. The firm's risk management division estimates the distance to default (in terms of number of standard deviations) using the Merton Model, or

$$\frac{\left(\dfrac{FV_B}{MV_A}\right) - \left(\delta - \dfrac{1}{2}\,\sigma_A^2\right)T}{\sigma_A T^{0.5}}$$

Given the distance to default, the estimated risk-neutral default probability is:

a. 2.74%
b. 12.78%
c. 12.79%
d. 30.56%

Answer: **a**

Explanation: According to the Merton model, the default probability is
N[Ln(100/130) − (25% − (30%2)/2) * 5}/(30% * sqrt(5))] = 2.74%
a.   Is correct
b.   Incorrect N[Ln(130/100) + (25% + (30%2)/2) * 5}/(30% * sqrt(5))] = 12.78%
c.   Incorrect N[Ln(100/130) + (25% − (30%)/2) * 5}/(30% * sqrt(5))] = 12.79%
d.   Incorrect − N[Ln(100/130) − (25% + (30%2)/2) * 5}/(30% * (5))] = 30.56%

Topic: Credit Risk Measurement and Management
Subtopic: Credit Derivatives
Reference: Rene M. Stulz, Risk Management and Derivatives (Mason, Ohio: South-Western, 2003), Chapters 18

28. There are different commercially available credit risk models. These models exhibit significant differences as well as similarities. Which of the following models builds on transition probabilities determined by macro factors?

    a. CreditMetrics
    b. KMV's PortfolioManager
    c. CreditRisk+
    d. CreditPortfolioView

Answer: **b**

Explanation: CreditMetrics, PortfolioManager, and CreditRisk+ use constant transition probabilities; CreditPortfolioView uses transition probabilities determined by macro factors.

Topic: Credit Risk Measurement and Management
Subtopic: Credit risk management models
Reference: Arnaud de Servigny and Olivier Renault, Measuring and Managing Credit Risk.

29. John Smith is a bank supervisor responsible for the oversight of Everbright Group, a large banking conglomerate. Everbright Group now determines its credit risk profile according to the foundation IRB approach and assesses operational risk according to the standardized approach as described in the Basel II Capital Accord. Which of the following are specific issues that should be addressed as part of Smith's supervisory review process of Everbright Group?

   i.   Review the bank's internal control systems.
   ii. Check compliance with transparency requirements as described in Pillar 3 of Basel II Accord.
   iii. Make sure that the bank estimates for LGD and EAD for its corporate loans are in compliance with supervisory estimates.
   iv. Evaluate the impact of interest rate risk by assessing the impact of a 200 basis point interest rate shock to the bank's capital position.

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

Answer: **c**

Explanation: The supervisor's duties as part of the supervisory review process include:
Check compliance with Pillars I and III of Basel II Accord, which would include credit risk mitigation and transparency requirements. Review internal control systems. Access internal capital management methods employed by the bank. So I and II are correct. Note that the foundation IRB approach, the bank provides its estimates for PD but uses supervisory estimates for LGD and EAD for corporate loans. So III is incorrect. Also, the impact of interest rate risk on the bank's capital position must be accessed by determining the impact of a 200 basis point shock or its equivalent. So IV is also correct. Therefore, the correct answer for this question is choice C.

Topic: Operational and Integrated Risk Management
Subtopic: Basel II Accord
Reference: "Basel II: International Convergence of Capital Measurement and Capital Standards: A Revised Framework – Comprehensive Version" (Basel Committee on Banking Supervision Publication, June 2006)

30. Silo Bank begins its risk measurement process by calculating VaR for market, credit, and operational risk individually, and then aggregates the three measures to produce a firm-wide VaR. Correlation between risk types is a key input for calculating firm-wide VaR. Which of the following statements about correlation are valid?

i.   When market and credit risks involve securities issued by firms such as bonds, warrants, and stocks, correlation estimates for market and credit risk can be derived using equity returns if Merton's model for the pricing of debt holds.

ii. If correlations between highly adverse market, credit, and operational outcomes are high, there is diversification across risk categories and therefore the firm-wide VaR is substantially less than the sum of the market, credit, and operational risk VaRs.

iii. With non-normal distributions, the use of correlations estimated using historical data from a stable period may not adequately capture how extreme returns for one type of risk are related to extreme returns of another type of risk.

    a. i, ii and iii
    b. i only
    c. ii and iii only
    d. None of the statements are valid.

Answer: b

Explanation:
i.   is true.
ii.   is false – if correlations are low, there is diversification benefit.
iii. is false – asset correlations tend to be higher in times of stress.

Topic: Operational and Integrated Risk Management
Subtopic: Economic capital and risk aggregation
Reference: Nocco and Stulz; "Enterprise Risk Management: Theory and Practice".

31. The Trading Desk of Global Bank PLC presents its risk manager with a potential trade. The trade is to provide support through a bank guarantee to the AAA tranche issued by a Special Purpose Vehicle (SPV). The SPV's assets are restricted to residential mortgage loans that have been sold by other originating banks into the pool, making the bond issued by the SPV an RMBS. As far as the bank knows, no further relationship is known to exist between the originating banks and the SPV issuing the AAA tranche of the RMBS in question. As a risk manager, the first decision is to evaluate the potential for counterparty risk in this transaction. Taking into account that no additional external credit enhancements are available here, which party involved in the complex securitization transaction would expose Global Bank PLC to counterparty risk?

    a. There is only counterparty exposure with the regional banks that originated the mortgages that are securitized in the SPV because in providing the bank guarantee to the AAA tranche on this RMBS, Global Bank PLC is exposed to the credit quality of these banks.

    b. There is counterparty exposure to both the regional banks and the SPV issuing the RMBS, and any default in either would directly affect Global Bank PLC.

    c. There is only counterparty exposure to the SPV because if the mortgages in the SPV were to default, the SPV would not be able to continue to make payments.

    d. There is no counterparty exposure as the bank guarantee to be provided by Global Bank PLC is only a contingent exposure.

Answer: **c**

Explanation:
a. Is Incorrect. There is only counterparty exposure with the regional banks that originated the mortgages that are securitized in the SPV because in providing the bank guarantee to the AAA tranche on this RMBS, Global Bank PLC is exposed to the credit quality of these banks.
b. Is Incorrect. There is counterparty exposure to both the regional banks and the SPV issuing the RMBS and any default in either would directly affect Global Bank PLC.
c. Correct. There is only counterparty exposure to the SPV because if the mortgages in the SPV were to default, the SPV would not be able to continue to make payments.
d. Is Incorrect. There is no counterparty exposure as the bank guarantee to be provided by Global Bank PLC is only a contingent exposure.

Topic: Credit Risk Measurement and Management
Subtopic: Structured finance, securitization, tranching and subordination.
Reference: Adam Ashcroft and Til Schuermann, "Understanding the Securitization of Subprime Mortgage Credit", 2007.

32. A credit risk manager of Esta Bank is reviewing the credit risk of a EUR 400,000 loan to KidCo, which is a subsidiary of Pattern Inc. Assume that KidCo will default if Pattern Inc. defaults, but Pattern Inc. will not necessarily default if KidCo defaults. If Pattern Inc. has a 1-year probability of default of 1% and KidCo has a 1-year probability of default of 5% given that Pattern Inc. does not default, what is the probability that KidCo defaults in the next year?

    a. 5.00%
    b. 6.00%
    c. 5.95%
    d. 4.95%

Answer: **c**

Explanation: This question tests that candidates understand conditional probability in the context of a credit risk question. Here are 4 possible scenarios and probabilities:

Scenario	Probability	Explanation
Pattern Inc. defaults, KidCo does not default	0.0%	By assumption, KidCo defaults if Pattern Inc. defaults
Pattern Inc. defaults, KidCo defaults	1.0%	Pattern Inc. has a 1% probability of default in the next year
Pattern Inc. does not default, KidCo defaults	4.95%	Pattern Inc. does not default with probability 99%, KidCo defaults with probability 5%
Pattern Inc. does not default, KidCo does not default	94.05%	Pattern Inc. does not default with probability 99%, KidCo does not default with probability 95%

KidCo defaults in scenarios 2 and 3 with probability 5.95%.

a.   This is the probability KidCo defaults, given Pattern Inc. does not default
b.   This is the probability KidCo defaults, given Pattern Inc. does not default plus the probability that Pattern Inc. defaults
c.   Correct.
d.   This is the probability both KidCo and Pattern Inc. do not default

Topic: Credit Risk Measurement and Management
Subtopic: Structured finance, securitization, tranching and subordination.
Reference: Culp; Chapters 13,16; Hull, Chapter 23.

33. The spread on a one-year BBB-rated bond relative to the risk-free treasury of similar maturity is 1.4%. It is estimated that the contribution to this spread by all noncredit factors (e.g., liquidity risk, taxes) is 0.4%. Assuming the loss given default rate for the underlying credit is 40%, what is, approximately, the implied default probability for this bond?

    a. 1.67%
    b. 2.33%
    c. 3.50%
    d. 2.50%

Answer: **d**

Explanation: The probability of default equals the credit risk spread divided by the loss given default.
PD = spread / LGD Here, the spread due to credit risk equals 1.4% - 0.4% or 1.0% and the loss given default is 40%.
The probability of default is then 2.5%.
a.   is incorrect. Incorrectly sets PD = 1.0/0.6 = 1.67.
b.   is incorrect. Incorrectly sets PD = 1.4/0.6 = 2.33.
c.   is incorrect . Incorrectly sets PD = 1.4/0.4 = 3.50.

Topic: Credit Risk Measurement and Management
Subtopic: Probability of default, loss given default and recovery rates.
Reference: Arnaud de Servigny and Oliver Renault, Measuring and Managing Credit Risk, (New York: McGraw-Hill, 2004) chapter 3, 4

34. The following table lists the default probabilities for an A-rated issue by a company facing the risk of imminent downgrade.

Year	Default Probability
1	0.300%
2	0.450%
3	0.550%

Assume that defaults, if they take place, only happen at the end of the year. Based on the information in the table above, calculate the cumulative default rate at the end of each of the next three years.

a. 0.300%, 0.750%, 1.300%
b. 0.300%, 0.150%, 0.250%
c. 0.300%, 0.749%, 1.295%
d. 0.300%, 0.449%, 0.548%

Answer: **c**

Explanation: Assume that dt signifies default by the end of the year.
d1 = 0.300%
d2 = 0.450%
d3 = 0.550%.
At the end of the first year, the survival rate is S1= 1-d1=1-0.300% = 99.700%.
At the end of the second year, the survival rate is S2 = S1 × (1-d2) =0.997×(1-0.00450) = 0.992514.
The default is C2 = 1-S2 =1-0.992514 = 0.00749
At the end of the third year, the survival rate is S3 = S2 × (1-d3) =0. 992514×(1-0.00550) = 0.987055
The default is C3 = 1- S3 = 1- S2×(1- d3) = 1- 0.992514×(1-0.00550) = 0.01295.
a.   is incorrect because the calculations assume the survival rate is at 100%.
b.   is incorrect because the calculations assume that the increments in the default probability are equal to the cumulative default rates.
c.   is correct.
d.   is incorrect because of calculation errors.

Topic: Credit Risk Measurement and Management
Subtopic: Probability of default, loss given default and recovery rates.
Reference: Arnaud de Servigny and Oliver Renault, Measuring and Managing Credit Risk, (New York: McGraw-Hill, 2004) chapter 3, 4

35. Which of the following statements are true?

i.   Hedge fund manager compensation is often symmetric (i.e., a dollar of gain has the opposite impact on compensation as a dollar of loss), while the compensation of mutual fund managers is almost always asymmetric.

ii. Leverage obtained through lines of credit increases the risk of a hedge fund more than leverage obtained by issuing debt, because unexpected cancellation of a line of credit by a lender during troubled times can force a fund to liquidate its positions in illiquid markets.

iii. A hedge fund investor should pay performance-based compensation to the manager for producing alpha, but should not pay performance-based compensation to a hedge fund manager who has done well because the fund invests in risk factors that mirror the performance of his style or strategy, and the style or strategy has performed well.

iv. The lack of hedge fund transparency is particularly problematic for investors with fiduciary responsibilities such as pension fund managers, and to secure funding from these investors, hedge fund managers often have to provide more information to these investors.

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

Answer: **b**

Explanation: Statements ii, iii and iv are true. Statement i is false – the opposite is true.

Topic: Risk Management and Investment Management
Subtopic: Hedge fund risk management
References: René M. Stulz, "Hedge Funds: Past, Present and Future".

36. Which of the following statements does not identify a potential factor that played a role in the subprime crisis?

    a. Many products offered to subprime borrowers were very complex and subject to misunderstanding and/or misrepresentation.

    b. Credit ratings were assigned to subprime MBS with significant error. Even though the rating agencies publicly disclosed their rating criteria for subprime, investors lacked the ability to evaluate the efficacy of these models.

    c. Existing investment mandates often distinguished between structured and corporate ratings, forcing asset managers to evaluate structured debt issues and corporate debt issues with the same credit rating but different coupons.

    d. Without due diligence by the asset manager, the arranger's incentives to conduct its own due diligence are reduced.

Answer: **c**

Explanation: Existing investment mandates failed to consider the rating in relation to the type of security considered and assumed that an AAA rating for a corporate and an AAA rating for a CDO could be treated exactly the same. Existing investment mandates did not adequately distinguish between structured and corporate ratings. Asset managers had an incentive to reach for yield by purchasing structured debt issues with the same credit rating but higher coupons as corporate debt issues.

Topic: Credit Risk Measurement and Management
Subtopic: Securitization
Reference: Adam Ashcroft and Til Schuermann, "Understanding the Securitization of Subprime Mortgage Credit"

37. Which of the following instruments has or have the most potential counterparty credit risk when the final exchange draws near maturity?

    i.   An FX forward contract in which the bank will pay USD 1.1 million and receive EUR 0.77 million on December 1, 2008.

    ii.   A EUR 10 million interest rate swap with one remaining payment due December 1, 2008, in which the bank pays EURIBOR + 1.0% and receives 4.5%.

    iii. A cross-currency swap with final payments due December 1, 2008, in which the bank pays 5% annually on a notional USD 1.1 million and receives 10% annually on a notional value of EUR 0.7 million.

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

Answer: **c**

Explanation: FX forwards and Cross currency swaps with final exchange involves exchanging two currencies at rates fixed at inception. Because of this, the potential future credit exposure profile peaks at maturity for both these instruments. In case of interest rate swaps, there is no exchange of notional amounts. Therefore, the profile tends to peak well before maturity.

Topic: Credit Risk Measurement and Management
Subtopic: Counterparty risk

38. You have a long position in a digital call option – an option that is also called cash-or-nothing – on shares in Global Enterprises. The digital call has a strike price of USD 20 with one year remaining to expiration. Assume that the shares currently trade at USD 22 and annual return volatility of Global Enterprises shares is 15%. Which of the following sensitivities would be associated with this option?

    i.   Delta is positive.
    ii.   Gamma is positive.
    iii. Vega is negative.
    iv. Vega is positive.

Which statements are true?

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

Answer: **a**

Explanation: A call spread replicates a cash-or-nothing option. Such long call spread is constituted by a long call C1 with a strike K-epsilon, and a short call C2 with a strike K+epsilon where epsilon is small. The strategy is market bullish, the delta is always positive so I is true. Furthermore, the vega and gamma can be positive or negative depending on the spot level. When the underlying price is bigger than the strike price, the vega is negative and the gamma as well corresponding to C2's Greeks. So, II is wrong and III is true.

Topic: Market Risk Measurement and Management
Subtopic: Exotic derivatives
Reference: John Hull, Options, Futures, and Other Derivatives, 7th Edition.

39. The Merton model is used to predict default. It builds on several very strong assumptions and its applicability is hampered by practical difficulties. Which of the following statements does not correctly identify limiting assumptions or practical difficulties of using the model?

    a. The Merton Model relies on a simplistic capital structure consisting of only one debt issue.
    b. The Merton Model asset value volatility cannot be estimated because firm value does not trade.
    c. The Merton Model assumes that debt does not pay a coupon while most publicly-trade debt is coupon debt.
    d. The Merton Model assumes a constant riskless interest rate.

Answer: **b**

Explanation: Firm asset volatility can be estimated using equity and call option on equity, so firm asset value does not have to trade.

Topic: Credit Risk Measurement and Management
Subtopic: Credit risk management models
Reference: Arnaud de Servigny and Olivier Renault, Measuring and Managing Credit Risk Chapter 3 – Default Risk: Quantitative Methodologies
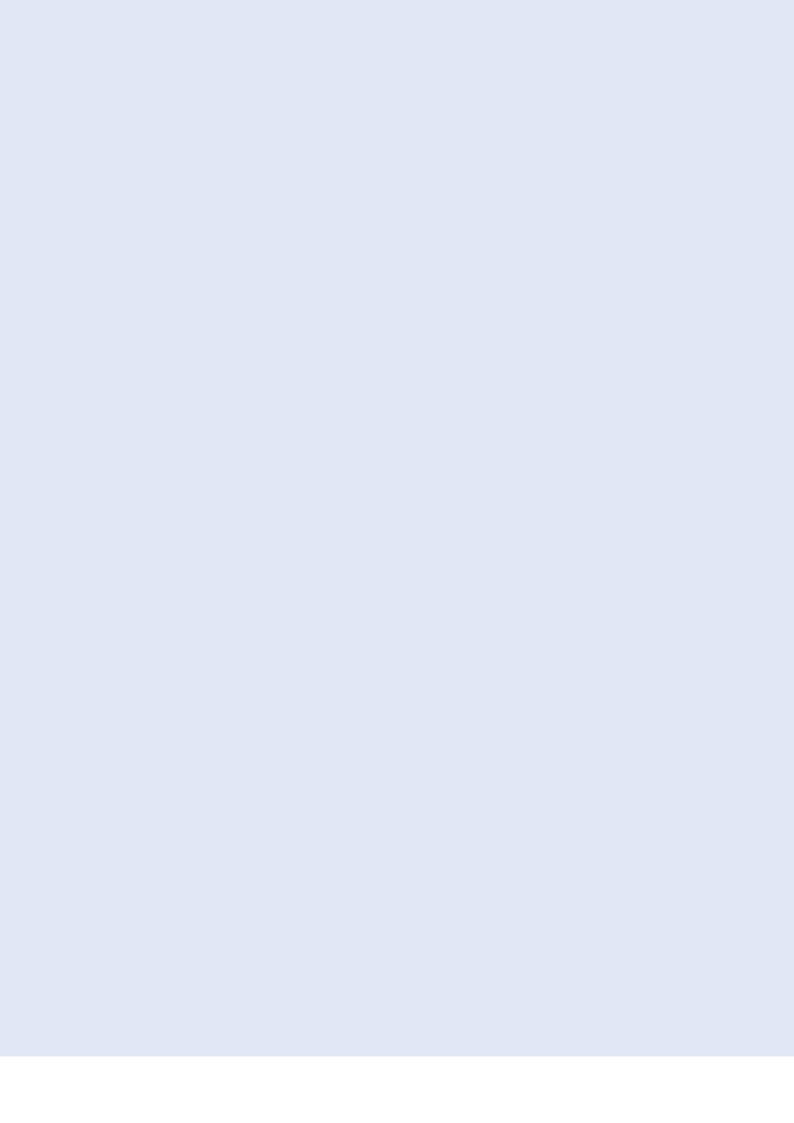

40. The current yield-to-maturity on a 1-year zero coupon bond with a face value of 1,000 is 3%. There is an equal probability that, in the coming 6 months, the yield will either increase or decrease by 50 bp, respectively (to 2.5% and 3.5%, respectively). Using this information, what is the expected discounted value of the zero-coupon bond?

    a. 969.45
    b. 970.67
    c. 982.80
    d. 985.23

Answer: **b**

Explanation: The other alternatives are either intermediate steps or random incorrect number.

Topic: Market Risk Measurement and Management
Subtopic: Term structure models
Reference: Tuckman – Chapter 9

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