

---

# 2013 FRM PART I PRACTICE EXAMS

---

|                                   |    |
|-----------------------------------|----|
| HOW TO USE THE FRM PRACTICE EXAMS | 3  |
| PRACTICE EXAM 1                   | 4  |
| PRACTICE EXAM 1 ANSWERS           | 33 |
| PRACTICE EXAM 2                   | 48 |
| PRACTICE EXAM 2 ANSWERS           | 76 |
| DISTRIBUTION TABLES               | 92 |

FRM PART I SCHWESER PRACTICE EXAMS

©2013 Kaplan, Inc., d.b.a. Kaplan Schweser. All rights reserved.

Printed in the United States of America.

ISBN: 978-1-4277-4471-5 / 1-4277-4471-8

PPN: 3200-3235

---

**Required Disclaimer:** GARP® does not endorse, promote, review, or warrant the accuracy of the products or services offered by Kaplan Schweser of FRM® related information, nor does it endorse any pass rates claimed by the provider. Further, GARP® is not responsible for any fees or costs paid by the user to Kaplan Schweser, nor is GARP® responsible for any fees or costs of any person or entity providing any services to Kaplan Schweser. FRM®, GARP®, and Global Association of Risk Professionals™ are trademarks owned by the Global Association of Risk Professionals, Inc.

These materials may not be copied without written permission from the author. The unauthorized duplication of these notes is a violation of global copyright laws. Your assistance in pursuing potential violators of this law is greatly appreciated.

Disclaimer: The Schweser Practice Exams should be used in conjunction with the original readings as set forth by GARP®. The information contained in these Practice Exams is based on the original readings and is believed to be accurate. However, their accuracy cannot be guaranteed nor is any warranty conveyed as to your ultimate exam success.

---

# HOW TO USE THE FRM PRACTICE EXAMS

---

Test yourself with these practice exams only after you have completed all assigned readings.

The purpose of these practice questions is to make sure that you know most of the concepts and ideas that are in the assigned readings. If you truly know the material, you will do well on the actual exam. While our practice questions cover the material, **they are not the actual exam questions**. Our practice exams are not designed to predict your score on the actual FRM Exam. Use these exams to identify those areas for which you need additional work.

Remember that GARP tries very hard every year to develop new and innovative ways to test you. Your only defense against a tricky exam writer is to actually know the material. Learning and recalling the material is what our questions are designed to help you do.

The Part I FRM Exam contains 100 multiple-choice questions. You will have four hours to complete the entire exam (240 minutes). Our practice exams are weighted according to the 2013 topic area coverage and weightings assigned by GARP:

| <i>Book</i> | <i>Topic Area</i>              | <i>Exam Weight</i> | <i>Questions</i> |
|-------------|--------------------------------|--------------------|------------------|
| 1           | Foundations of Risk Management | 20%                | 20               |
| 2           | Quantitative Analysis          | 20%                | 20               |
| 3           | Financial Markets and Products | 30%                | 30               |
| 4           | Valuation and Risk Models      | 30%                | 30               |

The actual exam questions, however, are not presented by category (e.g., Foundations of Risk Management first, then Quantitative Analysis). According to GARP, FRM candidates are expected to be able to recognize and deal with risk-related topics in an all-encompassing manner. On the exam, the presentation of questions will test this ability. Our practice exams are designed to prepare you for this possible exam format.

Whatever you do, **don't memorize these questions**. Instead, learn the logic behind each of the questions. GARP isn't going to ask you our questions, but they will ask you questions that address the same concepts, logic, and definitions necessary to answer these practice exam questions.

# PRACTICE EXAM 1

FRM Exam Part I contains 100 multiple-choice questions. You must answer the questions by filling in a scantron sheet with a number 2 or HB pencil. For realism, we suggest that you use this answer sheet and darken the bubbles corresponding to your answers. You have 240 minutes (4 hours) to complete this exam. That equates to 2.4 minutes per question, so budget your time well. Good luck!

1.  a  b  c  d

2.  a  b  c  d

3.  a  b  c  d

4.  a  b  c  d

5.  a  b  c  d

6.  a  b  c  d

7.  a  b  c  d

8.  a  b  c  d

9.  a  b  c  d

10.  a  b  c  d

11.  a  b  c  d

12.  a  b  c  d

13.  a  b  c  d

14.  a  b  c  d

15.  a  b  c  d

16.  a  b  c  d

17.  a  b  c  d

18.  a  b  c  d

19.  a  b  c  d

20.  a  b  c  d

21.  a  b  c  d

22.  a  b  c  d

23.  a  b  c  d

24.  a  b  c  d

25.  a  b  c  d

26.  a  b  c  d

27.  a  b  c  d

28.  a  b  c  d

29.  a  b  c  d

30.  a  b  c  d

31.  a  b  c  d

32.  a  b  c  d

33.  a  b  c  d

34.  a  b  c  d

35.  a  b  c  d

36.  a  b  c  d

37.  a  b  c  d

38.  a  b  c  d

39.  a  b  c  d

40.  a  b  c  d

41.  a  b  c  d

42.  a  b  c  d

43.  a  b  c  d

44.  a  b  c  d

45.  a  b  c  d

46.  a  b  c  d

47.  a  b  c  d

48.  a  b  c  d

49.  a  b  c  d

50.  a  b  c  d

51.  a  b  c  d

52.  a  b  c  d

53.  a  b  c  d

54.  a  b  c  d

55.  a  b  c  d

56.  a  b  c  d

57.  a  b  c  d

58.  a  b  c  d

59.  a  b  c  d

60.  a  b  c  d

61.  a  b  c  d

62.  a  b  c  d

63.  a  b  c  d

64.  a  b  c  d

65.  a  b  c  d

66.  a  b  c  d

67.  a  b  c  d

68.  a  b  c  d

69.  a  b  c  d

70.  a  b  c  d

71.  a  b  c  d

72.  a  b  c  d

73.  a  b  c  d

74.  a  b  c  d

75.  a  b  c  d

76.  a  b  c  d

77.  a  b  c  d

78.  a  b  c  d

79.  a  b  c  d

80.  a  b  c  d

81.  a  b  c  d

82.  a  b  c  d

83.  a  b  c  d

84.  a  b  c  d

85.  a  b  c  d

86.  a  b  c  d

87.  a  b  c  d

88.  a  b  c  d

89.  a  b  c  d

90.  a  b  c  d

91.  a  b  c  d

92.  a  b  c  d

93.  a  b  c  d

94.  a  b  c  d

95.  a  b  c  d

96.  a  b  c  d

97.  a  b  c  d

98.  a  b  c  d

99.  a  b  c  d

100.  a  b  c  d



---

# PRACTICE EXAM 1

---

1. In analyzing two commonly used value at risk (VaR) methods, which of the following statements regarding such methods is least likely correct?
  - a. The delta-normal method often results in a lower proportion of distributions with thin tails.
  - b. The delta-normal method does not allow for a reasonable valuation of option-like positions.
  - c. The historical simulation method often recognizes changes in volatility and correlations from structural changes.
  - d. The historical simulation method is not subject to model risk.
  
2. A \$1,000 par corporate bond carries a coupon rate of 6%, pays coupons semiannually, and has ten coupon payments remaining to maturity. Market rates are currently 5%. There are 90 days between settlement and the next coupon payment. The dirty and clean prices of the bond, respectively, are closest to:
  - a. \$1,043.76, \$1,013.76.
  - b. \$1,043.76, \$1,028.76.
  - c. \$1,056.73, \$1,041.73.
  - d. \$1,069.70, \$1,054.70.
  
3. Which of the following statements regarding option “Greeks” is incorrect?
  - a. Vega is highest when options are at-the-money.
  - b. Forward instruments cannot be used to create gamma-neutral positions.
  - c. Rho is higher for at-the-money versus in-the-money options.
  - d. Gamma represents the expected change in delta for a change in the value of the underlying instrument.
  
4. A bank has a USD 4 million portfolio available for investing. The cost of funds for the \$4 million is 5.5%. The bank lends 50% of the assets to domestic customers for an average loan rate of 7.35%. The rest of the portfolio is lent to some UK clients at 8% at a current exchange rate of USD1.62/GBP. At the same time, the bank sells a forward contract to eliminate exchange rate risk equal to the expected receipts one year from now. The forward rate is USD1.52/GBP. The net interest margin on the bank’s investment balance sheet is closest to:
  - a. -1.16%.
  - b. 1.93%.
  - c. 2.18%.
  - d. 4.34%.

5. Bob James sells a March 2010 call on XYZ stock with an exercise price of \$45 for a \$3 premium. He also buys a March 2010 call on the same stock with an exercise price of \$40 for a \$5 premium. Identify this option strategy and the maximum profit and loss for the investor.
- Bear call spread, maximum profit is \$3, maximum loss is \$2.
  - Bull call spread, maximum profit is \$3, maximum loss is unlimited.
  - Bear call spread, maximum profit is unlimited, maximum loss is \$2.
  - Bull call spread, maximum profit is \$3, maximum loss is \$2.
6. Based on a sample size of 100 and sample mean of \$30, you estimate a 95% confidence interval for the mean weekly soft drink expenditures of students at a local college. Your estimate of the confidence interval is \$26.77 to \$33.23. Since you knew the standard deviation beforehand, your confidence interval was based on a standard deviation closest to:
- 1.65.
  - 6.59.
  - 11.53.
  - 16.48.
7. Consider a 1-year European call option with a strike price of \$27.50 that is currently valued at \$4.10 on a \$25 stock. The 1-year risk-free rate is 6% compounded annually. Which of the following is closest to the value of the corresponding put option (assume continuous compounding)?
- \$0.00.
  - \$4.95.
  - \$5.00.
  - \$5.04.
8. Which of the following statements comparing VaR with expected shortfall is true?
- Expected shortfall is sub-additive while VaR is not.
  - Both VaR and expected shortfall measure the amount of capital an investor can expect to lose over a given time period and are, therefore, interchangeable as risk measures.
  - Both VaR and expected shortfall depend on the assumption of a normal distribution of returns.
  - VaR can vary according to the confidence level selected, but expected shortfall will not.

9. Cooper Industries (Cooper) is the pay-fixed counterparty in an interest rate swap. The swap is based on a notional value of \$2,000,000, and Cooper receives a floating rate based on the 6-month Hong Kong Interbank Offered Rate (HIBOR). Cooper pays a fixed rate of 7% semiannually. A swap payment has just been made. The swap has a remaining life of 18 months, with pay dates at 6, 12, and 18 months. Continuously compounded spot HIBOR rates are shown in the table below.

|                |      |
|----------------|------|
| 6-month HIBOR  | 6.5% |
| 12-month HIBOR | 6.8% |
| 18-month HIBOR | 7.5% |
| 24-month HIBOR | 7.7% |

The value of the swap to Cooper is closest to:

- a. \$0.  
b. \$6,346.  
c. \$17,093.  
d. \$72,486.
10. Metallgesellschaft Refining and Marketing (MGRM) offered customers contracts to buy fixed amounts of heating oil and gasoline at a fixed price over a 5- or 10-year period. The customer contracts effectively gave MGRM a short position. MGRM hedged exposure using a stack-and-roll hedging strategy. A stack-and-roll hedge is best described as:
- a. buying futures contracts of different expirations and allowing them to expire in sequence.  
b. buying futures contracts of different expirations and closing out the position shortly before expiration.  
c. using short-term futures to hedge a long-term risk exposure by replacing them with longer-term contracts shortly before they expire.  
d. using short-term futures contracts with a larger notional value than the long-term risk they are meant to hedge.
11. Assume an investor holds a portfolio of bonds as follows:
- \$2,000,000 par value of 10-year bonds with a duration of 6.95 priced at 95.5000.
  - \$3,000,000 par value of 15-year bonds with a duration of 9.77 priced at 88.6275.
  - \$5,000,000 par value of 30-year bonds with a duration of 14.81 priced at 114.8750.

The duration of this portfolio is closest to:

- a. 10.64.  
b. 12.06.  
c. 13.28.  
d. 13.57.



12. A portfolio manager wishes to leverage her equity position using index futures to a beta of 1.5. She currently has a well-diversified \$250 million equity portfolio with a beta correlated to the market. The current value of the S&P futures index is 1,200 (multiplier of 250). How many contracts are necessary to adjust the beta of this portfolio?
- Short 417 contracts.
  - Short 1,250 contracts.
  - Long 417 contracts.
  - Long 1,250 contracts.
13. Nevin Woodcomb is a portfolio manager for the Matrix Tactical Growth Fund, a 1940 Act mutual fund with total assets of \$225 million. The mandate of the mutual fund is to make active tactical shifts in long and short exposure based on current views of stock market action. Recently, Woodcomb has been cautious on stocks and has positioned the fund with a beta of  $-0.30$ ; however, the most recent jobless claims were more positive than Woodcomb expected, and he expects the stock market to rally strongly when the monthly non-farm payroll data is released. Woodcomb would like to take advantage of this market rally using S&P 500 index futures and increase the fund's beta to 1.25. Currently, S&P 500 futures are trading at 1,140 and the multiplier is 250. How can Woodcomb achieve his objective for his fund?
- Sell 751 contracts.
  - Buy 751 contracts.
  - Buy 988 contracts.
  - Buy 1,224 contracts.
14. A hedge fund is considering using one of the following three methods for estimating value at risk (VaR): traditional historical simulation, multivariate density estimation, or a hybrid method (i.e., age-weighted historical simulation). Which of the following statements is an advantage of these methods compared to parametric methods for estimating VaR?
- The multivariate density estimation is very flexible in introducing dependence on economic state variables.
  - Deviations from normality may be a concern for the historical simulation, multivariate density estimation, or hybrid methods.
  - Data is used more efficiently with historical simulation, multivariate density estimation, and hybrid methods than with parametric methods.
  - The hybrid approach requires distribution assumptions.
15. Past financial disasters have resulted when a firm allows a trader to have dual roles as both the head of trading and the head of the back-office support function. Which of the following case studies did not involve this particular operational risk oversight?
- Allied Irish Bank.
  - Barings.
- I only.
  - II only.
  - Both I and II.
  - Neither I nor II.

16. An analyst is concerned with the symmetry and peakedness of a distribution of returns over a period of time for a company she is examining. She does some calculations and finds that the median return is 4.2%, the mean return is 4.8%, and the modal return is 3.7%. She also finds that the measure of excess kurtosis is 2. Based on this information, the correct characterization of the distribution of returns over time is:
- |    | <u>Skewness</u> | <u>Kurtosis</u> |
|----|-----------------|-----------------|
| a. | Positive        | Leptokurtic     |
| b. | Positive        | Platykurtic     |
| c. | Negative        | Platykurtic     |
| d. | Negative        | Leptokurtic     |
17. Tip-Top, Inc., (Tip-Top) has a commitment with SuperSize Bank for \$10 million. The terms of the loan are fixed and cannot be changed over its life. Tip-Top experiences an unexpected change in its credit rating from Ba to Baa. Explain the most likely effect on expected loss and actual loss.
- SuperSize Bank will increase the estimate of expected loss but not actual loss.
  - SuperSize Bank will increase the estimate of expected loss and increase its estimate of actual loss.
  - SuperSize Bank will decrease the estimate of expected loss but not actual loss.
  - SuperSize Bank will decrease the estimate of expected loss and increase its estimate of actual loss.
18. The capital asset pricing model (CAPM) is based on several limiting assumptions. Which of the following statements is correct regarding the CAPM? The CAPM:
- does not assume that the expected excess returns for the market are known.
  - assumes that the market portfolio should be the one with the highest Sharpe ratio of all possible portfolios.
  - does not assume that investors have access to the same information.
  - assumes that investors' expectations regarding risk and return are not identical but normally distributed.
19. The spot rate for a commodity is \$19. The annual lease rate for the commodity is 5%. The appropriate continuously compounded annual risk-free rate is 6.5%. Which of the following amounts is closest to the 3-month commodity forward price?
- \$18.46.
  - \$18.93.
  - \$19.07.
  - \$19.55.

20. A buffalo farmer is concerned that the price he can get for his buffalo herd will be less than he has forecasted. To protect himself from price declines in the herd, the farmer has decided to hedge with live cattle futures. Specifically, he has entered into the appropriate number of cattle future positions for September delivery that he believes will help offset any buffalo price declines during the winter slaughter season. The appropriate position and the likely sources of basis risk in the hedge are, respectively:
- short; choice of futures delivery date.
  - short; choice of futures asset.
  - short; choice of futures delivery date and asset.
  - long; choice of futures delivery date and asset.
21. Trudy Baker, FRM, and Steven Phillips, FRM, are conducting regression analysis. As part of their preliminary analysis, Baker and Phillips plan to employ a scattergram as well as examine residuals. Baker suggests that a scattergram will indicate if the relationship of interest is positive or negative. Phillips suggests that the residual of a sample regressions for a large sample will not equal the corresponding population error term. With respect to Baker's and Phillips's plans and assertions:
- both Baker and Phillips are wrong.
  - both Baker and Phillips are correct.
  - Phillips is wrong and Baker is correct.
  - Baker is wrong and Phillips is correct.
22. A forward contract on a stock index was created three months ago. The current price of the index is \$1,100. Expressed on a continuously compounded annual basis, the risk-free rate of interest is 4% and the index pays a dividend of 2%. The contract requires delivery three months from today at a price of \$1,080. The value of the contract is closest to:
- \$8.97.
  - \$14.44.
  - \$25.26.
  - \$30.44.
23. In building a portfolio of fixed income securities for one of your clients, you determine that the use of STRIPS (separate trading of registered interest and principal securities) issued by the Treasury would assist in reducing reinvestment risk. Which of the following statements regarding STRIPS is correct?
- STRIPS tend to trade at a premium.
  - Shorter-term C-STRIPS (coupon) tend to trade at a discount.
  - Longer-term C-STRIPS (coupon) tend to trade at a premium.
  - STRIPS tend to have significant risk of illiquidity.

24. A company is considering entering into a joint venture that will require an investment of \$10 million. The project is expected to generate cash flows of \$4 million, \$3 million, and \$4 million in each of the next three years, respectively. Assuming a discount rate of 10%, what is the project's net present value (NPV)?
- \$879,000.
  - \$309,000.
  - +\$100,000.
  - +\$243,000.
25. Analyst Joseph Lockwood examines a single-factor regression for a hedge fund and makes the following two statements:
- Statement 1:* Heteroskedasticity exists if the regression residuals are correlated with their lagged values.
- Statement 2:* Heteroskedasticity causes the *t*-statistics of the regression to be incorrectly calculated using ordinary least squares methods.
- Which of Lockwood's claims are correct?
- Statement 1 is correct and Statement 2 is correct.
  - Statement 1 is correct and Statement 2 is incorrect.
  - Statement 1 is incorrect and Statement 2 is correct.
  - Statement 1 is incorrect and Statement 2 is incorrect.
26. A stock currently trades at \$10. At the end of three months, the stock will either be \$11 or \$9. The continuously compounded risk-free rate of interest is 3.5% per year. The value of a 3-month European call option with a strike price of \$10 is closest to:
- \$0.11.
  - \$0.54.
  - \$0.65.
  - \$1.01.
27. Isabelle Burns, FRM, is an investment advisor for a firm whose client base is composed of high net worth individuals. In her personal portfolio, Burns has an investment in Torex, a company that has developed software to speed up Internet browsing. Burns has thoroughly researched Torex and believes the company is financially strong yet currently significantly undervalued. According to the GARP Code of Conduct, Burns may:
- not recommend Torex as long as she has a personal investment in the stock.
  - not recommend Torex to a client unless her employer gives written consent to do so.
  - recommend Torex to a client, but she must disclose her investment in Torex to the client.
  - recommend Torex to a client without disclosure as long as it is a suitable investment for the client.

28. Donaldson Capital Management, a regional money management firm, manages nearly \$400 million allocated among three investment managers. All portfolios have the same objective, which is to produce superior risk-adjusted returns (by beating the market) for their clients. You have been hired as a consultant to measure the performance of the portfolio managers. You have collected the following information based on the last ten years of returns.

| Portfolio Manager | Mean Annualized Rate of Return | Beta | Standard Deviation of Return |
|-------------------|--------------------------------|------|------------------------------|
| A                 | 0.18                           | 1.35 | 0.24                         |
| B                 | 0.21                           | 1.95 | 0.25                         |
| C                 | 0.24                           | 2.10 | 0.22                         |

During the same time period the average annual rate of return on the market portfolio was 13% with a standard deviation of 19%. In order to assess the portfolio performance of the above managers, you should use:

- the Treynor measure of performance.
  - the Sharpe measure of performance.
  - the Jensen measure of performance.
  - the Sortino measure of performance.
29. Which of the following statements about sampling and the central limit theorem is least likely correct?
- The variance of the distribution of sample means is  $\sigma^2/n$ .
  - The central limit theorem may be used for large sample sizes for skewed distributions.
  - The mean of the population and the mean of all possible sample means are always equal.
  - The standard deviation of the mean of many observations is more than the standard deviation of a single observation.
30. Bank regulators are examining the loan portfolio of a large, diversified lender. The regulators' main concern is that the bank remains solvent during turbulent economic times. Which of the following is most likely the area on which the regulators will want to focus?
- Expected loss, since each asset can expect, on average, to decline in value from a positive probability of default.
  - Expected loss, given the decrease in underwriting standards of new loans.
  - Unexpected loss, since the bank will need to set aside additional capital for the unlikely event that recovery rates are smaller than expected.
  - Unexpected loss, since the bank will need to set aside additional capital for the unlikely event that usage given default is smaller than expected.

31. An analyst develops the following probability distribution about the state of the economy and the market.

| Initial Probability P(A) | Conditional Probability P(B   A) |
|--------------------------|----------------------------------|
| Good economy 60%         | Bull market 50%                  |
|                          | Normal market 30%                |
|                          | Bear market 20%                  |
| Poor economy 40%         | Bull market 20%                  |
|                          | Normal market 30%                |
|                          | Bear market 50%                  |

Which of the following statements about this probability distribution is least likely accurate?

- The probability of a normal market is 0.30.
  - The probability of having a good economy and a bear market is 0.12.
  - Given that the economy is good, the chance of a poor economy and a bull market is 0.15.
  - Given that the economy is poor, the combined probability of a normal or a bull market is 0.50.
32. Multidimensional scenario analysis can take two general forms: historical or prospective. The historical approach is backward looking, while the prospective approach is forward looking. Which of the following statements is correct regarding prospective and historical scenario approaches?
- The historical approach uses an exponential smoothing model to weight market data over the relevant time period.
  - The prospective approach ignores correlations between risk factors.
  - The factor push method of historical scenario analysis uses a constant multiple of historic correlations to forecast correlations during an economic crisis.
  - None of the above statements are correct.
33. Jenny Caldwell, FRM, is using a moving average model in which she assumes weights decline exponentially back through time. The original volatility was calculated at 1.5%. However, she believes a decay factor of 0.96 for an exponentially weighted moving average (EWMA) model is appropriate for modeling a more realistic variance measure. If the stock market return is 1% today, what is the new estimate of volatility using the EWMA model?
- 0.97%.
  - 1.31%.
  - 1.48%.
  - 1.58%.

34. James Tulsma, FRM, is analyzing a publicly traded firm and is using the company's beta, the risk-free rate of return, and the expected return on the market to estimate the company's required rate of return. He is somewhat concerned that the underlying assumptions of this technique are not realistic. Which of the following statements is an assumption of the capital asset pricing model (CAPM)?
- Investors minimize their expected utility of wealth at the end of the period.
  - Investors are risk-neutral.
  - Investors are only concerned with the mean and standard deviation of returns.
  - Assets are not divisible.
35. A butterfly spread involves transactions in different options. It can be created by buying:
- a call option with a low strike price and then selling a call option with a higher strike price.
  - a put option with a high strike price and then selling a put option with a lower strike price.
  - a put option with a low strike price, buying another put option with a higher strike price, and selling two put options with a strike price halfway between the low and high strike options.
  - a call option with a high strike price, buying another call option with a higher strike price, and buying two call options with a strike price halfway between the low and high strike options.
36. An analyst is concerned that the trading strategy she recently identified has generated a statistically insignificant result and has asked for guidance in assessing the strategy. A result is statistically significant if it is:
- unlikely to have occurred merely by chance, and the  $p$ -value is less than the significance level.
  - likely to have occurred merely by chance, and the  $p$ -value is less than the significance level.
  - unlikely to have occurred merely by chance, and the  $p$ -value is greater than the significance level.
  - likely to have occurred merely by chance, and the  $p$ -value is greater than the significance level.
37. To equitize the cash portion of assets under management, a portfolio manager enters into a long futures position on the S&P 500 Index with a multiplier of 250. The cash position is \$5,000,000, which at the current futures value of 1,000 requires the manager to be long 20 contracts. If the current initial margin is \$12,500 per contract, and the current maintenance margin is \$10,000 per contract, the variation margin the portfolio manager needs to advance if the futures contract value falls to 985 at the end of the first day of the position is closest to:
- \$25,000.
  - \$30,000.
  - \$50,000.
  - \$75,000.

38. Assume that the current 1-year forward exchange rate is 1.200 USD per EUR. An American bank pays a 2.4% annual interest rate on a 1-year deposit and a 4.0% annual interest rate on a 3-year USD deposit. A European bank pays a 1.5% annual interest rate for a 1-year deposit and a 2.0% annual interest rate for a 3-year EUR deposit. The forward exchange rate in USD per EUR for exchange three years from today is closest to:
- 1.224.
  - 1.249.
  - 1.261.
  - 1.296.
39. WEB, an investment-banking firm, is the principal underwriter for MTEX's upcoming debenture issue. Lynn Black, FRM, is an analyst with WEB, and she learned from an employee in MTEX's programming department that a serious problem was recently discovered in the software program of its major new product line. In fact, the problem is so bad that many customers have canceled their orders with MTEX. Black checked the debenture's prospectus and found no mention of this development. The red herring prospectus has already been distributed. According to the GARP Code of Conduct, Black's best course of action is to:
- inform her immediate supervisor at WEB of her discovery.
  - keep quiet because this is material nonpublic inside information.
  - notify potential investors of the omission on a fair and equitable basis.
  - report her discovery to the Division of Corporation Finance of the Securities and Exchange Commission.
40. Which of the following theories often used to explain the term structure of interest rates is based on the idea that most investors prefer short-term deposits, all else equal?
- Liquidity preference theory.
  - Supply-demand theory.
  - Market segmentation theory.
  - Unbiased expectations theory.
41. Which of the following statements regarding the general effects of maturity on bond prices and returns is most likely correct?
- Bond prices will tend to increase with maturity when coupon rates are above the relevant forward rates.
  - When short-term rates are above forward rates utilized by bond prices, then long-term investments will tend to outperform short-term investments.
- I only.
  - II only.
  - Both I and II.
  - Neither I nor II.



Questions 42 and 43 use the following information.

| Maturity (Years) | STRIP Price | Spot Rate | Forward Rate |
|------------------|-------------|-----------|--------------|
| 0.5              | 99.2556     | 1.50%     | 1.50%        |
| 1.0              | 98.2240     | 1.80%     | 2.10%        |
| 1.5              | 96.7713     | 2.20%     | ?            |
| 2.0              | 95.1524     | ?         | 3.40%        |

42. The 6-month forward rate on an investment that matures in 1.5 years is closest to:
- 2.50%.
  - 2.75%.
  - 3.00%.
  - 3.25%.
43. The price of a \$1,000 par value Treasury bond (T-bond) with a 3% coupon that matures in 1.5 years is closest to:
- \$1,010.02.
  - \$1,011.85.
  - \$1,013.68.
  - \$1,015.51.
44. Many different types of swaps exist. Examples of swaps include: interest rate swaps, currency swaps, commodity swaps, equity swaps, and volatility swaps. A swaption is an option which gives the holder the right to enter into a swap. Which of the following statements about swaps and swaptions is most likely correct?
- Equity swap payments may be floating on both sides.
  - Unlike options, premiums for swaptions are not dependent on the strike rate specified in the swaption.
  - The most common reason for entering into commodity swap agreements is to speculate on commodities prices.
  - For the fixed-rate payer in an S&P 500 Index swap, a negative index return does not require a payment from the fixed-rate payer.
45. An option trader is attempting to judge whether an option's premium is cheap or expensive. To do so, he employs a GARCH(1,1) model to forecast volatility. The particular model he estimates has an intercept term equal to 0.000005, a parameter estimate on the latest estimate of variance of 0.85, and a parameter estimate on the latest innovation of 0.13. If the latest volatility estimate from the model were 2.2% per day and the option's underlying asset changed 3%, the trader's estimate of the next period's standard deviation is closest to:
- 0.07%.
  - 2.31%.
  - 5.20%.
  - 2.62%.

46. The current price of a stock is \$25. A put option with a \$20 strike price that expires in six months is available.  $N(d_1) = 0.9737$  and  $N(d_2) = 0.9651$ . If the underlying stock exhibits an annual standard deviation of 25%, and the current continuously compounded risk-free rate is 4.25%, the Black-Scholes-Merton value of the put is closest to:
- \$0.01.
  - \$0.03.
  - \$0.33.
  - \$0.36.
47. John Bone is a junior bond analyst for XYZ investments. He is examining both investment grade bonds and speculative grade bonds. In particular, he is looking for bonds located below the separation between these two bond classifications. Which of the following bonds would be classified as a speculative grade bond?
- FHLMC discount note.
  - ACC rail bond rated Baa.
  - OMC Corp. MTN rated BB.
  - Traveler's floating-rate note rated Aa.
48. An analyst is testing the hypothesis that the variance of monthly returns for Index A equals the variance of monthly returns for Index B based on samples of 50 monthly observations. The sample variance of Index A returns is 0.085, whereas the sample variance of Index B returns is 0.084. Assuming the samples are independent and the returns are normally distributed, which of the following represents the most appropriate test statistic?
- $\frac{\text{sample variance of Index A}}{\text{sample variance of Index B}}$
  - $\frac{\text{sample variance of Index A} - \text{sample variance of Index B}}{\text{standard error of sample statistic}}$
  - $\frac{\text{sample variance of Index B}}{\text{sample variance of Index A}}$
  - $\frac{\text{sample variance of Index B} - \text{sample variance of Index A}}{\text{standard error of sample statistic}}$
49. For a given portfolio, the expected return is 10% with a standard deviation of 15%. The beta of the portfolio is 0.75. The expected return of the market is 11% with a standard deviation of 18%. The risk-free rate is 4%. The portfolio's Treynor measure is closest to:
- 0.0075.
  - 0.0120.
  - 0.0400.
  - 0.0800.

50. Michael Overton, FRM, is using Monte Carlo simulation to estimate price paths. Under the assumption that stock prices follow geometric Brownian motion (GBM), he is trying to determine the next day's portfolio value. The portfolio value is currently \$500,000, and the mean expected return is 0 with an anticipated standard deviation of 15% over the next 200 days. Assuming the first random draw from a normal distribution is equal to  $-0.1050$ , what is the simulated price of the portfolio at the end of the first day?
- \$481,526.
  - \$489,733.
  - \$497,621.
  - \$499,443.

51. Canadian Bank Inc. (CBI) has the following annual gross income amounts in its business lines over its most recent three years:

|                    | 2009          | 2008          | 2007          |
|--------------------|---------------|---------------|---------------|
| Retail banking     | \$380 million | \$344 million | \$326 million |
| Commercial banking | \$712 million | \$645 million | \$599 million |
| Investment banking | \$846 million | \$777 million | \$687 million |

Using the standardized approach, which of the following amounts represents CBI's operational risk capital requirement for 2010?

- \$253.2 million.
  - \$265.8 million.
  - \$274.9 million.
  - \$278.4 million.
52. The 3-month futures contract of a certain index is priced at \$1,020. Its underlying is valued at \$1,010 and pays a continuous dividend rate of 1%. If the current risk-free rate is 2.75%, the arbitrage profit opportunity is closest to:
- \$0.49.
  - \$5.57.
  - \$7.83.
  - \$9.96.

53. Greg Hoffman, a Part I FRM candidate, works as an independent securities research consultant and is known for unbiased, objective research and recommendations. Hoffman has been hired by managers of Hill Manufacturing, Inc., (HMI) to write a research report on the company. Hoffman performs a thorough analysis of the firm's financials, the industry in which it operates, and the overall market and economy. After conducting his due diligence, Hoffman writes a report on HMI with a strong "Buy" recommendation. Hoffman posts the report for purchase on a website he created to support his consulting business but does not state either on the website or in the report that HMI paid for the research. Several of Hoffman's regular clients purchase the report and subsequently purchase shares in HMI, which rapidly increase in price by more than 20%. According to the GARP Code of Conduct, Hoffman has:
- violated Standard 1.2 related to independence and objectivity, but not Standard 2.2 related to disclosure of conflicts.
  - violated Standard 2.2 related to disclosure of conflicts, but not Standard 1.2 related to independence and objectivity.
  - not violated either Standard 1.2 related to independence and objectivity or Standard 2.2 related to disclosure of conflicts.
  - violated both Standard 1.2 related to independence and objectivity and Standard 2.2 related to disclosure of conflicts.
54. Howard Parks, FRM, is an investor with a short position and is preparing to deliver a bond for this position. The bond to purchase for delivery is based on a settlement price of \$98.03 (also known as the quoted futures price). Which of the following four bonds is cheapest-to-deliver?

| <i>Bond</i> | <i>Quoted Bond Price</i> | <i>Conversion Factor</i> |
|-------------|--------------------------|--------------------------|
| A           | 103                      | 1.03                     |
| B           | 116                      | 1.12                     |
| C           | 105                      | 1.07                     |
| D           | 124                      | 1.23                     |

- Bond A.
  - Bond B.
  - Bond C.
  - Bond D.
55. An analyst estimates a stock has a 40% chance of earning 10%, a 40% chance of earning 12.5%, and a 20% chance of earning 30%. Which of the following amounts is closest to the stock's standard deviation of expected returns?
- 2.44%.
  - 3.87%.
  - 6.00%.
  - 7.58%.

56. A hedger calculates the covariance between the spot and the futures prices to be 0.05, the spot standard deviation to be 0.3, and the futures standard deviation to be 0.2. Which of the following amounts is closest to the optimal hedge ratio for this position?
- 0.556.
  - 0.800.
  - 0.833.
  - 1.250.

57. For an option-free bond, which of the following are the effects of the convexity adjustment on the magnitude (absolute value) of the approximate bond price change in response to an increase in yield and in response to a decrease in yield, respectively?

| <u>Decrease in Yield</u> | <u>Increase in Yield</u> |
|--------------------------|--------------------------|
| a. Increase in magnitude | Decrease in magnitude    |
| b. Increase in magnitude | Increase in magnitude    |
| c. Decrease in magnitude | Decrease in magnitude    |
| d. Decrease in magnitude | Increase in magnitude    |

58. Realty Funds, LLC, is a firm that specializes in pooling real estate properties and selling shares on these assets. In order to measure risk of the properties the firm quantifies daily value at risk (VaR). The use of VaR as a risk measurement in this case is:
- inappropriate and narrow in scope.
  - appropriate as long as the firm can mark to market daily.
  - appropriate as long as the firm continues to monitor real estate values.
  - subject to predatory trading.

59. Which of the following statements regarding hypothesis testing is correct?
- A Type II error is rejecting the null hypothesis when it is true.
  - Reject the null hypothesis if  $p$ -value < significance level.
  - The critical  $z$ -value for a one-tailed test of significance at the 0.01 level will be either +2.58 or -2.58.
  - The test statistic for hypotheses concerning equality of variances is

$$\text{computed as } \sqrt{pq \left( \frac{1}{n_1} + \frac{1}{n_2} \right)}.$$

60. Which of the following statements incorrectly describe the Taylor Series approximation?
- The first derivative of a function for the relationship between a financial derivative and its underlying asset estimates delta.
  - It provides good approximation estimates of price changes in callable bonds or mortgage-backed securities.
  - It provides good approximation estimates of changes in well-behaved quadratic functions.
  - The second derivative of a function for the relationship between a financial derivative and its underlying asset estimates the rate of change of delta.

61. Which of the following statements regarding the factors leading to the downfall of Long-Term Capital Management is correct?
- Their trading strategies for fixed income instruments were based on the notion that the credit spreads would ultimately increase.
  - Their trading strategies for equity options were based on the notion that market volatility would ultimately increase.
  - Their balance sheet leverage was far above the levels of other large investment banks.
  - Their models assumed that low-frequency/high-severity events were uncorrelated over time.
62. For the past four years, the returns on a portfolio were 6%, 9%, 4%, and 12%. The corresponding returns of the benchmark were 7%, 10%, 4%, and 14%. The risk-free rate of return is 7%, and the mean squared deviation from the minimum return is 2.5. The portfolio's Sortino ratio is closest to:
- 0.3000.
  - 0.4743.
  - 0.7000.
  - 1.1068.
63. A portfolio manager manages a \$10 million portfolio that has a beta of 1.0 relative to the S&P 500. The S&P 500 futures are trading at 1,100 and the multiplier is 250. He would like to hedge exposure to market risk over the next few months. Suppose that at the maturity of the futures contract, the market index is trading at 1,090 and the portfolio has experienced a 1% decline in value. Evaluate the following statements:
- The appropriate hedge for the portfolio is a long position in 36 contracts.
  - The net impact of the market decline on the appropriately hedged portfolio is a gain of \$10,000.
- I only.
  - II only.
  - Both I and II.
  - Neither I nor II.
64. Given the following 1-year transition matrix, which of the following amounts is closest to the probability that an Aaa-rated firm will default over a 2-year period?

| Rating from | Rating to |     |     |         |
|-------------|-----------|-----|-----|---------|
|             | Aaa       | Baa | Caa | Default |
| Aaa         | 90%       | 10% | 0%  | 0%      |
| Baa         | 10%       | 80% | 5%  | 5%      |
| Caa         | 1%        | 4%  | 80% | 15%     |

- 0.00%.
- 0.23%.
- 0.50%.
- 0.65%.

65. The standardized approach for calculating operational risk capital requirements uses beta factors for a given business line and annual gross income for business lines over a 3-year period. Which of the following business units has the highest beta factor?
- Trading and sales.
  - Retail banking.
  - Agency and custody services.
  - Asset management.
66. An investor is following the real-time changes in the price of options on a particular asset. She notices that both a European call and a European put on the same underlying asset each have an exercise price of \$45. The two options have six months to expiration and are both selling for \$4. She also observes that the underlying asset is selling for \$43 and that the rate of return on a 1-year Treasury bill is 6%. According to put-call parity, which series of transactions would be necessary to take advantage of any mispricing in this case?
- Sell the call, sell a T-bill equal to the present value of \$45, buy the put, and buy the underlying asset.
  - Buy the call, buy a T-bill equal to the present value of \$45, sell the put, and sell the underlying asset.
  - Buy the call, sell a T-bill equal to the present value of \$45, sell the put, and buy the underlying asset.
  - Sell the call, buy a T-bill equal to the present value of \$45, buy the put, and sell the underlying asset.
67. Suppose we plan on buying crude oil in one month to produce gasoline and heating oil for sale in two months. The 1-month futures price for crude oil is currently \$55.00/barrel. The 2-month futures prices for gasoline and heating oil are \$61.50/barrel and \$58.50/barrel, respectively. Which of the following amounts is closest to the 5-3-2 crack (commodity) spread?
- \$4.70/barrel.
  - \$5.30/barrel.
  - \$23.50/barrel.
  - \$26.50/barrel.
68. The forward rate of a 3-month EUR/USD foreign exchange contract is 1.1565 USD per EUR. EUR LIBOR is 4% and USD LIBOR is 2%. The spot USD per EUR exchange rate is closest to:
- 1.1336.
  - 1.1507.
  - 1.1623.
  - 1.1799.

69. Which of the following statements concerning the capital asset pricing model (CAPM) and the capital market line (CML) is correct?
- Beta identifies the appropriate level of risk for which an investor should be compensated.
  - Unsystematic risk is not diversifiable, so there is no reward for taking on such risk.
  - Assets with equivalent betas will always earn different returns.
  - The market risk premium is calculated by multiplying beta by the difference between the expected return on the market and the risk-free rate of return.

70. An analyst obtains sample statistics on return information for Vay Industries and Ranch Meatpacking as follows:

$$\sum_{i=j=1}^{12} [R_i - E(R_i)] \times [R_j - E(R_j)] = 71.75$$

$$\sum_{i=1}^{12} [R_i - E(R_i)]^2 = 379.90$$

$$\sum_{j=1}^{12} [R_j - E(R_j)]^2 = 135.06$$

Based on this information, which of the following amounts are the covariance between the two sets of returns and the correlation coefficient, respectively?

|    | <u>Covariance</u> | <u>Correlation coefficient</u> |
|----|-------------------|--------------------------------|
| a. | 5.98              | 0.32                           |
| b. | 5.98              | 0.42                           |
| c. | 6.52              | 0.32                           |
| d. | 6.52              | 0.42                           |

71. A firm has determined that the value at risk (VaR) of its investment portfolio is \$18 million for one day at a 95% confidence level. Which of the following statements regarding this VaR measure is correct?
- There is a 95% probability that the portfolio will lose \$18 million on a given day.
  - There is a 95% probability that the portfolio will lose no more than \$18 million on a given day.
  - There is a 5% probability that the portfolio will lose \$18 million on a given day.
  - There is a 5% probability that the portfolio will lose no more than \$18 million on a given day.



72. Big City Bank has contractually agreed to a \$20,000,000 credit facility with Upstart Corp. Upstart will immediately access 40% of the total commitment. Big City Bank estimates a 1-year probability of default between 1% and 2% and assigns a 20% recovery rate. Big City has no experience with Upstart and conservatively estimates draw down upon default to be between 50–75%. Which of the following amounts represents the difference between the minimum and maximum expected loss for Big City Bank?
- Less than \$100,000.
  - Between \$100,000 and \$200,000.
  - Between \$200,000 and \$300,000.
  - Greater than \$300,000.
73. An existing option short position is delta-neutral, but has a  $-5,000$  gamma exposure. An option is available that has a gamma of 2 and a delta of 0.7. What actions should be taken to create a gamma-neutral position that will remain delta-neutral?
- Go long 2,500 options and sell 1,750 shares of the underlying stock.
  - Go long 2,500 options and buy 1,750 shares of the underlying stock.
  - Go long 10,000 options and sell 7,000 shares of the underlying stock.
  - Go long 10,000 options and buy 7,000 shares of the underlying stock.
74. Suppose that you buy a call option with an exercise price of \$25 for \$3 and sell a call option with an exercise price of \$35 for \$1. If the stock price is \$34 at expiration, your net profit per share is closest to:
- \$6.
  - \$7.
  - \$8.
  - \$9.
75. To create a delta-neutral portfolio, an investor who has written 15,000 call options (that are currently exactly at-the-money) will have to:
- long 7,500 shares in the underlying instrument.
  - short 7,500 shares in the underlying instrument.
  - long 15,000 shares in the underlying instrument.
  - short 15,000 shares in the underlying instrument.
76. A portfolio manager of an endowment wants to calculate a daily VaR for the portfolio. The €5,000,000 portfolio is restricted from using derivative securities. The manager uses a 5% level of significance to estimate the VaR. The manager ranked the 100 daily returns from last year, and reports the lowest eight returns to be:  $-0.0159$ ,  $-0.0132$ ,  $-0.0211$ ,  $-0.0106$ ,  $-0.0254$ ,  $-0.0099$ ,  $-0.0368$ , and  $-0.0584$ . Which of the following amounts is closest to the daily VaR using the historical simulation method?
- €66,000.
  - €79,500.
  - €105,500.
  - €127,000.

77. Which of the following statements regarding external and internal credit ratings is correct?
- I. With respect to internal ratings, “underrating” during growth periods and “overrating” during the decline of a cycle is seen more with the use of at-the-point than through-the-cycle approaches.
  - II. The ratings delivered by specialized and regional agencies tend to be consistent with those delivered by larger agencies.
- a. I only.
  - b. II only.
  - c. Both I and II.
  - d. Neither I nor II.
78. You simulate the distribution of operational losses for your bank. You find that the loss that corresponds to the 99th percentile of potential losses is \$500,000 and the mean of the distribution is \$50,000. Your estimate of operational risk economic capital is closest to:
- a. \$50,000.
  - b. \$450,000.
  - c. \$495,000.
  - d. \$500,000.
79. The operational risk failure at Kidder Peabody triggered a loss of confidence in the firm’s management. Its parent company, General Electric, sold Kidder to Paine Webber, which later dismantled the company. Which of the following actions led to the downfall of Kidder?
- a. A trader misreported trades, which allowed him to report substantial fake profits.
  - b. The firm suffered losses due to a mistake in the firm’s calculation of duration, which failed to account for the sale of interest-only payments.
  - c. Taped phone conversations were discovered, which demonstrated that staff members knew about manipulated price quotes.
  - d. A trader bullied back-office employees into not following up on trade confirmations.

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

|                | Coefficient | Standard Error |
|----------------|-------------|----------------|
| Intercept      | 2.1         | 2.01           |
| Industry index | 1.9         | 0.31           |

|           | Degrees of Freedom | SS      |
|-----------|--------------------|---------|
| Explained | 1                  | 92.648  |
| Residual  | 3                  | 24.512  |
| Total     | 4                  | 117.160 |

Which of the following statements regarding the regression is incorrect?

- The correlation coefficient between the  $X$  and  $Y$  variables is 0.889.
  - The industry index coefficient is significant at the 99% confidence interval.
  - If the return on the industry index is 4%, the stock's expected return is 9.7%.
  - The variability of industry returns explains 21% of the variation of company returns.
81. A bank entered into a 5-year \$150 million annual-pay LIBOR-based interest rate swap three years ago as the fixed rate payer at 5.5%. The relevant discount rates (continuously compounded) for 1-year and 2-year obligations are currently 5.75% and 6.25%, respectively. A payment was just made. The value of the swap is closest to:
- \$2,560,000.
  - \$2,560,000.
  - \$6,450,000.
  - \$6,450,000.
82. Which of the following statements about sampling and estimation is least likely correct?
- The rate of sampling error is generally lower for larger sample sizes.
  - The central limit theorem states that the sample mean for large sample size will not be distributed normally regardless of the distribution of the underlying population.
- I only.
  - II only.
  - Both I and II.
  - Neither I nor II.

83. Samantha Fore, FRM, is examining foreign asset-liability positions that are mismatched in individual currencies at regional financial institutions. Fore is specifically looking at the overall currency exposure of the western region consisting of three banks: Mountain West, First Interstate, and Glacier Bank. Given the uncertainty in non-U.S. markets, Fore is concerned about a euro collapse.

|                 | <i>Mountain West</i> | <i>First Interstate</i> | <i>Glacier Bank</i> |
|-----------------|----------------------|-------------------------|---------------------|
| EUR Assets      | 1,350,000            | 500,000                 | 875,000             |
| EUR Liabilities | 2,000,000            | 400,000                 | 1,550,000           |
| EUR Bought      | 275,000              | 150,000                 | 2,450,000           |
| EUR Sold        | 650,000              | 375,000                 | 1,875,000           |

- On an aggregate basis, how would this region's euro exposure be characterized?
- The aggregate euro exposure faces the risk that the euro will rise in value against the domestic currency.
  - The aggregate euro exposure faces the risk that the euro will fall in value against the domestic currency.
  - The banks, collectively, are net long euros.
  - The banks, collectively, are close to evenly matched and face little euro exposure.
84. In the case of Barings Bank (Barings), Nick Leeson incurred huge trading losses. Which of the following statements correctly describes one of the factors that led to the bankruptcy of Barings?
- Barings had insufficient liquidity to cover marked to market losses.
  - Leeson used a long straddle strategy on the Nikkei 225.
  - Leeson held speculative double short positions in the market for Nikkei 225 futures contracts.
  - There was ambiguity concerning who was responsible for performing specific oversight functions.
85. Harold Newman manages a portfolio of investment securities for a commercial bank. The portfolio has a current market value equal to \$5,334,500 with a daily variance of 0.0002. Over the years, the portfolio has increased its proportionate holdings of equity securities, and Newman is concerned that the portfolio may be riskier than the bank's internal regulations allow. The annual VaR (5%) assuming there are 250 trading days in a year is closest to:
- 0.52%.
  - 2.33%.
  - 36.89%.
  - 43.82%.

86. A risk analyst notices that the distribution he is assessing has a large number of observations in the right tail which are mostly unexpected and a small number of observations in the left tail, many of which are also unexpected. Which of the following statistical measures would help the analyst identify the distribution's characteristics?
- I. Variance of weekly price changes.
  - II. Kurtosis of weekly price changes.
- a. I only.
  - b. II only.
  - c. Both I and II.
  - d. Neither I nor II.
87. Joe Reilly, FRM, and Claire Meyers, FRM, are discussing the level of event risk in their bond portfolio. Reilly says that since their portfolio consists of investment grade bonds, event risk should not be a concern. Meyers says that since they have a small number of different issues in their portfolio, and event risk is idiosyncratic, the event risk in their portfolio is negligible. Which, if either, of these statements is based on correct assumptions?
- a. Neither statement by Reilly nor Meyers are correct.
  - b. The statement made by Reilly is correct, but not the one made by Meyers.
  - c. The statement made by Meyers is correct, but not the one made by Reilly.
  - d. Both statements made by Meyers and Reilly are correct.
88. An investment analyst takes a random sample of 100 aggressive equity funds and calculates the average beta as 1.7. The sample betas have a standard deviation of 0.4. Using a 95% confidence interval and a  $z$ -statistic, which of the following statements about the confidence interval and its interpretation is most likely accurate? The analyst can be confident at the 95% level that the interval:
- a. 0.916 to 2.484 includes the mean of the sample betas.
  - b. 1.622 to 1.778 includes the mean of the sample betas.
  - c. 0.916 to 2.484 includes the mean of the population beta.
  - d. 1.622 to 1.778 includes the mean of the population beta.

**Use the following information to answer Questions 89 and 90.**

An investor has a short position in a 20-year, 5% coupon, U.S. Treasury bond (T-bond) with a yield to maturity (YTM) of 6% and par value of \$100. Assume discounting occurs on a semiannual basis.

89. Which of the following amounts is closest to the dollar value of a basis point (DV01)?
- a. 0.1053.
  - b. 0.1061.
  - c. 0.1351.
  - d. 0.1360.

90. Using a 30-year, 5% coupon, U.S. T-bond yielding 5% with a DV01 of 0.1544 to hedge the interest rate risk in the 20-year bond, which of the following actions should the investor take?
- Buy \$68.20 of the hedging instrument.
  - Buy \$68.72 of the hedging instrument.
  - Buy \$87.50 of the hedging instrument.
  - Buy \$88.08 of the hedging instrument.
91. Match the following events to the corresponding risk type.
- A rogue trader within an institution.
  - Stock XYZ decreases in price due to a market crisis.
  - Using a put option to hedge an equity exposure.
  - Counterparty sues bank to avoid meeting its obligations.
- 1: legal risk; 2: credit risk; 3: model risk; 4: credit risk.
  - 1: operational risk; 2: market risk; 3: market risk; 4: settlement risk.
  - 1: people risk; 2: market risk; 3: basis risk; 4: legal risk.
  - 1: operational risk; 2: basis risk; 3: credit risk; 4: legal risk.
92. A Canadian-based tire company is due a \$2,500,000 SGD payment from its Singapore-based distributor in two months. The Canadian firm hedges the exchange rate risk using a forward contract priced at \$0.80 CAD/SGD. If the Singapore dollar depreciates over the next two months to a spot rate of \$0.73 CAD/SGD, how much more or less will the Canadian-based tire firm receive in Canadian dollars by hedging, versus an unhedged position?
- \$175,000 CAD more.
  - \$175,000 CAD less.
  - \$70,000 CAD more.
  - \$29,167 SGD less.
93. Which of the following hedged positions would be subject to basis risk?
- A jet fuel wholesaler expects the price of jet fuel to fall in one year. The wholesaler therefore establishes a short position in a 1-year crude oil contract to offset price declines.
  - A drilling company will have one million barrels of crude oil available for sale in August on the east coast. It is currently February, so the company has taken a short 6-month crude oil futures position on one million barrels for east coast delivery.
- I only.
  - II only.
  - Both I and II.
  - Neither I nor II.
94. Which of the following statements is not correct regarding the use of implied volatility to predict future volatility?
- The implied volatility model assumes that asset prices follow a continuous time lognormal diffusion process.
  - Options with the same underlying assets may trade at different “vol” terms.
  - Implied volatility is less than actual volatility on average.
  - Implied volatility data is limited to a few assets and markets.

95. Which of the following statements is correct regarding the use of the  $F$ -test and the  $F$ -statistic?
- I. For simple linear regression, the  $F$ -test tests the same hypothesis as the  $t$ -test.
  - II. The  $F$ -statistic is used to find which items in a set of independent variables explain a significant portion of the variation of the dependent variable.
- a. I only.
  - b. II only.
  - c. Both I and II.
  - d. Neither I nor II.
96. You sample 25 observations from a sample of unknown variance. You calculate a sample mean of 70 and sample standard deviation of 60. You wish to conduct a two-tailed test of the null hypothesis that the mean is equal to 50. The most appropriate test statistic is a:
- a.  $z$ -statistic of 1.67.
  - b.  $z$ -statistic of 0.33.
  - c.  $t$ -statistic of 0.33 with 24 degrees of freedom.
  - d.  $t$ -statistic of 1.67 with 24 degrees of freedom.
97. Consider the expected returns and standard deviations for the following portfolios:

| Portfolio | Expected Return | Standard Deviation |
|-----------|-----------------|--------------------|
| 1         | 4%              | 2%                 |
| 2         | 6%              | 6%                 |
| 3         | 4%              | 4%                 |
| 4         | 10%             | 6%                 |
| 5         | 12%             | 14%                |

- If these are the only portfolios available, which portfolios are not efficient?
- a. 2 and 5.
  - b. 1 and 3.
  - c. 2 and 3.
  - d. 3 and 5.
98. An investor wishes to compute the exchange rate of a 7-month futures contract on the Swiss franc. Each contract controls 125,000 Swiss francs and is quoted in terms of dollar/franc. Suppose the current exchange rate is 1.02 dollar/franc. What is the 7-month futures exchange rate assuming a continuously compounded risk-free rate in Switzerland of 2% and a continuously compounded risk-free rate in the U.S. of 1%?
- a. 0.987 dollar/franc.
  - b. 1.002 dollar/franc.
  - c. 1.014 dollar/franc.
  - d. 1.225 dollar/franc.

99. You have derived the following spot rate curve and forward rates from the prices of Treasury STRIPS:

| Maturity (Years) | Spot Rate | Forward Rate |
|------------------|-----------|--------------|
| 0.5              | 1.50%     | 1.50%        |
| 1.0              | 2.15%     | 2.80%        |
| 1.5              | 2.53%     | 3.29%        |
| 2.0              | 2.94%     | ?            |

Using the information in the table, the 6-month forward rate on an investment that matures in 2.0 years is closest to:

- a. 3.40%.
  - b. 3.70%.
  - c. 3.78%.
  - d. 4.18%.
100. An options portfolio manager is going on vacation and does not plan to return until the day the options are set to expire. The portfolio manager gives his assistant instructions on four of the long option positions in his portfolio (all options have the same expiration date). Which of the following pairs of options and instructions is correct?
- a. At-the-money American call option with a strike of \$50 on a stock that does not pay a dividend; exercise if the stock price doubles.
  - b. American put option with a strike of \$25 on a stock currently selling for \$50 that does not pay a dividend; exercise the option if the stock price falls by more than 80%.
  - c. Deep-in-the-money European call option with a strike price of \$30 and a current stock price of \$50; exercise immediately.
  - d. Deep-in-the-money American call option with a strike price of \$100 where the stock has a dividend that exceeds the risk-free rate by 4%; exercise on the ex-dividend date.



---

# PRACTICE EXAM 1 ANSWERS

---

1. c The historical simulation method may not recognize changes in volatility and correlations from structural changes. (See Book 4, Topic 35)
2. c The dirty price of the bond is calculated as  $N = 10$ ;  $I/Y = 2.5$ ;  $PMT = 30$ ;  $FV = 1,000$ ;  $CPT \rightarrow PV = 1,043.76$ . Adjusting the PV for the fact that there are only 90 days until the receipt of the first coupon gives  $\$1,043.76 \times (1.025)^{90/180} = \$1,056.73$ . Clean price = dirty price – accrued interest =  $\$1,056.73 - \$30(90 / 180) = \$1,041.73$ . (See Book 3, Topic 25)
3. c In-the-money options are more sensitive to changes in rates (rho is higher) than out-of-the-money options. (See Book 4, Topic 39)
4. a Assuming no default risk, the domestic return is 7.35%. The return on the UK investments, however, is equal to the amount invested today, (USD\$2,000,000) / (USD1.62/GBP) = GBP1,234,568, which turns into  $GBP1,234,568 \times 1.08 = GBP1,333,333$  one year from now. Since the forward contract guarantees the exchange rate in the future, this translates into  $GBP1,333,333 \times USD1.5200 / GBP = USD2,026,666$ . This is a dollar return to the bank of  $USD2,026,666 / USD2,000,000 - 1 = 1.33\%$ . Hence, the weighted average return to the bank's investments is  $(0.5)(7.35\%) + (0.5)(1.33\%) = 4.34\%$ . Since the cost of funds for the bank is 5.5%, the net interest margin for the bank is  $4.34 - 5.50 = -1.16\%$ . (See Book 3, Topic 31)
5. d Bull call spread, maximum profit is \$3, maximum loss is \$2.

In a bull call spread, the buyer of the spread purchases a call option with a low exercise price,  $X_L$ , and subsidizes the purchase price of the call by selling a call with a high exercise price,  $X_H$ .

The maximum profit will occur at any stock price over the high exercise price. For example, at a stock price of \$50: Maximum profit:  $10 - 5 - 5 + 3 = \$3$ .

The maximum loss will occur at any stock price below the low exercise price. For example, at a stock price of \$35: Maximum loss:  $0 - 0 - 5 + 3 = -\$2$ .

(See Book 3, Topic 28)

6. d With a known variance, the 95% confidence interval is constructed as  $\bar{x} \pm 1.96 \frac{\sigma}{\sqrt{n}}$ . So you know that  $33.23 = 30 + 1.96 \frac{\sigma}{\sqrt{100}}$ . Solving for  $\sigma$  provides 16.48. (See Book 2, Topic 13)
7. d A 6% rate compounded annually is approximately equivalent to a 5.8269% rate (rounded to four decimal places) compounded continuously.  
 $\ln(1 + 0.06) = 0.058268908$   
Using put-call parity:  $p = c + Xe^{-rT} - S_0 = 4.10 + 27.50e^{-0.058269} - 25 = \$5.04$ . (See Book 3, Topic 27)

8. a VaR measures the expected amount of capital one can expect to lose within a given confidence level over a given period of time. One of the problems with VaR is that it does not provide information about the expected size of the loss beyond the VaR. VaR is often complemented by the expected shortfall, which measures the expected loss conditional on the loss exceeding the VaR. Note that since expected shortfall is based on VaR, changing the confidence level may change both measures. A key difference between the two measures is that VaR is not sub-additive, meaning that the risk of two funds separately may be lower than the risk of a portfolio where the two funds are combined. Violation of the sub-additivity assumption is a problem with VaR that does not exist with expected shortfall. (See Book 4, Topic 34)
9. c The fixed payments made by Cooper are  $(0.07 / 2) \times \$2,000,000 = \$70,000$ . The present value of the fixed payments =
- $$(\$70,000e^{-(0.065 \times 0.5)}) + (\$70,000e^{-(0.068 \times 1.0)}) + [(\$70,000 + \$2,000,000) \times e^{-(0.075 \times 1.5)}]$$
- $$= \$67,762 + \$65,398 + \$1,849,747 = \$1,982,907$$
- The value of the floating rate payments received by Cooper at the payment date is the value of the notional principal, or \$2,000,000. Recall that a swap payment has just been made.
- The value of the swap to Cooper is  $(\$2,000,000 - \$1,982,907) = \$17,093$ .  
(See Book 3, Topic 26)
10. c A stack is a bundle of futures contracts with the same expiration. Over time, a firm may acquire stacks with various expiry dates. To hedge a long-term risk exposure, a firm would close out each stack as it approaches expiry and enter into a contract with a more distant delivery, known as a roll. This strategy is called a stack-and-roll hedge and is designed to hedge long-term risk exposures with short-term contracts. Using short-term futures contracts with a larger notional value than the long-term risk they are meant to hedge could result in “over hedging” depending on the hedge ratio.  
(See Book 1, Topic 7)
11. b The duration of a portfolio of bonds is the weighted average (using market value weights) of the durations of the bonds in the portfolio. First let’s find the weights.

| <i>Bond</i> | <i>Price as Percentage of Par</i> | <i>Face Value \$</i> | <i>Market Value \$</i> |
|-------------|-----------------------------------|----------------------|------------------------|
| 1           | 95.5000                           | 2,000,000            | 1,910,000              |
| 2           | 88.6275                           | 3,000,000            | 2,658,825              |
| 3           | 114.8750                          | 5,000,000            | 5,743,750              |
| Total       |                                   |                      | 10,312,575             |

The weights based on market values are:

$$\text{Weight of bond 1} = 1,910,000 / 10,312,575 = 0.1852$$

$$\text{Weight of bond 2} = 2,658,825 / 10,312,575 = 0.2578$$

$$\text{Weight of bond 3} = 5,743,750 / 10,312,575 = 0.5570$$

| <i>Bond</i> | <i>Weights</i> | <i>Duration</i> | <i>Weighted Duration</i> |
|-------------|----------------|-----------------|--------------------------|
| 1           | 0.1852         | 6.95            | 1.2871                   |
| 2           | 0.2578         | 9.77            | 2.5187                   |
| 3           | 0.5570         | 14.81           | 8.2492                   |
| Total       |                |                 | 12.0550                  |

(See Book 4, Topic 43)

12. c To increase the beta of the portfolio from the market beta (1.0) to 1.5, the portfolio manager should take a long position:

$$\# \text{ of contracts} = (1.5 - 1.0) \times \frac{\$250,000,000}{1,200 \times 250} = 417 \text{ contracts}$$

(See Book 3, Topic 22)

13. d Woodcomb wants to increase exposure to systematic risk so he will want to buy S&P index futures. Buying futures will increase the current beta to his target of 1.25.

$$\text{number of contracts} = (\text{target beta} - \text{current beta}) \times (\text{portfolio value} / \text{futures value})$$

$$\text{number of contracts} = [1.25 - (-0.30)] \times [\$225 \text{ million} / (1,140 \times 250)]$$

$$\text{number of contracts} = (1.55) \times (789.47)$$

$$\text{number of contracts} = 1,224$$

(See Book 3, Topic 22)

14. a The traditional historical simulation, multivariate density estimation, and hybrid methods are all non-parametric methods for estimating value at risk (VaR). Therefore, these methods do not require assumptions regarding the entire distribution of returns to estimate VaR. The multivariate density estimation is very flexible in introducing dependence on economic state variables. Deviations from normality are not as big of a concern for the historical simulation, multivariate density estimation, or hybrid methods compared to parametric methods. Data is used more efficiently with parametric methods. (See Book 4, Topic 35)

15. a The rogue trader for Barings had dual roles as both the head of trading and the head of the back-office support function. This operational risk oversight allowed him to hide millions in losses from senior management. In the Allied Irish Bank case, John Rusnak did not run the back-office operations. (See Book 1, Topic 7)

16. a The fact that mean > median > mode is consistent with a distribution that is positively skewed. For all normal distributions, kurtosis = 3. Excess kurtosis = kurtosis - 3, which is 0 for a normal distribution. In this case, excess kurtosis = 2, which means kurtosis = 5. This means that the distribution being examined is more peaked than the normal distribution and is said to be leptokurtic. (See Book 2, Topic 11)

17. c A change from a Ba to Baa rating is an example of a credit upgrade. A credit upgrade will decrease the likelihood of default (EDF) reducing expected loss. Note that expected loss is an estimate of average future loss. Actual loss is by definition equal to zero until a credit event occurs. (See Book 4, Topic 48)
18. b The CAPM assumes that the market portfolio should be the portfolio with the highest Sharpe ratio of all possible portfolios and should include all investable assets. It also assumes that the expected excess returns for the market are assumed to be known in that investors have access to the same information. As well, it assumes that returns are normally distributed and investors' expectations for risk and return are identical. (See Book 1, Topic 3)
19. c The 3-month forward rate is calculated as follows:  

$$F_{0,T} = (S_T)e^{(r-\delta_1)T} = \$19 \times e^{(0.065-0.05)0.25} = \$19.07$$
 (See Book 3, Topic 30)
20. c The farmer needs to be short the futures contracts. The two sources of basis risk confronting the farmer will result from the fact that he is using a cattle contract to offset the price movement of his buffalo herd. Cattle prices and buffalo prices may not be perfectly positively correlated. As a result, the correlation between buffalo and cattle prices will have an impact on the basis of the cattle futures contract and spot buffalo meat. The delivery date is a problem in this situation, because the farmer's hedge horizon is winter, which probably will not commence until December or January. In order to maintain a hedge during this period, the farmer will have to enter into another futures contract, which will introduce an additional source of basis risk. (See Book 3, Topic 22)
21. b A scattergram can help determine whether a relationship is positive or negative. Since the population and sample coefficients are almost always different, the residual will very rarely equal the corresponding population error term. (See Book 2, Topic 11)
22. c  $S_0e^{-qT} - Ke^{-rT} = 1,100e^{-0.02(0.25)} - 1,080e^{-0.04(0.25)} = 25.26$  (See Book 3, Topic 24)
23. a Because of the cost involved with stripping/reconstituting STRIPS, investors generally pay a premium for STRIPS. Shorter-term C-STRIPS tend to trade at a premium and longer-term C-STRIPS tend to trade at a discount. There is no evidence that STRIPS have *significant* risk of illiquidity; they can be illiquid, though. (See Book 4, Topic 40)
24. a  $NPV = 4 / 1.10 + 3 / (1.10)^2 + 4 / (1.10)^3 - \$10 = -\$0.879038$  million, or  $-\$879,038$   
 Calculator approach: CF0 = -10; CF1 = 4; CF2 = 3; CF3 = 4;  
 I = 10 → NPV =  $-\$0.879038$  (million)  
 (See Book 1, Topic 1)
25. c Heteroskedasticity exists if the variance of the residuals is not constant. In a heteroskedastic regression, the *t*-statistics will be incorrectly calculated using ordinary least squares methods. (See Book 2, Topic 16)
26. b In this case,  $U = 1.1$ ,  $D = 0.9$ ,  $r = 0.035$ , and the value of the option is \$1 if the stock increases and \$0 if the stock decreases. The probability of an up movement,  $\pi_U$ , can be calculated as  $(e^{(0.035 \times 3/12)} - 0.9) / (1.1 - 0.9) = 0.5439$ . The value of the call option is therefore  $(0.5439 \times \$1) / e^{(0.035 \times 3/12)} = \$0.54$ . (See Book 4, Topic 37)

27. c Standards 2.1 and 2.2—Conflicts of Interest. Members and candidates must act fairly in all situations and must fully disclose any actual or potential conflict to all affected parties. Sell-side members and candidates should disclose to their clients any ownership in a security that they are recommending. (See Book 1, Topic 9)
28. b The Treynor measure is most appropriate for comparing well-diversified portfolios. That is, the Treynor measure is the best to compare the excess returns per unit of systematic risk earned by portfolio managers, provided all portfolios are well-diversified.

All three portfolios managed by Donaldson Capital Management are clearly less diversified than the market portfolio. Standard deviation of returns for each of the three portfolios is higher than the standard deviation of the market portfolio, reflecting a low level of diversification.

Jensen's alpha is the most appropriate measure for comparing portfolios that have the same beta. The Sharpe measure can be applied to all portfolios because it uses total risk and it is more widely used than the other two measures. Also, the Sharpe ratio evaluates the portfolio performance based on realized returns and diversification. A less-diversified portfolio will have higher total risk and vice versa. (See Book 1, Topic 5)

29. d The central limit theorem holds for any distribution (skewed or not) as long as the sample size is large (i.e.,  $n > 30$ ). The mean of the population and the mean of the distribution of all sample means are equal. The standard deviation of the mean of many observations is less than the standard deviation of a single observation. (See Book 2, Topic 12)
30. c Unexpected loss is a measure of the variation in expected loss. As a precaution, the bank needs to set aside sufficient capital in the event that actual losses exceed expected losses with a reasonable likelihood. For example, smaller recovery rates would be indicative of larger actual losses. (See Book 4, Topic 49)
31. c Given that the economy is good, the probability of a poor economy and a bull market is zero. The other statements are true. The  $P(\text{normal market}) = (0.60 \times 0.30) + (0.40 \times 0.30) = 0.30$ .  $P(\text{good economy and bear market}) = 0.60 \times 0.20 = 0.12$ . Given that the economy is poor, the probability of a normal or bull market =  $0.30 + 0.20 = 0.50$ . (See Book 2, Topic 10)
32. d None of the statements are correct. The historical approach uses historic data from past crisis events, the prospective scenario conditional approach includes correlations between risk factors, and the factor push method is a prospective approach not a historical approach. (See Book 4, Topic 51)
33. c 
$$\sigma_n^2 = \lambda \sigma_{n-1}^2 + (1 - \lambda) u_{n-1}^2 = 0.96(0.015^2) + (1 - 0.96)(0.01^2)$$

$$= 0.000216 + 0.000004 = 0.00022$$

$$\sigma = \sqrt{0.00022} = 0.01483 \text{ or } 1.48\%$$
 (See Book 2, Topic 19)
34. c The capital asset pricing model (CAPM) assumes the following:
- Investors desire to maximize their expected utility of wealth at the end of the next period.
  - Investors are risk averse.
  - Investors are only concerned with the mean and standard deviation of returns.
  - Assets are fully divisible.
- (See Book 1, Topic 3)

35. c Buying a call (put) option with a low strike price, buying another call (put) option with a higher strike price, and selling two call (put) options with a strike price halfway between the low and high strike options will generate the butterfly payment pattern. Two of the wrong answer choices deal with bull and bear spreads, which can also be replicated with either calls or puts. A bull spread involves purchasing a call (put) option with a low strike price and selling a call (put) option with a higher exercise price. A bear spread is the exact opposite of the bull spread. (See Book 3, Topic 28)
36. a A result is statistically significant if it is unlikely to have happened by chance. The decision rule is to reject the null hypothesis if the  $p$ -value is less than the significance level. If the  $p$ -value is less than the significance level, then we conclude that the sample estimate is statistically different than the hypothesized value. (See Book 2, Topic 15)
37. d The futures contract ended at 985 on the first day. This represents a decrease in value in the position of  $(1,000 - 985) \times \$250 \times 20 = \$75,000$ . The initial margin placed by the manager was  $\$12,500 \times 20 = \$250,000$ . The maintenance margin for this position requires  $\$10,000 \times 20 = \$200,000$ . Since the value of the position declined  $\$75,000$  on the first day, the margin account is now worth  $\$175,000$  (below the  $\$200,000$  maintenance margin) and will require a variation margin of  $\$75,000$  to bring the position back to the initial margin. It is not sufficient just to bring the position back to the maintenance margin. (See Book 3, Topic 21)
38. c We are given that the forward exchange rate in one year is 1.200 and are asked to find the exchange rate in three years. This means we need to apply the 2-year forward rate one year from today.

The 2-year forward rate in the United States is:

$$\sqrt{\frac{1.040^3}{1.024}} = \sqrt{1.0985} = 1.0481 - 1, \text{ or } 4.81\%$$

The 2-year forward rate in Europe is:

$$\sqrt{\frac{1.020^3}{1.015}} = \sqrt{1.0455} = 1.0225 - 1, \text{ or } 2.25\%$$

Finally, we can apply interest rate parity:

$$F_t = 1.200 \times \frac{1.0481^2}{1.0225^2} = 1.261$$

(See Book 4, Topic 41)

39. a Standards 3.1 and 3.2 relate to the preservation of confidentiality. The simplest, most conservative, and most effective way to comply with these Standards is to avoid disclosing any information received from a client, except to authorized fellow employees who are also working for the client. If the information concerns illegal activities by MTEX, Black *may* be obligated to report activities to authorities. (See Book 1, Topic 9)
40. a The liquidity preference theory suggests that the shape of the term structure is determined by the fact that most investors prefer short-term liquid assets, holding return constant. (See Book 3, Topic 23)
41. a In general, bond prices will tend to increase with maturity when coupon rates are *above* relevant forward rates. When short-term rates are *below* the forward rates utilized by bond prices, the investors who invest in longer-term investments will tend to outperform investors who roll over shorter-term investments. (See Book 4, Topic 41)

42. c The forward rate can be calculated as  $[(98.2240 / 96.7713) - 1] \times 2 = 3\%$ .  
(See Book 4, Topic 41)
43. b The price is calculated as  $\$15 (0.992556) + \$15 (0.982240) + \$1,015 (0.967713) = \$1,011.85$ . (See Book 4, Topic 41)
44. a Unique among swaps, equity swap payments may be floating on both sides (and the payments not known until the end of the settlement period). Similar to options, premiums for swaptions are dependent on the strike rate specified in the swaption. The most common reason for entering into commodity swap agreements is to control the costs of purchasing resources, such as oil and electricity. A negative index return requires the fixed-rate payer to pay the percentage decline in the index. (See Book 3, Topic 26)
45. b The GARCH(1,1) estimate of volatility will be:

$$0.000005 + (0.13)(0.03)^2 + (0.85)(0.022)^2 = 0.000533$$

$$\text{volatility} = \sqrt{0.000533} = 0.0231 = 2.31\%$$

(See Book 2, Topic 19)

46. b  $P = (\$20 \times e^{-0.0425 \times 0.5} \times 0.0349) - (\$25 \times 0.0263) = \$0.02582 \approx \$0.03$

(See Book 4, Topic 38)

47. c Any security with a rating below BBB by S&P or Baa by Moody's is a speculative or non-investment grade instrument. (See Book 3, Topic 32)

48. a The appropriate test is an  $F$ -test, where the larger sample variance (Index A) is placed in the numerator. (See Book 2, Topic 13)

49. d The formula for the Treynor measure is  $\left[ \frac{E(R_P) - R_F}{\beta_P} \right]$ . Thus, the value for the Treynor measure in this case is  $(0.10 - 0.04) / 0.75 = 0.08$ . (See Book 1, Topic 5)

50. d In this example:

$$\Delta t = \frac{1}{200}, u = 0, \text{ and } \sigma = 0.15$$

Therefore, by using the geometric Brownian motion method, the change in stock price is calculated as follows:

$$\Delta S_0 = (0) \left( \frac{1}{200} \right) + 0.15(-0.105) \left( \sqrt{\frac{1}{200}} \right) = -0.001114$$

At the end of the first day the portfolio value will be  $\$500,000 - (0.001114 \times \$500,000) = \$499,443$ . (See Book 2, Topic 18)

51. d For the standardized approach, CBI must apply different beta factors to specific business lines. The amounts are multiplied by the average annual gross income over the past 3-year period. The beta factors for retail banking, commercial banking, and investment banking are 12%, 15%, and 18%, respectively.

Average annual gross revenues for retail banking:

$$(380 + 344 + 326) / 3 = 350 \text{ million}$$

Average annual gross revenues for commercial banking:

$$(712 + 645 + 599) / 3 = 652 \text{ million}$$

Average annual gross revenues for investment banking:

$$(846 + 777 + 687) / 3 = 770 \text{ million}$$

Operational risk capital requirement:

$$0.12(350) + 0.15(652) + 0.18(770) = 278.4 \text{ million}$$

(See Book 4, Topic 50)

52. b According to the cash-and-carry formula, the futures price should be:

$$1,010e^{(0.0275-0.01)0.25} = \$1,014.43$$

Hence, the futures is overvalued, indicating it should be sold and the index be purchased for a risk-free profit of  $\$1,020 - \$1,014.43 = \$5.57$ . (See Book 3, Topic 24)

53. d Hoffman has violated both Standard 1.2—independence and objectivity, which specifically mentions that GARP Members must not offer, solicit, or accept any gift, benefit, compensation, or consideration that could be reasonably expected to compromise their own or another's independence and objectivity, and Standard 2.2—Conflicts of Interest, which states the Members should make full and fair disclosure of all matters that could reasonably be expected to impair independence and objectivity or interfere with respective duties to their employer, clients, and prospective clients. (See Book 1, Topic 9)

54. c Bond C is the cheapest-to-deliver bond, at \$0.11.

| <i>Bond</i> | <i>Cost of Delivery</i>              |
|-------------|--------------------------------------|
| A           | $103 - (98.03 \times 1.03) = \$2.03$ |
| B           | $116 - (98.03 \times 1.12) = \$6.21$ |
| C           | $105 - (98.03 \times 1.07) = \$0.11$ |
| D           | $124 - (98.03 \times 1.23) = \$3.42$ |

(See Book 3, Topic 25)

55. d Expected value =  $(0.4)(10\%) + (0.4)(12.5\%) + (0.2)(30\%) = 15\%$

$$\text{Variance} = (0.4)(10 - 15)^2 + (0.4)(12.5 - 15)^2 + (0.2)(30 - 15)^2 = 57.5$$

$$\text{Standard deviation} = \sqrt{57.5} = 7.58\%$$

(See Book 2, Topic 11)



56. d  $HR = \text{Beta}_{S,F} = \frac{\text{Cov}_{S,F}}{\sigma_F^2} = \frac{0.05}{0.2^2} = 1.25$

(See Book 3, Topic 22)

57. a Option-free bonds have positive convexity and the effect of (positive) convexity is to increase the magnitude of the price increase when yields fall and to decrease the magnitude of the price decrease when yields rise. (See Book 4, Topic 43)

58. a The use of VaR as a risk measurement tool in this case is inappropriate and narrow in scope. This is an example of the misuse of VaR in choosing a time period that does not correspond to the liquidity of the assets in the portfolio. (See Book 1, Topic 8)

59. b The critical  $z$ -value for a one-tailed test of significance at the 0.01 level will be either +2.33 or -2.33. The test statistic for hypotheses concerning equality of variances is  $F = \frac{s_1^2}{s_2^2}$ . The statement regarding  $p$ -value is true. A Type II error is failing to reject the null hypothesis when it is actually false. (See Book 2, Topic 13)

60. b The Taylor Series does not provide good approximations of price changes when the underlying asset is a callable bond or mortgage-backed security. The Taylor Series approximation only works well for “well-behaved” quadratic functions that can be approximated by a polynomial of order two. (See Book 4, Topic 36)

61. d LTCM believed that, although yield differences between risky and riskless fixed-income instruments varied over time, the risk premium (or credit spread) tended to revert (decrease) to average historical levels. This was similar to their equity volatility strategy. Also, their balance sheet leverage was actually in line with other large investment banks (but their true leverage, economic leverage, was not considered). (See Book 1, Topic 7)

62. b The benchmark returns are not important here. The average of the portfolio returns is  $(6 + 9 + 4 + 12) / 4 = 31 / 4 = 7.75$ .

$$\text{Sortino ratio} = \frac{E(R_P) - R_{\min}}{\sqrt{\text{MSD}_{\min}}} = \frac{7.75 - 7}{\sqrt{2.5}} = 0.4743$$

Note: If the minimum acceptable return is not provided, it is reasonable to use the risk-free rate instead. (See Book 1, Topic 5)

63. d Neither statement is correct. The appropriate number of contracts for the hedge is:

$$\beta_{\text{portfolio}} \times \left( \frac{\text{portfolio value}}{\text{futures price} \times \text{multiplier}} \right) = 1.0 \times \left( \frac{\$10,000,000}{1,100 \times 250} \right) \approx 36 \text{ contracts}$$

However, since the manager is long the portfolio, he will want to take a *short position* in the 36 contracts.

Change in value of portfolio =  $-0.01(\$10,000,000) = -\$100,000$ .

Change in value of futures position =  $36(1,100 - 1,090)(250) = +\$90,000$ .

Net payoff =  $-\$100,000 + \$90,000 = -\$10,000$ . The net impact is a *loss* of \$10,000.

(See Book 3, Topic 22)

64. c At the end of year 1 there is a 0% chance of default and a 90% chance that the firm will maintain an Aaa rating. In year 2, there is a 0% chance of default if the firm was rated Aaa after 1 year ( $90\% \times 0\% = 0\%$ ). There is a 5% chance of default if the firm was rated Baa after 1 year ( $10\% \times 5\% = 0.5\%$ ). Also, there is a 15% chance of default if the firm was rated Caa after 1 year ( $0\% \times 15\% = 0\%$ ). The probability of default is 0% from year 1 plus 0.5% chance of default from year 2 for a total probability of default over a 2-year period of 0.5%. (See Book 4, Topic 47)
65. a The beta factors used in the standardized approach for operational risk are as follows: trading and sales: 18%; retail banking: 12%; agency and custody services: 15%; asset management: 12%. (See Book 4, Topic 50)
66. a According to put-call parity:
- $$c_0 + Xe^{-rT} = p_0 + S_0$$
- The left-hand side =  $\$4 + \$45e^{-0.06 \times 0.5} = \$47.67$
- The right-hand side =  $\$4 + \$43 = \$47$
- Since the value of the fiduciary call is not equal to the value of the protective put, put-call parity is violated and there is an arbitrage opportunity.
- Sell overpriced and buy underpriced. That is, sell the fiduciary call and buy the protective put.
- Therefore, sell the call for \$4, sell the Treasury bill for \$43.67 (i.e., borrow at the risk-free rate), buy the put for \$4 and buy the underlying asset for \$43. The arbitrage profit is \$0.67. (See Book 3, Topic 27)
67. b The 5-3-2 spread tells us the amount of profit that can be locked in by buying five barrels of oil and producing three barrels of gasoline and two barrels of heating oil.  $(61.5 \times 3) + (58.5 \times 2) - (55 \times 5) = \$26.50$  for 5 barrels; \$5.30/barrel. (See Book 3, Topic 30)
68. c Use interest-rate parity to solve this problem.  $1.1565 = Se^{(0.02-0.04)0.25}$ , so  $S = 1.1623$ . (See Book 3, Topic 31)
69. a Beta identifies the appropriate level of risk for which an investor should be compensated. Unsystematic risk is asset-specific and, therefore, a diversifiable risk. The market risk premium is calculated as the excess of the expected return on the market over the risk-free rate of return. Assets with equivalent betas should earn the same return because arbitrage will prevent assets with the same risk from earning different returns. (See Book 1, Topic 3)

$$70. \text{ c} \quad \text{Cov}_{ij} = \frac{\sum_{i=j=1}^{12} [R_i - E(R_i)] \times [R_j - E(R_j)]}{n-1} = \frac{71.75}{11} = 6.52$$

$$\sigma_i = \sqrt{\frac{\sum_{i=1}^{12} [R_i - E(R_i)]^2}{11}} = \sqrt{\frac{379.90}{11}} = 5.88$$

$$\sigma_j = \sqrt{\frac{\sum_{j=1}^{12} [R_j - E(R_j)]^2}{11}} = \sqrt{\frac{135.06}{11}} = 3.5$$

$$r_{ij} = \frac{\text{Cov}_{ij}}{\sigma_i \times \sigma_j} = \frac{6.52}{(5.88)(3.5)} = 0.32$$

(See Book 2, Topic 13)

71. b The VaR of this investment can be interpreted as either (1) there is a 95% probability that the portfolio will lose no more than \$18 million on a given day or (2) there is a 5% probability that the portfolio will lose more than \$18 million on a given day.  
(See Book 1, Topic 1)

72. b We can calculate the expected loss as follows.

$$\text{EL} = \text{AE} \times \text{EDF} \times \text{LGD}$$

Maximum loss

$$\begin{aligned} \text{Adjusted exposure} &= \text{OS} + (\text{COM}_U - \text{OS}) \times \text{UGD} \\ &= \$8,000,000 + (\$12,000,000) \times (0.75) \\ &= \$17,000,000 \end{aligned}$$

$$\text{EL} = (\$17,000,000) \times (0.02) \times (0.80) = \$272,000$$

Minimum loss

$$\begin{aligned} \text{Adjusted exposure} &= \text{OS} + (\text{COM}_U - \text{OS}) \times \text{UGD} \\ &= \$8,000,000 + (\$12,000,000) \times (0.5) \\ &= \$14,000,000 \end{aligned}$$

$$\text{EL} = (\$14,000,000) \times (0.01) \times (0.80) = \$112,000$$

Therefore, the difference between maximum and minimum loss is \$272,000 – \$112,000 = \$160,000.

(See Book 4, Topic 48)

73. **a** Since the current position is short gamma, the action that must be taken is to go long the option in the ratio of the current gamma exposure to the gamma of the instrument to be used to create the gamma-neutral position ( $5,000 / 2 = 2,500$ ). However, this will change the delta of the portfolio from zero to  $(2,500 \times 0.7) = 1,750$ . This means that 1,750 of the underlying stock position will need to be sold to maintain both gamma and delta neutrality. (See Book 4, Topic 39)
74. **b** You have purchased a bull spread. You will exercise the call that you purchased for a net profit of  $(34 - 25) - 3 = \$6$  per share. The call that you sold will not be exercised, so your net profit is the cost of \$1 per share. Your total net profit is  $6 + 1 = \$7$  per share. (See Book 3, Topic 28)
75. **a** If the investor has written 15,000 call options, he must go long delta times the short option position to create a delta-neutral position, or buy  $15,000 \times 0.50 = 7,500$  shares. Note that the delta of a call option, which is exactly at-the-money, is 0.5. (See Book 4, Topic 39)
76. **b** The historical simulation VaR for 5% is the fifth lowest return, which is  $-1.59\%$ ; therefore, the correct VaR is:  $-79,500 = (-0.0159) \times (5,000,000)$ . (See Book 1, Topic 1)
77. **d** The “underrating” and “overrating” is seen more with the use of the through-the-cycle approach. Also, the ratings delivered by more specialized and regional agencies tend to be less homogeneous than those delivered by major players like S&P and Moody’s. (See Book 4, Topic 47)
78. **b** Operational risk economic capital is the difference between the loss at a given confidence level and the expected loss. In this case,  $\$500,000 - \$50,000 = \$450,000$ . (See Book 4, Topic 50)
79. **a** The head of the government bond trading desk at Kidder Peabody, Joseph Jett, misreported trades, which allowed him to report substantial artificial profits. After these errors were detected, \$350 million in falsely reported gains had to be reversed. (See Book 1, Topic 7)
80. **d** The  $R^2$  of the regression is calculated as  $ESS / TSS = (92.648 / 117.160) = 0.79$ , which means that the variation in industry returns explains 79% of the variation in the stock return. By taking the square root of  $R^2$ , we can calculate that the correlation coefficient ( $r$ ) = 0.889. The  $t$ -statistic for the industry return coefficient is  $1.9 / 0.31 = 6.13$ , which is sufficiently large enough for the coefficient to be significant at the 99% confidence interval. Since we have the regression coefficient and intercept, we know that the regression equation is  $R_{\text{stock}} = 1.9X + 2.1$ . Plugging in a value of 4% for the industry return, we get a stock return of  $1.9(4\%) + 2.1 = 9.7\%$ . (See Book 2, Topic 14)
81. **b** Fixed-rate coupon =  $150,000,000 \times 0.055 = \$8,250,000$
- $$B_{\text{fixed}} = 8.25e^{-0.0575} + 158.25e^{-0.0625 \times 2} = \$147,440,000$$
- $$B_{\text{floating}} = \$150,000,000$$
- $$V_{\text{swap}} = \$150,000,000 - \$147,440,000 = \$2,560,000$$
- (See Book 3, Topic 26)

82. c The rate of sampling error has no relation to the sample size; all things being equal, the likelihood of sampling error will be the same regardless of sample size. According to the central limit theorem, the sample mean for large sample sizes will be distributed normally regardless of the distribution of the underlying population.  
(See Book 2, Topic 13)

83. a

|                 | <i>Mountain West</i> | <i>First Interstate</i> | <i>Glacier Bank</i> | <i>Totals</i> |
|-----------------|----------------------|-------------------------|---------------------|---------------|
| EUR Assets      | 1,350,000            | 500,000                 | 875,000             | 2,725,000     |
| EUR Liabilities | 2,000,000            | 400,000                 | 1,550,000           | 3,950,000     |
| EUR Bought      | 275,000              | 150,000                 | 2,450,000           | 2,875,000     |
| EUR Sold        | 650,000              | 375,000                 | 1,875,000           | 2,900,000     |

The region's net euro exposure is computed as follows:

(EUR assets – EUR liabilities) + (EUR bought – EUR sold)

$$(2,725,000 - 3,950,000) + (2,875,000 - 2,900,000) = -\text{EUR } 1,250,000$$

The banks, collectively, have a negative net exposure. A negative net exposure position means that the region is net short in a currency. The region faces the risk that the euro will rise in value against the domestic currency. (See Book 3, Topic 31)

84. d The basic problem at Barings was operation risk control. Nick Leeson was in charge of trading and settlement. This dual responsibility allowed him to hide losses by crossing trades at fabricated prices. He then booked the profitable side of the trade in accounts that were reported and the unprofitable side in an unreported account. The lack of supervision also permitted him to shift from hedged trading strategies to speculative strategies in an effort to hide previously incurred losses. Clearly his reporting to multiple managers in a convoluted organizational structure led to ambiguity concerning who was responsible for performing specific oversight functions.

Leeson used a short straddle strategy on the Nikkei 225 and held speculative double long positions in the market for Nikkei 225 futures contracts.

Liquidity was an issue in the Metallgesellschaft and LTCM cases, not Barings.  
(See Book 1, Topic 7)

85. c First convert the daily variance into a daily standard deviation  $\sqrt{0.0002} = 0.01414$ .

$$\text{daily VaR}(5\%)_{\text{percentage basis}} = z_{5\%} \times \sigma = 1.65(0.01414) = 0.02333 = 2.333\%$$

$$\begin{aligned} \text{annual VaR}(5\%)_{\text{percentage basis}} &= \text{daily VaR}(5\%)_{\text{percentage basis}} \times \sqrt{250} = 0.02333 \times \sqrt{250} \\ &= 0.3689 = 36.89\% \end{aligned}$$

(See Book 4, Topic 35)

86. b The distribution is skewed and leptokurtic. To measure the magnitude of these skewed tails, the analyst needs to consider both the skewness and kurtosis. (See Book 2, Topic 11)

87. a Even investment grade bonds are exposed to the risk of the issuer being taken over or merging with another company. Event risk can increase on a market level if there is a trend toward increasing mergers in the economy. (See Book 3, Topic 32)
88. d Given that the population variance is unknown and the sample size is large, the 95% confidence interval for the population mean is:

$$\bar{x} \pm z_{\alpha/2} \frac{s}{\sqrt{n}}$$

The confidence interval is:

$$1.7 \pm 1.96 \left( \frac{0.4}{\sqrt{100}} \right) = 1.7 \pm 1.96(0.04) = 1.7 \pm 0.0784 = 1.622 \text{ to } 1.778$$

(See Book 2, Topic 13)

89. b For the 6% bond,  $N = 20 \times 2 = 40$ ;  $I/Y = 6/2 = 3$ ;  $PMT = 5/2 = 2.5$ ;  $FV = 100$ ;  $CPT \rightarrow PV = 88.4426$ . For the 6.01% bond,  $N = 20 \times 2 = 40$ ;  $I/Y = 6.01/2 = 3.005$ ;  $PMT = 5/2 = 2.5$ ;  $FV = 100$ ;  $CPT \rightarrow PV = 88.3365$ .  $P_0 - P_1 = 88.4426 - 88.3365 = 0.1061$ . Note: This explanation used an increase in yield. The DV01 for a decrease in yield is 0.1063. (See Book 4, Topic 43)
90. b The hedge ratio is  $(0.1061 / 0.1544) = 0.6872$ . Since the investor has a short position in his bond portfolio, the investor needs to buy \$0.6872 of par value of the hedging instrument for every \$1 of par value for the 20-year bond. (See Book 4, Topic 43)
91. c “A rogue trader within an institution” is an example of people risk (i.e., operational risk). “Stock XYZ decreases in price due to a market crisis” is an example of market risk. “Using a put option to hedge an equity exposure” is an example of basis risk. “Counterparty sues bank to avoid meeting its obligations” is an example of legal risk. (See Book 1, Topic 1)
92. a Hedged position: \$0.80 CAD/SGD
- $$\$2,500,000 \text{ SGD} \times \$0.80 \text{ CAD/SGD} = \$2,000,000 \text{ CAD}$$
- Unhedged position:  $\$2,500,000 \times \$0.73 \text{ CAD/SGD} = \$1,825,000 \text{ CAD}$
- (See Book 3, Topic 20)
93. a Basis risk occurs when a derivatives instrument used to hedge a position does not exactly correspond to the position being hedged. Hedging jet fuel with oil futures is not a perfect hedge and is, therefore, subject to basis risk. Basis risk can also occur when the maturity of the underlying position and the maturity of the derivative used to hedge are significantly different. Stack hedges, in which multiple future liabilities are hedged with a single near-term futures contract, are subject to basis risk. Strip hedges match the dates of the underlying position and the derivatives positions and, assuming the commodity in the futures contract matched the commodity to be hedged, are not subject to basis risk. (See Book 3, Topic 30)
94. c Empirical results suggest implied volatility is greater than realized volatility on average, causing an upward bias in predictions. (See Book 4, Topic 38)

95. a The simple linear regression  $F$ -test tests the same hypothesis as the  $t$ -test because there is only one independent variable. The  $F$ -statistic is used to tell you if *at least one* independent variable in a set of independent variables explains a significant portion of the variation of the dependent variable. It tests the independent variables as a group, and thus won't tell you *which* variable has significant explanatory power. The  $F$ -test decision rule is to reject the null hypothesis if the  $F > F_c$ . (See Book 2, Topic 17)
96. d Because the variance is unknown and the sample size is less than 30, the appropriate test statistic is a  $t$ -statistic with  $n - 1 = 24$  degrees of freedom. The  $t$ -statistic is
- $$\frac{70 - 50}{60 / \sqrt{25}} = 1.67. \text{ (See Book 2, Topic 13)}$$
97. c For a portfolio to be efficient, it should have the lowest amount of risk for a given return, or the highest return for a given amount of risk. Portfolio 2 is not efficient, because it has the same standard deviation as Portfolio 4 but a smaller expected return. Portfolio 3 is not efficient, because it has the same expected return as Portfolio 1 but a larger standard deviation. (See Book 1, Topic 2)
98. c Using the interest rate parity formula, the futures exchange rate is computed as follows:
- $$F_0 = S_0 e^{(r_{\text{FC}} - r_{\text{FC}})T}$$
- $$F_0 = 1.02 e^{(0.01 - 0.02)(7/12)} = \$1.014 / \text{CHF}$$
- (See Book 3, Topic 24)
99. d The forward rate can be calculated from  $\left(1 + \frac{0.0294}{2}\right)^4 = \left(1 + \frac{0.0253}{2}\right)^3 \times \left(1 + \frac{f}{2}\right)^1$ .
- Solving for  $f$  gives 0.0418, or 4.18%. (See Book 4, Topic 41)
100. b American put options on non-dividend-paying stocks may be optimally exercised early. American call options on non-dividend-paying stocks should never be exercised before expiration, and European options cannot be exercised prior to expiration. American call options on dividend-paying stocks may be exercised early if the dividend received exceeds the amount of foregone interest. If this is the case, exercise should take place immediately before (not on) the ex-dividend date. (See Book 3, Topic 27)

# PRACTICE EXAM 2

FRM Exam Part I contains 100 multiple-choice questions. You must answer the questions by filling in a scantron sheet with a number 2 or HB pencil. For realism, we suggest that you use this answer sheet and darken the bubbles corresponding to your answers. You have 240 minutes (4 hours) to complete this exam. That equates to 2.4 minutes per question, so budget your time well. Good luck!

1.  a  b  c  d

2.  a  b  c  d

3.  a  b  c  d

4.  a  b  c  d

5.  a  b  c  d

6.  a  b  c  d

7.  a  b  c  d

8.  a  b  c  d

9.  a  b  c  d

10.  a  b  c  d

11.  a  b  c  d

12.  a  b  c  d

13.  a  b  c  d

14.  a  b  c  d

15.  a  b  c  d

16.  a  b  c  d

17.  a  b  c  d

18.  a  b  c  d

19.  a  b  c  d

20.  a  b  c  d

21.  a  b  c  d

22.  a  b  c  d

23.  a  b  c  d

24.  a  b  c  d

25.  a  b  c  d

26.  a  b  c  d

27.  a  b  c  d

28.  a  b  c  d

29.  a  b  c  d

30.  a  b  c  d

31.  a  b  c  d

32.  a  b  c  d

33.  a  b  c  d

34.  a  b  c  d

35.  a  b  c  d

36.  a  b  c  d

37.  a  b  c  d

38.  a  b  c  d

39.  a  b  c  d

40.  a  b  c  d

41.  a  b  c  d

42.  a  b  c  d

43.  a  b  c  d

44.  a  b  c  d

45.  a  b  c  d

46.  a  b  c  d

47.  a  b  c  d

48.  a  b  c  d

49.  a  b  c  d

50.  a  b  c  d

51.  a  b  c  d

52.  a  b  c  d

53.  a  b  c  d

54.  a  b  c  d

55.  a  b  c  d

56.  a  b  c  d

57.  a  b  c  d

58.  a  b  c  d

59.  a  b  c  d

60.  a  b  c  d

61.  a  b  c  d

62.  a  b  c  d

63.  a  b  c  d

64.  a  b  c  d

65.  a  b  c  d

66.  a  b  c  d

67.  a  b  c  d

68.  a  b  c  d

69.  a  b  c  d

70.  a  b  c  d

71.  a  b  c  d

72.  a  b  c  d

73.  a  b  c  d

74.  a  b  c  d

75.  a  b  c  d

76.  a  b  c  d

77.  a  b  c  d

78.  a  b  c  d

79.  a  b  c  d

80.  a  b  c  d

81.  a  b  c  d

82.  a  b  c  d

83.  a  b  c  d

84.  a  b  c  d

85.  a  b  c  d

86.  a  b  c  d

87.  a  b  c  d

88.  a  b  c  d

89.  a  b  c  d

90.  a  b  c  d

91.  a  b  c  d

92.  a  b  c  d

93.  a  b  c  d

94.  a  b  c  d

95.  a  b  c  d

96.  a  b  c  d

97.  a  b  c  d

98.  a  b  c  d

99.  a  b  c  d

100.  a  b  c  d





---

## PRACTICE EXAM 2

---

1. Monte Carlo simulation and the historical method are two means of calculating VaR. Which of the following describes a disadvantage of the Monte Carlo method compared to the historical method of calculating VaR? The Monte Carlo method:
- I. takes advantage of the normal distribution.
  - II. incorporates flexibility in modeling price paths.
- a. I only.
  - b. II only.
  - c. Both I and II.
  - d. Neither I nor II.

2. Given the following information, which of the following amounts is closest to  $d(1.0)$ , the discount factor for the first year?

|                        | Bond A  | Bond B  | Bond C |
|------------------------|---------|---------|--------|
| Bond maturity in years | 0.5     | 1       | 2      |
| Coupon                 | 6.00%   | 12.00%  | 9.00%  |
| Price                  | 101.182 | 102.341 | 99.573 |

- a. 0.9099.
  - b. 0.9138.
  - c. 0.9655.
  - d. 0.9823.
3. Lear, Inc., (Lear) operates a manufacturing business in a very competitive industry. Lear is looking to exploit risk better than its competitors and cites its unused lines of credit ready for immediate or emergency use as a distinct advantage. The lines of credit are best described as a(n):
- a. experience advantage.
  - b. flexibility advantage.
  - c. resource advantage.
  - d. speed advantage.

4. A portfolio manager received a report on his fund's performance. According to the report, the portfolio return was 2.5% with a standard deviation of 21% and a beta of 1.2. The risk-free rate over this period was 3.5%, the semi-standard deviation of the portfolio was 16%, and the tracking error of the fund was 2%. What is the difference between the value of the fund's Sortino ratio (assuming the risk-free rate is the minimum acceptable return) and its Sharpe ratio?
- 0.563.
  - 0.347.
  - 0.053.
  - 0.015.

5. Gloria Brown, FRM, calculated the intrinsic value of RTN Company and expects the stock to generate a 25% annual return over the foreseeable future. However, Brown is concerned that her price forecast may be too high. She conducted a hypothesis test and concluded that at a 5% significance level, the null hypothesis can be rejected that RTN Company's investment return would be equal to or less than 25% per year. The one-tailed test utilized a  $z$ -test. Indicate the meaning of the significance level chosen by Brown and state the correct rejection region.

| <u>Significance level</u>                                     | <u>Rejection region</u> |
|---------------------------------------------------------------|-------------------------|
| a. Brown will reject a true null hypothesis 5% of the time.   | $z > 1.645$             |
| b. Brown will reject a false null hypothesis 95% of the time. | $z < -1.645$            |
| c. Brown will reject a true null hypothesis 5% of the time.   | $z < -1.645$            |
| d. Brown will reject a false null hypothesis 95% of the time. | $z > 1.645$             |

6. Assume a 3-year bond with a face value of \$100 pays a 3.5% coupon on a semiannual basis. What is the price of the bond according to the following spot rates?

| <u>Maturity (years)</u> | <u>Spot rate (%)</u> |
|-------------------------|----------------------|
| 0.5                     | 2.20%                |
| 1.0                     | 2.25%                |
| 1.5                     | 2.30%                |
| 2.0                     | 2.35%                |
| 2.5                     | 2.40%                |
| 3.0                     | 2.45%                |

- 101.15.
- 102.85.
- 102.97.
- 103.07.

7. An investor owns a stock and is bullish over the short term. Which of the following strategies will be the most appropriate one for this investor if the primary concern is to make a bet on the volatility of the stock?
- A covered call.
  - A protective put.
  - An at-the-money strip.
  - An at-the-money strap.
8. STT is a small mobile phone manufacturer that frequently makes investments in projects overseas. The organization has \$20 million in assets, which is comprised of 45% debt and 55% equity. A recent international project had a market risk premium of 5%, a country risk premium of 2%, and a beta of 1.6 (based on historical information). STT's current cost of borrowing is 10%, with a default spread of 7% given a relevant risk-free rate of 3%. What is STT's weighted average cost of capital given their marginal corporate tax rate of 35%?
- 12.783%.
  - 10.735%.
  - 9.858%.
  - 8.975%.
9. Paper Products Inc.'s research department developed a new type of environmentally friendly paper. The marketing department surveyed a random sample of 100 people. The survey is designed to gauge customer interest level in the new product. The sample indicates an average purchase of 2,500 reams per year with a variance of 160,000 reams. The researcher's supervisor is concerned that the sample size is too small. The researcher advises against increasing the sample size, stating that "there is a risk of sampling from more than one population." Determine the standard error of the sample mean and indicate whether the researcher's statement is correct or incorrect.
- | <u>Standard error</u> | <u>Researcher's statement</u> |
|-----------------------|-------------------------------|
| a. 8                  | Correct                       |
| b. 40                 | Incorrect                     |
| c. 8                  | Incorrect                     |
| d. 40                 | Correct                       |
10. Bond A has an effective duration of 12.13 and a 2-year key rate exposure of \$4.04. You would like to hedge it with a security with an effective duration of 2.48 and a 2-year key rate exposure of 0.81 per \$100 face value. What amount of face value would be used to hedge the 2-year exposure?
- \$102.
  - \$163.
  - \$489.
  - \$499.

11. You are given the following information about a call option:

- Time to maturity = 3 years.
- Continuous risk-free rate = 3%.
- Continuous dividend yield = 2%.
- $N(d_1) = 0.7$ .

What is the delta of this option?

- a. -0.64.
  - b. 0.36.
  - c. 0.66.
  - d. 0.70.
12. Jimmy Deininger, FRM, is a portfolio manager who runs a large \$400,000,000 long equity portfolio. Relative to the S&P 500, Deininger's portfolio has a beta of 1.07. Currently, S&P futures are trading at 1,368, and the futures multiplier is 250. Deininger wishes to create a hedge for his portfolio for the next four months using S&P futures. How many futures contracts should Deininger buy or sell to hedge this portfolio?
- a. Long hedge; 1,490 contracts.
  - b. Short hedge; 1,053 contracts.
  - c. Long hedge; 992 contracts.
  - d. Short hedge; 1,251 contracts.
13. You hold a \$75 million portfolio with a duration of nine and a one-year hedging horizon. There is an appropriate one-year futures contract quoted at 104-13 with a duration of eight and a contract size of \$100,000. Which of the following actions should you undertake to provide an appropriate hedge for small changes in yield?
- a. Short 639 futures contracts.
  - b. Long 639 futures contracts.
  - c. Short 809 futures contracts.
  - d. Long 809 futures contracts.
14. A loan portfolio is made up of ten noncorrelated loans, each with a value of \$1 million and an estimated probability of default of 3% in any given year. Recovery in the case of default is expected to be zero. Which of the following amounts is closest to the cumulative expected loss on the loan portfolio over two years?
- a. \$0.03 million.
  - b. \$0.059 million.
  - c. \$0.30 million.
  - d. \$0.591 million.
15. An analyst determines that there is a 50% chance the economy will grow and that there is a 50% chance the economy will go into a recession. If the economy grows, there is a 60% chance that ABC stock will rise in price and a 40% chance it will fall in price. If a recession occurs, there is a 15% chance ABC's stock price will rise and an 85% chance the price will fall. Given that ABC stock has risen in price, what is the probability the economy has grown?
- a. 30%.
  - b. 50%.
  - c. 70%.
  - d. 80%.

16. What are the minimum values of an American-style and a European-style 3-month call option with a strike price of \$80 on a non-dividend-paying stock trading at \$86 if the risk-free rate is 3%?
- |    | <u>American</u> | <u>European</u> |
|----|-----------------|-----------------|
| a. | \$6.00          | \$6.00          |
| b. | \$5.96          | \$6.00          |
| c. | \$6.00          | \$6.59          |
| d. | \$6.59          | \$6.59          |
17. Harriet Fields, an investment adviser specializing in selling municipal bonds, advertises on television explaining their safety and security. The bonds she is currently selling are limited obligation bonds backed only by the revenue generated from the projects they fund, which include a housing project and a golf course. Fields tells her prospective clients that the bonds are safe, secure, and offer generous interest payments. Which of the following statements is most correct regarding Fields's actions?
- Fields did not violate the GARP Code of Conduct because municipal bonds are generally regarded as being safe investments.
  - Fields violated the part of the GARP Code of Conduct dealing with confidentiality.
  - Fields violated the GARP Code of Conduct when she misrepresented the bonds by not explaining their inherent risks.
  - Fields has not violated any of the ethical responsibilities related to the GARP Code of Conduct.
18. A portfolio manager of an endowment wants to calculate a daily VaR for the portfolio. The €10,000,000 portfolio is restricted from using derivative securities. The annual return is expected to be 10%, with a standard deviation of 15%. If the manager assumes there are 250 trading days in a year and uses a 1% level of significance, which of the following amounts is closest to the daily VaR using the delta-normal method?
- €217,043.
  - €221,350.
  - €241,100.
  - €245,100.
19. When there are risky assets and a risk-free asset available, investors can achieve the best combinations of risk and return by holding:
- some combination of the risk-free asset and any of the efficient portfolios of risky assets.
  - the market portfolio.
  - some combination of the efficient portfolios of risky assets.
  - some combination of the risk-free asset and the market portfolio of risky assets.

20. A bank has a USD50,000,000 portfolio available for investing. The cost of funds for the USD50,000,000 is 4.5%. The bank lends 50% of the assets to domestic customers at an average loan rate of 6.25%. The rest of the portfolio is lent to UK clients at 7%. The current exchange rate is USD1.642/GBP. At the same time, the bank sells a forward contract equal to the expected receipts one year from now. The forward rate is USD1.58/GBP. The weighted average return to the bank on its assets is closest to:
- 1.99%.
  - 2.13%.
  - 2.26%.
  - 4.61%.
21. If the expected variance of a regression error term depends on the value of the independent variable, then this:
- does not violate the assumptions of the classical linear regression model.
  - would violate the assumptions of the classical linear regression model and is called serial correlation.
  - would violate the assumptions of the classical linear regression model and is called homoskedasticity.
  - would violate the assumptions of the classical linear regression model and is called heteroskedasticity.
22. What economic capital charge should be applied to a bank portfolio, if at the 99% confidence level, the portfolio will be worth at least \$250 million at year-end? Assume that the expected year end portfolio value is \$350 million.
- \$99 million.
  - \$100 million.
  - \$247.5 million.
  - \$250 million.
23. Assume that a trader wishes to set up a hedge such that he sells \$100,000 of a Treasury bond and buys Treasury TIPS as a hedge. Using a historical yield regression framework, assume the DV01 on the T-bond is 0.072, the DV01 on the TIPS is 0.051, and the hedge adjustment factor (regression beta coefficient) is 1.2. What is the face value of the offsetting TIPS position needed to carry out this regression hedge?
- \$138,462.
  - \$169,412.
  - \$268,499.
  - \$280,067.
24. A \$1,000 par bond with 22 years to maturity and a 4% semiannual coupon has a yield to maturity of 5%. Assuming a 5 basis point change in yield, the convexity of the bond is closest to:
- 258.
  - 502.
  - 942.
  - 129.

25. Between 1993 and 1995, Nick Leeson's actions resulted in losses of approximately \$1.25 billion and forced Barings into bankruptcy. Which of the following actions would least likely have prevented the bankruptcy of Barings' Bank?
- Information on account gains and losses being more transparent.
  - Management being more suspicious of huge reported profits.
  - All traders being required to meet SIMEX (Singapore International Monetary Exchange) standards.
  - A system of checks and balances being established to detect wildly speculative positions.
26. A bakery owner has decided to exit the business and sell her futures contracts. The contract calls for the delivery of 100 tons of wheat in five months at a price of \$105 per ton. The current price of wheat on the spot market is \$110 per ton. The risk-free rate is 4% (continuously compounded) and the market rate of interest is 6% (continuously compounded). Ignore trade and storage costs. Which of the following amounts is closest to the fair value for the contract?
- \$674.
  - \$759.
  - \$912.
  - \$1,111.
27. Colleagues Benjamin Ecko and Bernard Charles recently discussed the application of the normal distribution for random variables. Ecko claimed that the  $z$ -statistic measures the distance, in standard deviation units, that a given observation is from the population mean. Charles claimed that there is a 95% chance that the  $z$ -statistic lies above negative 1.96. Regarding the statements of Ecko and Charles:
- Ecko is correct; Charles is correct.
  - Ecko is correct; Charles is incorrect.
  - Ecko is incorrect; Charles is correct.
  - Ecko is incorrect; Charles is incorrect.
28. Which of the following statements is correct regarding the factors that led to the financial crisis at Metallgesellschaft Refining and Marketing?
- There was a cash flow problem that constrained the company's ability to fully execute the hedge already in place.
  - The maturity mismatch between its short and long positions is widely believed to have contributed to the problems.
  - The shifting of prices so that the petroleum spot prices were greater than petroleum futures prices created a significant cash flow problem.
  - Gains and losses on customer contracts were realized when customers entered into the contracts.
29. There are various bond interest payment classifications in use. Ignoring the risk of default, which of the following types of bonds may result in payment of less than the specified or implied amount/rate of interest?
- Income bonds.
  - Zero-coupon bonds.
  - Floating-rate bonds.
  - Participating bonds.



30. The S&P 500 Index is trading at 1,015. The S&P 500 pays an expected continuously compounded dividend yield of 2%, and the continuously compounded risk-free rate is 4.1%. The value of a 3-month futures contract on the S&P 500 is closest to:
- 1,020.34.
  - 1,030.60.
  - 1,036.54.
  - 1,078.84.
31. Two firms, Bell-Con and Bro-Con, enter into a fixed-for-fixed currency swap, with an agreement to make periodic payments annually. Bell-Con pays 3.5% in euros and receives 3% in U.S. dollars. At the beginning of the swap, Bell-Con pays a principal amount to Bro-Con of USD 250 million, and Bro-Con pays EUR 200 million to Bell-Con. What amounts are exchanged every period, and what happens to the principal amounts at the swap's conclusion?
- Bell-Con will pay EUR 8.75 million to Bro-Con, Bro-Con will pay USD 6 million to Bell-Con, and there will be no other payments exchanged at swap conclusion.
  - Bell-Con will pay EUR 7 million to Bro-Con, Bro-Con will pay USD 7.5 million to Bell-Con, and the principal amounts will be re-exchanged at swap conclusion.
  - Bell-Con will pay EUR 7 million to Bro-Con, Bro-Con will pay USD 6 million to Bell-Con, and there will be no other payments exchanged at swap conclusion.
  - Bell-Con will pay EUR 8.75 million to Bro-Con, Bro-Con will pay USD 7.5 million to Bell-Con, and the principal amounts will be re-exchanged at swap conclusion.
32. A financial institution has entered into a plain vanilla currency swap with one of its customers. The period left on the swap is two years with the institution paying 4.5% on USD120 million and receiving 2% on JPY3,500 million annually. The current exchange rate is 120 JPY/USD, and the flat term structure in both countries generates a 3% rate in the United States and a 0.5% rate in Japan. The current value of this swap to the institution is closest to:
- \$93.3 million.
  - \$93.3 million.
  - \$118.1 million.
  - \$118.1 million.
33. SCU stock is currently priced at \$106 per share, and the risk-free interest rate is 3.25%. Assuming that SCU does not pay any dividends, what is the lower bound of an American put option on SCU that expires in three months and has an exercise price of \$110?
- \$0.
  - \$0.48.
  - \$3.11.
  - \$4.00.

34. Zero-coupon bonds issued by the Treasury are called STRIPS (separate trading on registered interest and principal securities). Which of the following statements regarding STRIPS and zero-coupon bonds is incorrect?
- Longer-term C-STRIPS tend to trade cheap.
  - Shorter-term C-STRIPS tend to trade rich.
  - Investors generally pay a discount for zero-coupon bonds.
  - Zero-coupon bonds are generally more sensitive to interest rate changes than coupon bonds.
35. An investor is looking to create an options portfolio on XYZ stock that will have virtually zero vega exposure while maximizing the ability to profit from increases in interest rates. If the current price of XYZ is \$50, which of the following would accomplish his goals?
- Sell a call with a strike price of \$50.
  - Buy a call with a strike price of \$25.
  - Sell a put with a strike price of \$50.
  - Buy a put with a strike price of \$25.
36. Joe Brocato is currently following two stocks in the pharmaceutical industry: ABC and XYZ. He is bullish on ABC, but bearish on XYZ. ABC is currently priced at \$53.60 and XYZ is currently priced at \$9.80. He is considering an options strategy to capitalize on his expectations. Brocato gathers the following three months of data on put and call options for both stocks:

*ABC:*

| <i>Call</i> | <i>Strike</i> | <i>Put</i> |
|-------------|---------------|------------|
| \$8.50      | \$45.00       | \$0.20     |
| \$4.40      | \$50.00       | \$0.50     |
| \$1.10      | \$55.00       | \$2.75     |

*XYZ:*

| <i>Call</i> | <i>Strike</i> | <i>Put</i> |
|-------------|---------------|------------|
| \$2.50      | \$ 7.50       | \$0.15     |
| \$0.55      | \$10.00       | \$0.75     |
| \$0.10      | \$12.50       | \$2.75     |

In three months, assume ABC has increased in price by \$1.00 while XYZ has dropped by \$1.67. Which of the following strategies would have been the most profitable in three months?

- Short the ABC put option with the \$45 strike price, and short the XYZ call option with the \$7.50 strike price.
- Go long the ABC put option with the \$45 strike price, and go long the XYZ call option with the \$7.50 strike price.
- Go long the ABC call option with the \$55 strike price, and go short the XYZ put option with the \$10 strike price.
- Short the ABC call option with the \$55 strike price, and go long the XYZ put option with the \$10 strike price.

37. An analyst takes a random sample of the returns on 225 stocks from a population with a known variance of returns of 100. The standard error of the sample mean return would be closest to:
- 0.44.
  - 0.67.
  - 1.50.
  - 6.67.
38. Assume that a binomial interest-rate tree indicates a 6-month period spot rate of 2.5%, and the price of the bond if rates decline is \$98.45, and if rates increase is \$96. The risk-neutral probabilities respectively associated with a decline and increase in rates if the market price of the bond is \$97 correspond to:
- 0.1/0.9.
  - 0.9/0.1.
  - 0.2/0.8.
  - 0.8/0.2.
39. The risk-free rate is 5% and the expected market risk premium is 10%. A portfolio manager is projecting a return of 12%. The portfolio has a beta of 0.7, and the market beta is 1.0. After adjusting for risk, this portfolio is expected to:
- equal the performance predicted by the CAPM.
  - outperform the CAPM return.
  - underperform the CAPM return.
  - unable to determine based on the information provided.
40. A portfolio manager of an endowment wants to compare the VaR estimates from the delta-normal method to the historical simulation method. The €100,000,000 portfolio is restricted from using derivative securities. The daily return is expected to be 0.0004, with a daily standard deviation of 0.0095. The manager uses a 2% level of significance that has a  $z$ -value of 2.05. The manager ranked the 250 daily returns from last year from highest to lowest, and reports the lowest six returns to be: -0.0191, -0.0259, -0.0311, -0.0354, -0.0368, and -0.0384. What is the daily VaR using the delta-normal method compared to the historical simulation method?
- The delta-normal method estimate is the same as that of the historical simulation method.
  - The delta-normal method estimated VaR is -€910,000.
  - The historical simulation method estimated VaR is -€2,590,000.
  - The historical simulation method estimated VaR is -€3,680,000.
41. A bank borrows USD5 million at 4.5%, purchases euros on the spot market, and lends that amount to a German firm at 6%. The euro spot rate is EUR1.12/USD. After one year, the exchange rate is EUR0.84/USD. The rate of return of this loan to the bank is closest to:
- 1.5%.
  - 3.5%.
  - 36.8%.
  - 77.8%.

42. The current spot price for cotton is \$0.325 per pound. The annual risk-free rate is 3.0%, and the cost to store and insure cotton is \$0.002 per pound per month. A 3-month futures contract for cotton is trading at \$0.3368 per pound. Is there an arbitrage opportunity available, and if so, how should an investor take advantage of it?
- There is no arbitrage opportunity available.
  - Yes; the investor should sell the futures contract, borrow at the risk-free rate, and buy the spot asset.
  - Yes; the investor should buy the futures contract, sell the spot asset, and lend at the risk-free rate.
  - Yes; the investor should buy the futures contract, borrow at the risk-free rate, and buy the spot asset.
43. If it is necessary to be long 2,500 deep-in-the-money call options in order to create a gamma-neutral position, which of the following actions would best restore the original delta-neutral position after the addition of the options?
- Sell 1,250 shares of the underlying asset.
  - Buy 1,250 shares of the underlying asset.
  - Sell 2,500 shares of the underlying asset.
  - Buy 2,500 shares of the underlying asset.
44. Dometown Savings (Downtown) is considering a loan to Fit Right Corporation (Fit Right). Fit Right has requested a credit facility of \$10 million of which \$2 million will be used immediately. The bank has assessed an internal credit rating of BBB+ equivalent to a 2% default probability over the next year. Draw down upon default is assumed to be 60%. The bank has additionally estimated a 40% recovery rate based on pledged collateral. The standard deviation of EDF and LGD is 5% and 30%, respectively. The closest estimate of the Downtown's adjusted exposure and unexpected loss is:
- adjusted exposure of \$5,200,000 and unexpected loss of \$270,000.
  - adjusted exposure of \$5,200,000 and unexpected loss of \$350,000.
  - adjusted exposure of \$6,800,000 and unexpected loss of \$270,000.
  - adjusted exposure of \$6,800,000 and unexpected loss of \$350,000.
45. A financial institution created a model to measure interest rate volatility. The historical distribution of interest rate volatility did not appear to be normally distributed due to the obvious large fat-tails. The firm is contemplating using a regime-switching volatility model to capture the apparent existence of time-varying high and low interest rate volatility. Which of the following statements best characterize the implementation of a regime-switching model for this firm?
- The interest rate distributions are conditionally normally distributed assuming static interest rate volatility.
  - The assumption of normality is not appropriate in this case, and therefore, a regime-switching model is unlikely to work well.
  - The probability of large deviations from normality occurring are more likely with a regime-switching model.
  - The regime-switching model may resolve the fat-tail problem.

46. Yasuo Hamanaka, the lead copper trader for Sumitomo, attempted to corner the copper market. Since the copper market was relatively small, Hamanaka had the potential to control and corner it. This trader did not use which of the following tactics to corner the copper market?
- I. Establishing a long dominant position in physical copper.
  - II. Establishing a short dominant position in copper futures.
- a. I only.
  - b. II only.
  - c. Both I and II.
  - d. Neither I nor II.
47. For a binomial random variable, B (number of trials = 12, probability of success = 0.4), what are the mean and variance of this variable?
- |    | <u>Mean</u> | <u>Variance</u> |
|----|-------------|-----------------|
| a. | 4.8         | 2.88            |
| b. | 4.8         | 1.92            |
| c. | 7.2         | 2.88            |
| d. | 7.2         | 1.92            |
48. Early exercise of an option is more likely for which of the following types of options?
- a. European call options on stocks paying large dividends.
  - b. American call options on stocks paying small dividends.
  - c. American call options close to maturity.
  - d. American put options on stocks paying large dividends.
49. An investor buys a stock for \$40 per share and simultaneously sells a call option on the stock with an exercise price of \$42 for a premium of \$3 per share. Ignoring dividends and transaction costs, which of the following amounts represents the maximum profit the investor of this covered call can earn if the position is held to expiration?
- a. \$1.
  - b. \$2.
  - c. \$3.
  - d. \$5.
50. A bank has \$500 million in assets with a modified duration of 7 and \$400 million in liabilities with a modified duration of 5. Accounting only for duration effects, the impact of a 50-basis-point parallel upward shift in the yield curve on the bank's equity value is closest to a:
- a. \$7.5 million decrease.
  - b. \$7.5 million increase.
  - c. \$15 million decrease.
  - d. \$15 million increase.

51. A data quality scorecard can be used to monitor the success of a data governance program. Data quality scores are created by using either base-level or complex metrics. Which of the following viewpoints regarding data quality scorecards is best described as using complex metrics to quantify the impact of each data quality problem?
- Business impact view.
  - Business process view.
  - Data quality issues view.
  - Data process issues view.
52. It is currently August 2010, and the spot price of soybeans is \$5.05/bushel. Storage costs for soybeans on a continuously compounded basis are \$0.45/bushel annually. The appropriate continuously compounded interest rate is 8%. If a soybean farmer has just finished harvesting his crop but would like to sell half of the crop in February 2011 and half in May 2011 by going short futures contracts, which of the following statements is most accurate? The farmer should store his crop only if the:
- February futures contract price is at least \$5.48/bushel and the May futures contract price is at least \$5.70/bushel.
  - February futures contract price is at least \$5.48/bushel and the May futures contract price is at least \$5.73/bushel.
  - February futures contract price is at least \$5.50/bushel and the May futures contract price is at least \$5.70/bushel.
  - February futures contract price is at least \$5.50/bushel and the May futures contract price is at least \$5.73/bushel.
53. If a 91-day U.S. Treasury bill (T-bill) is priced at a discount of 6.8%, what will an investor actually pay for a \$10,000 bill at issuance?
- \$9,320.
  - \$9,828.
  - \$9,830.
  - \$9,832.
54. Which of the following statements regarding market, credit, and operational risk is correct?
- People risk relates to the risk associated with incompetence and lack of suitable training of internal employees and/or external individuals.
  - Between two counterparties, presettlement risk is always higher than settlement risk.
  - Options are examples of financial instruments with non-directional risks.
  - Funding liquidity risk results from a large position size forcing transactions to influence the price of securities.

55. A large publicly held company refines crude oil into gasoline and sells gasoline wholesale with long-term contracts at fixed prices. The firm also owns the land, with full rights, from which it pumps crude oil. The firm financed the purchase of the land by issuing floating-rate bonds. This firm could reduce the volatility of its earnings by entering into an:
- I. interest-rate swap.
  - II. oil commodity swap.
- a. I only.
  - b. II only.
  - c. Both I and II.
  - d. Neither I nor II.

56. You are reviewing the performance of a portfolio and have compiled the following information.

|                                             |        |
|---------------------------------------------|--------|
| Average return over the last year           | 13.75% |
| Benchmark average return over the last year | 12.36% |
| Standard deviation                          | 16.90% |
| Beta                                        | 1.23   |
| Tracking error                              | 7.21%  |
| Semi-standard deviation                     | 13.72% |
| Risk-free rate                              | 5.35%  |

In relation to the portfolio's performance, which of the following statements is correct?

- I. The information ratio for the portfolio is 0.192.
  - II. The Sharpe ratio yields a result lower than the Sortino ratio but higher than the information ratio.
- a. I only.
  - b. II only.
  - c. Both I and II.
  - d. Neither I nor II.

Use the following information to answer Question 57.

**Regression Statistics**

|            |         |
|------------|---------|
| R squared  | 0.8537  |
| R sq. adj. | 0.8120  |
| Std. error | 10.3892 |
| Num obs.   | 10      |

**ANOVA**

|           | df | SS        | MS        | F       | P-value |
|-----------|----|-----------|-----------|---------|---------|
| Explained | 2  | 4410.4500 | 2205.2250 | 20.4309 | 0.0012  |
| Residual  | 7  | 755.5500  | 107.9357  |         |         |
| Total     | 9  | 5166.0000 |           |         |         |

|                | Coefficients | Std. Error | t-Stat | P-value |
|----------------|--------------|------------|--------|---------|
| Intercept      | 35.5875      | 6.1737     | 5.7644 | 0.0007  |
| X <sub>1</sub> | 1.8563       | 1.6681     | 1.1128 | 0.3026  |
| X <sub>2</sub> | 7.4250       | 1.1615     | 6.3923 | 0.0004  |

57. Based on the results and a 5% level of significance, which of the following hypotheses cannot be rejected?
- $H_0: B_0 = 0$
  - $H_0: B_1 = 0$
  - $H_0: B_2 = 0$
  - $H_0: B_1 = B_2 = 0$
58. Long-Term Capital Management (LTCM) experienced financial difficulty in the late 1990s. Which of the following statements is false regarding their troubles?
- The amount of their positions in swaps was very large, but due to offsetting positions, the amount of their risk was in theory very small.
  - LTCM required their investors to invest for three years, thereby increasing funding risk.
  - LTCM obtained financing through repurchase agreements at very favorable terms.
  - Due to the size of their positions, LTCM could not liquidate their assets without selling at large discounts.
59. Charmaine Townsend, FRM, has been managing a growth portfolio for her clients using a screening process that identifies companies that have high earnings growth rates. Townsend has decided that because of a volatile economy, she is going to adopt a value strategy using a screening process that identifies companies that have low price-earnings multiples. Townsend will violate the GARP Code of Conduct if she makes this change in her investment process without:
- notifying her supervisor before she makes the change.
  - promptly notifying her clients of the change.
  - getting written permission from her clients in advance of the change.
  - getting prompt written acknowledgment of the change from her clients within a reasonable time after the change was made.
60. An options dealer sells equity call options. When sold, the options are at-the-money and the firm will be delta-neutral hedged. Which of the following statements is correct?
- The options dealer will have a negative gamma and negative vega exposure.
  - Over time, gamma and vega will have less of an impact on the value of the option dealer's position if the option moves away from the money.
- I only.
  - II only.
  - Both I and II.
  - Neither I nor II.



61. Which of the following statements is not a problem with multidimensional scenario analysis?
- Correlation of risk factors is ignored.
  - Determining how many risk factors to include is non-trivial.
  - Selecting a time period for parametric estimation is subjective.
  - Assigning weights to various scenarios is very complex.
62. Your firm uses a proprietary forecasting model that requires parameter estimates of random variables that are believed to follow the Poisson distribution. You are attempting to assess the probability of the number of defects in an assembly production process for a given company. Assume that there is a 0.005 probability of a defect for every production run. What is the probability of 7 defects in 1,000 production runs?
- 3.0%.
  - 4.4%.
  - 8.6%.
  - 10.4%.
63. Which of the following statements accurately describes an advantage of the Brennan and Schwartz model over the Cox-Ingersoll-Ross model for modelling interest rate dynamics?
- The Brennan and Schwartz model gives attention to interest rate volatility.
  - The Brennan and Schwartz model allows interest rate volatility to decline as rates fall.
  - The Brennan and Schwartz model gives attention to the mean reversion of interest rates.
  - The Brennan and Schwartz model is a more effective method for dealing with complex, leveraged portfolios.
64. You are analyzing a portfolio that has a Jensen's alpha of 4.75% and an actual return of 14.2%. The risk-free rate is 4.25% and the market risk premium is 6%. Based on the information provided, the beta of the portfolio is closest to:
- 0.77.
  - 0.87.
  - 0.97.
  - 1.07.
65. An options trader is attempting to judge whether an option's premium is cheap or expensive using a GARCH(1,1) model to forecast volatility. The intercept of the model has a value of 0.000008, the latest estimate of variance is 0.78, and the parameter estimate on the latest innovation is 0.16. If the latest volatility estimate from the model was 2.6% per day and the option's underlying asset value changed by 3.4%, the trader's estimate of the next period's standard deviation is closest to:
- 0.03%.
  - 0.07%.
  - 2.68%.
  - 3.38%.

66. An investor is about to deliver a short bond position and has four options to choose from as listed below. The settlement price is \$91.50. Based on the information provided, which of the four bonds is the cheapest-to-deliver?

| Bond | Quoted Price | Conversion Factor |
|------|--------------|-------------------|
| 1    | 98           | 1.02              |
| 2    | 122          | 1.27              |
| 3    | 105          | 1.08              |
| 4    | 112          | 1.15              |

- a. Bond 1.
  - b. Bond 2.
  - c. Bond 3.
  - d. Bond 4.
67. A bond portfolio consists of bonds with various maturities. The portfolio manager expects the yield curve to become steeper. In that case, which of the following statements is correct?
- a. A strip hedge will be a more effective hedge than a stack hedge.
  - b. A stack hedge will be a more effective hedge than a strip hedge.
  - c. A cross-hedge will be more effective than an immunization hedge.
  - d. An immunization hedge will be more effective than a cross-hedge.
68. Bob Hatfield has his own money management firm with two clients. The accounts of the two clients are equal in value. It is Hatfield's opinion that interest rates will fall in the near future. Based upon this, Hatfield begins increasing the bond allocation of each portfolio. In order to comply with Best Practices in the GARP Code of Conduct, the analyst needs to:
- a. inform the clients of the change and tell them it is based upon an opinion and not a fact.
  - b. make sure that the change is identical for both clients.
  - c. file a report with the SEC of the new portfolio allocation.
  - d. perform all of these functions.

69. Stampede Capital Management has entered into a currency swap with Polar Investments in which Stampede pays 3.5% per annum in euros and receives 2.8% per annum in dollars. Stampede pays a principal amount of \$130 million to Polar, while Polar pays €100 million to Stampede at inception of the swap. The yield curve in both Germany and the United States is upward-sloping with the following interest rates:

|               | 1-Year | 2-Year |
|---------------|--------|--------|
| Germany       | 4.00%  | 4.50%  |
| United States | 2.00%  | 2.25%  |

The swap will last for another two years and the current exchange rate is \$1.33/€. What is the value of the currency swap to Stampede?

- a. \$0.21 million.  
b. \$0.54 million.  
c. \$1.06 million.  
d. \$1.95 million.
70. As research analyst at his firm, Richard Starr is assigned the task of examining the relevance of the capital asset pricing model by running hypothesis tests on the risk-free rate and the market risk premium. Starr's supervisor makes the following statement: "For the CAPM to be valid, the mean 1-year Treasury bill rate should equal 4% and the mean market risk premium should be positive." Starr collects historical rate of return data for 1-year Treasury bills and for the annual market risk premiums over the past 30 years. He then conducts tests of hypotheses using the historical Treasury bill and market risk premium data. To examine the claims of his supervisor, identify whether Starr should perform one-tailed or two-tailed tests of these hypotheses.
- |    | <u>Risk-free rate hypothesis</u> | <u>Market risk premium hypothesis</u> |
|----|----------------------------------|---------------------------------------|
| a. | One-tailed test                  | One-tailed test                       |
| b. | One-tailed test                  | Two-tailed test                       |
| c. | Two-tailed test                  | One-tailed test                       |
| d. | Two-tailed test                  | Two-tailed test                       |

71. An analyst at Bergman International Bank has been asked to explain the calculation of VaR for linear derivatives to the newly hired junior analysts. Which of the following statements best describes the calculation of VaR for a linear derivative on the S&P 500 Index?
- For a futures contract, multiply the VaR of the S&P 500 Index by a sensitivity factor reflecting the percent change in the value of the futures contract for a 1% change in the index value.
  - For an options contract, multiply the VaR of the S&P 500 Index by a sensitivity factor reflecting the percent change in the value of the futures contract for a 1% change in the index value.
  - For a futures contract, divide the VaR of the S&P 500 Index by a sensitivity factor reflecting the absolute change in the value of the futures contract per absolute change in the index value.
  - For a options contract, divide the VaR of the S&P 500 Index by a sensitivity factor reflecting the percent change in the value of the futures contract for a 1% change in the index value.
72. An analyst is conducting a two-tailed  $z$ -test to determine if small cap returns are significantly different from 10%. The sample size is 200 and the computed  $z$ -statistic is 2.3. Using a 5% level of significance, which of the following statements is most accurate?
- Reject the null hypothesis and conclude that small cap returns are not significantly different from 10%.
  - Fail to reject the null hypothesis and conclude that small cap returns are significantly different from 10%.
  - Fail to reject the null hypothesis and conclude that small cap returns are close enough to 10% that we cannot say they are significantly different from 10%.
  - Reject the null hypothesis and conclude that small cap returns are significantly different from 10%.
73. Given the information in the table below and given that the 2-year spot rate is 10.263%, what is the appropriate action of an arbitrageur? Assume annual coupons and compounding.

|                   | Bond A  | Bond B  | Bond C |
|-------------------|---------|---------|--------|
| Maturity in years | 1       | 2       | 2      |
| Coupon rate       | 0%      | 0%      | 10%    |
| Price             | 95.2381 | 82.6446 | 100    |

- The arbitrageur should short the 1- and 2-year zero-coupon bonds and buy the 2-year coupon bond.
- The arbitrageur should buy the 1- and 2-year zero-coupon bonds and short the 2-year coupon bond.
- The arbitrageur should buy the 1-year zero-coupon and 2-year coupon bond and short the 2-year zero-coupon bond.
- The arbitrageur should short the 1-year zero-coupon and 2-year coupon bond and buy the 2-year zero-coupon bond.

74. Greg Barns, FRM, and Jill Tillman, FRM, are discussing the hypothesis they wish to test with respect to the model represented by  $Y_i = B_0 + B_1 \times X_i + \varepsilon_i$ . They wish to use the standard statistical methodology in their test. Barns thinks an appropriate hypothesis would be that  $B_1 = 0$  with the goal of proving it to be true. Tillman thinks an appropriate hypothesis to test is  $B_1 = 1$  with the goal of rejecting it. With respect to these hypotheses:
- the hypothesis of neither researcher is appropriate.
  - the hypothesis of Barns is appropriate but not that of Tillman.
  - the hypothesis of Tillman is appropriate but not that of Barns.
  - more information is required before a hypothesis can be set up.
75. The current price of a stock is \$25. A call option is available with a \$20 strike price that expires in three months. If the underlying stock exhibits an annual standard deviation of 25%, the current risk-free rate is 4.5%,  $N(d_1) = 0.9737$ , and  $N(d_2) = 0.9652$ , the Black-Scholes-Merton value of the call is closest to:
- \$4.39.
  - \$4.87.
  - \$5.25.
  - \$5.89.
76. Capital Returns, LLC, (Capital) is a hedge fund corporation that frequently enters positions to reduce default risk. Capital has entered a derivatives contract with a third party that has a AAA rating. Capital only enters into positions with third parties with AAA ratings to eliminate the high cost of analyzing them. Which of the following items is least likely to be a concern of Capital?
- Counterparty credit risk.
  - Decreased correlations in market downturns.
  - Expanding in areas where risk is not accounted for.
  - Failure to discover all risks.
77. An investor buys a December 2010 put of XYZ limited with a strike of USD 65 for USD 5, and sells a December 2010 put of XYZ limited with a strike of USD 50 for USD 3. Which of the following pairs represents the type of option strategy and the maximum profit of the strategy, respectively?
- |    | <u>Option strategy</u> | <u>Maximum profit</u> |
|----|------------------------|-----------------------|
| a. | Bull spread            | USD 15                |
| b. | Bear spread            | USD 15                |
| c. | Bull spread            | USD 13                |
| d. | Bear spread            | USD 13                |

78. Based on the information provided below, which of the following amounts are closest to the discount factors for  $d(0.5)$  and  $d(1.0)$ , respectively?

| Maturity | Coupon | Price   |
|----------|--------|---------|
| 6 months | 5.70%  | 101.426 |
| 1 year   | 15.00% | 102.642 |
| 2 years  | 8.20%  | 99.574  |

- |    | <u><math>d(0.5)</math></u> | <u><math>d(1.0)</math></u> |
|----|----------------------------|----------------------------|
| a. | 0.98615                    | 0.8860                     |
| b. | 0.96528                    | 0.8860                     |
| c. | 0.98615                    | 0.8760                     |
| d. | 0.96528                    | 0.8760                     |
79. Jeff Spider, FRM, is a consultant for SPA Consulting. He has been engaged by Limbo Company to select an equity investment manager for their defined benefit pension plan. Spider is considering Cutter Investments. The money management firm's 10 year performance is as follows: 35.1%, 15.6%, 12.0%, 22.2%, 50.3%, -20.0%, -33.4%, -30.6%, 30.8%, 13.0%. From the data provided, Spider calculated the following statistics:
- Mean                            9.5%
  - Median                           14.3%
  - Excess kurtosis               -0.9761

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

- |    | <u>Skewed</u> | <u>Kurtosis</u> |
|----|---------------|-----------------|
| a. | Positively    | Leptokurtic     |
| b. | Negatively    | Platykurtic     |
| c. | Positively    | Platykurtic     |
| d. | Negatively    | Leptokurtic     |
80. Assume you take a short position in a March T-bond futures contract and that the settlement price of the cheapest-to-deliver (CTD) bond in March will be 70. Also, assume that the conversion factor is equal to 1.3. You plan on delivering the bond's coupon payments in May and November. If the accrued interest from November to March is equal to \$1,500, what is the invoice price of this bond (face value = 100,000)?
- a. \$91,000.
  - b. \$92,500.
  - c. \$55,346.
  - d. \$71,500.

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

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

- |                | <u>X</u>    | <u>Y</u>    | <u>Z</u> |
|----------------|-------------|-------------|----------|
| a. Oil         | Corn        | Natural gas |          |
| b. Natural gas | Oil         | Corn        |          |
| c. Corn        | Natural gas | Oil         |          |
| d. Natural gas | Oil         | Corn        |          |
82. If you hedge a portfolio with a futures contract that has twice the standard deviation of its benchmark and a correlation of 0.5, the optimal hedge ratio is closest to:
- a. 0.25.  
b. 0.50.  
c. 1.00.  
d. 2.00.
83. Given the following 1-year transition matrix, what is the probability that a Baa-rated firm will default over a 2-year period?

| Rating from | Rating to |     |     |         |
|-------------|-----------|-----|-----|---------|
|             | Aaa       | Baa | Caa | Default |
| Aaa         | 90%       | 10% | 0%  | 0%      |
| Baa         | 10%       | 80% | 5%  | 5%      |
| Caa         | 1%        | 4%  | 80% | 15%     |

- a. 5.00%.  
b. 9.75%.  
c. 14.50%.  
d. 20.00%.
84. Which of the following pairs represent the correct effects on expected loss from increasing both loss given default (LGD) and draw down?

|    | <u>LGD</u> | <u>Draw down</u> |
|----|------------|------------------|
| a. | Increase   | Increase         |
| b. | No effect  | Increase         |
| c. | Increase   | No effect        |
| d. | No effect  | No effect        |

85. A 1-year American put option with an exercise price of \$40 will be worth \$10.00 at maturity with a probability of 0.25 and \$0.00 with a probability of 0.75. The current stock price is \$36. The discount rate is 5%. The optimal strategy is to:
- exercise the option because the payoff from exercise exceeds the present value of the expected future payoff.
  - not exercise the option because the payoff from exercise is less than the discounted present value of the future payoff.
  - exercise the option because it is currently at-the-money.
  - not exercise the option because it is out-of-the-money.
86. The 3-month eurodollar futures contract trades on the Chicago Mercantile Exchange (CME) and is the most popular interest rate futures in the United States. This contract settles in cash, and the minimum price change is one “tick,” which is a price change of one basis point, or \$25 per \$1 million contract. If the quoted price for the June 2009 Eurodollar futures contract is 96.89, the value of one contract is closest to:
- \$968,900.
  - \$970,000.
  - \$984,450.
  - \$992,225.
87. Which of the following items does not apply to the sum of squared residuals (SSR) from an ordinary least squares (OLS) regression?
- SSR is equal to  $\sum e_i^2$ .
  - SSR is equal to  $\sum [Y_i - (b_0 + b_1 \times X_i)]$ .
  - When using OLS, SSR is minimized.
  - SSR can indicate how well the regression model explains the dependent variable.
88. Which of the following statements regarding foreign exchange risk is correct?
- A bank with a negative net exposure in a currency position is net short the currency.
  - On-balance-sheet hedging is achieved when a financial institution has a matched maturity and currency foreign asset-liability book.
- I only.
  - II only.
  - Both I and II.
  - Neither I nor II.
89. Borough Corporation has selected a single risk metric to target in its risk management process. Steve Roland, FRM, and Bill Pound, FRM, are discussing the implications of the choice. Roland says that having a single quantifiable risk metric is generally accepted as necessary in risk management. Pound says that the metric should be augmented with scenario analysis to account for crises and the human element of the market. With respect to these statements:
- both Roland and Pound are incorrect.
  - both Pound and Roland are correct.
  - Roland is correct and Pound is incorrect.
  - Pound is correct and Roland is incorrect.



90. The annual returns for a portfolio are normally distributed with an expected value of £50 million and a standard deviation of £25 million. Which of the following amounts is closest to the probability that the value of the portfolio one year from today will be between £91.13 million and £108.25 million?
- 0.025.
  - 0.040.
  - 0.075.
  - 0.090.
91. Which of the following institutions primarily serves as a “credit manager” for the financial markets?
- Exchanges.
  - Clearinghouses.
  - Derivatives dealers.
  - Credit derivative product companies.
92. The Basel Committee on Banking Supervision has written stress testing principles for banks related to supervision. How many of the following statements are most likely correct regarding recommendations to supervisors?
- Supervisors should make annual comprehensive assessments of a bank’s stress testing procedures.
  - It is necessary for supervisors to question the use of stress tests that produce unrealistic results or are inconsistent with a bank’s risk appetite.
  - It is prudent for supervisors to conduct additional stress tests using common scenarios within a bank’s jurisdiction.
  - For a robust analysis, supervisors should utilize capital ratios in their assessment of capital adequacy and determine the mobility of capital across business lines.
- 1.
  - 2.
  - 3.
  - 4.

93. An analyst gathered the following data about three stocks:

| Stock | Beta | Estimated Return |
|-------|------|------------------|
| A     | 1.5  | 15.0%            |
| B     | 1.1  | 15.7%            |
| C     | 0.6  | 14.2%            |

If the risk-free rate is 8% and the risk-premium on the market is 7%, are Stock A and Stock C undervalued, properly valued, or overvalued, according to the security market line (SML)?

- |    | <u>Stock A</u> | <u>Stock C</u> |
|----|----------------|----------------|
| a. | Undervalued    | Undervalued    |
| b. | Overvalued     | Overvalued     |
| c. | Undervalued    | Overvalued     |
| d. | Overvalued     | Undervalued    |

94. You are using linear regression to analyze the relationship between a stock's returns and an industry index. The regression provides the following results.

|                | Coefficient | Standard Error |
|----------------|-------------|----------------|
| Intercept      | 3.8         | 2.25           |
| Industry Index | 2.2         | 0.58           |

|          | Sum of Squares |
|----------|----------------|
| Residual | 272.49         |
| Total    | 1,264.72       |

Assume that the sample uses ten years of quarterly observations. Based on the information provided, which of the following statements is incorrect?

- The industry index is significant at the 99% level.
  - The correlation coefficient between the stock and the industry index is 0.89.
  - The intercept is significant at the 95% level.
  - There are a total of 40 observations in the sample.
95. Based on the information provided, which of the following amounts are closest to the 2-year spot rate and the forward rate in 1.5 years (ending in year 2), respectively?

| Maturity  | STRIPS Price | Spot Rate | Forward Rate |
|-----------|--------------|-----------|--------------|
| 0.5 years | 98.7654      | 2.50%     | 2.50%        |
| 1.0 years | 97.0662      | 3.00%     | 3.50%        |
| 1.5 years | 95.2652      | 3.26%     | 3.78%        |
| 2.0 years | 93.2775      | ?         | ?            |

|    | <u>2-year spot rate</u> | <u>1.5-year forward rate</u> |
|----|-------------------------|------------------------------|
| a. | 1.755%                  | 4.26%                        |
| b. | 3.510%                  | 4.06%                        |
| c. | 1.755%                  | 4.06%                        |
| d. | 3.510%                  | 4.26%                        |

96. Goodeal, Inc., is considering the purchase of a new material handling system for a cost of \$15 million. This system is expected to generate a positive cash flow of \$1.8 million per year in perpetuity. What is the NPV of the proposed investment if the appropriate discount rate is 10.5%?
- \$2,142,857.
  - \$13,200,000.
  - \$16,800,000.
  - \$17,142,857.

97. The S&P 500 Index is trading at 1,025. The S&P 500 pays an expected dividend yield of 1.2%, the current risk-free rate of interest is 2.75%, and the prevailing market rate of interest is 4.25%. The value of a 3-month futures contract on the S&P 500 Index is closest to:
- 1,028.98.
  - 1,032.85.
  - 1,035.17.
  - 1,041.01.
98. Adam Farman has been asked to estimate the volatility of a technology stock index. He has identified a statistic which has an expected value equal to the population volatility and has determined that increasing his sample size will decrease the sampling error for this statistic. His statistic can best be described as:
- unbiased and efficient.
  - unbiased and consistent.
  - efficient and consistent.
  - unbiased only.
99. You calculate hedge positions for foreign currency exposures based on delta exposures. If your firm has significant nonlinear exposures to changes in exchange rates, which of the following statements is least correct?
- A dynamic hedge may be required.
  - The delta of a forward contract position is equal to one.
  - Delta approximations will be less precise for large changes in risk factors.
  - Delta exposures will change as exchange rates change.
100. Consider a \$1,000-face value, 12-year, 8%, semiannual coupon bond with a YTM of 10.45%. The change in value for a decrease in yield of 38 basis points is closest to:
- increase of \$22.76.
  - decrease of \$22.76.
  - increase of \$23.06.
  - decrease of \$23.06.

---

## PRACTICE EXAM 2 ANSWERS

---

1. **d** The Monte Carlo approach allows for whatever relationships the VaR modeler would like to take into account. It is the most flexible method for generating VaR; however, it comes at a cost of requiring substantial computing power, especially when the model used to generate portfolio relationships is complex. (See Book 2, Topic 18)

2. **a** To obtain the  $d(1.0)$  discount factor, first solve for  $d(0.5)$ . In the equation below, the price for Bond A is equated to its terminal cash flow in six months, which is the principal plus the semiannual coupon of \$3.00.

$$101.182 = 103.00 \times d(0.5)$$

$$d(0.5) = 0.9823$$

Next use the price and cash flows of Bond B to calculate the  $d(1.0)$  discount factor. The cash flow in six months is the semiannual coupon of \$6.00 and is discounted by  $d(0.5)$ . The cash flow in one year is the principal plus the semiannual coupon of \$6.00.

$$102.341 = 6.00 \times d(0.5) + 106.00 \times d(1.0)$$

$$102.341 = 6.00 \times 0.9823 + 106.00 \times d(1.0)$$

$$d(1.0) = 0.9099$$

(See Book 4, Topic 41)

3. **c** The unused lines of credit are an example of a resource advantage, specifically by preserving debt capacity. (See Book 1, Topic 1)

4. **d** Sharpe ratio =  $[E(R_p) - R_F] / \sigma$

$$(2.5 - 3.5) / 21 = -0.0476$$

Sortino ratio =  $[E(R_p) - R_{\min}] / (\text{semi-standard deviation})$

$$(2.5 - 3.5) / 16 = -0.0625$$

The difference between these two ratios is:  $-0.0625 - (-0.0476) = -0.0149$ .

(See Book 1, Topic 5)

5. **a** The level of significance is the probability of rejecting the null hypothesis when it is true. The null hypothesis will be rejected if the  $z$ -statistic is greater than 1.645. (See Book 2, Topic 13)

6. **d** To compute the price of the bond, discount each cash flow back to the present at the appropriate spot rates. \$1.75 is the coupon payment per period. Period 3 pays principal plus coupon of \$101.75. The first payment computation is as follows:

$$N = 0.5$$

$$I = 2.2\%$$

$$FV = 1.75$$

Solve for PV  $\rightarrow$  1.73

| <i>Maturity (years)</i> | <i>Spot rate (%)</i> | <i>PV</i>     |
|-------------------------|----------------------|---------------|
| 0.5                     | 2.20%                | 1.73          |
| 1.0                     | 2.25%                | 1.71          |
| 1.5                     | 2.30%                | 1.69          |
| 2.0                     | 2.35%                | 1.67          |
| 2.5                     | 2.40%                | 1.65          |
| 3.0                     | 2.45%                | 94.62         |
| <b>Bond price:</b>      |                      | <b>103.07</b> |

(See Book 3, Topic 23)

7. d A strap is betting on volatility in a bullish market since it pays off more on the upside.  
(See Book 3, Topic 28)

8. b The cost of equity for STT is equal to: risk-free rate + (beta  $\times$  equity risk premium)

$$\text{cost of equity} = 3\% + [1.6 \times (5\% + 2\%)] = 14.2\%$$

The cost of debt for STT is equal to: cost of borrowing  $\times$  (1 – marginal tax rate)

$$\text{cost of debt} = 10\% \times (1 - 0.35) = 6.5\%$$

Note that the cost of borrowing could also be computed as: risk-free rate + default spread = 3% + 7% = 10%.

Given STT's capital structure mix of 55% equity and 45% debt, its weighted average cost of capital is computed as:

$$\text{WACC} = (55\% \times 14.2\%) + (45\% \times 6.5\%) = 10.735\%$$

(See Book 1, Topic 1)

9. d Standard deviation =  $\sqrt{160,000} = 400$ ;  $400 / \sqrt{100} = 40$ . The researcher is correct that a possible consequence of increasing the sample size is sampling more than one population. In addition, increasing sample size will increase its costs. The need for additional precision must be balanced with cost and the risk of sampling more than one population. (See Book 2, Topic 13)

10. d Solve for the face value (F) using the following formula:

$$\frac{0.81}{100} F = \$4.04$$

$$F = \$499$$

Thus the correct response is d. The other answers are incorrect because they utilize the effective duration, which is not needed in this problem. (See Book 4, Topic 44)

11. c The delta of a call option with a continuous dividend yield is given by the following formula:

$$\text{Delta} = N(d_1) \times e^{-qT}$$

where:

$q$  = continuous dividend yield

$T$  = time to maturity

$$\text{So, Delta} = 0.7 \times e^{-0.02 \times 3} = 0.66.$$

(See Book 4, Topic 39)

12. d Since Deininger is long equities, a short hedge is appropriate. Deininger should sell S&P futures contracts by the following amount:

$$1.07 \times \frac{400,000,000}{1,368 \times 250} = 1,251 \text{ contracts}$$

(See Book 3, Topic 22)

13. c Since you are long the portfolio, the appropriate strategy is to short the futures.  
 $N = -(75,000,000 \times 9) / (104,406.25 \times 8) = -808.14$ . Rounding up to the nearest whole number means that you should short 809 futures contracts.

(See Book 3, Topic 25)

14. d The expected value of the portfolio after two years is:  $(10)(1 - 0.03)(1 - 0.03)$   $(\$1,000,000) = \$9,409,000$ . Therefore, the expected cumulative loss is:  $\$10,000,000 - \$9,409,000 = \$591,000$ . (See Book 4, Topic 48)

15. d We are looking to find  $P(G|U)$ , the probability the economy grows given that ABC stock is up.

$$P(G) = \text{probability the economy grows} = 0.50$$

$$P(R) = \text{probability of a recession} = 0.50$$

$$P(U|G) = \text{probability the stock is up given the economy grows} = 0.60$$

$$P(U|R) = \text{probability the stock is up given the economy goes into a recession} = 0.15$$

Using Bayes' formula:

$$P(G|U) = P(G) \times P(U|G) / [P(G) P(U|G) + P(R) P(U|R)]$$

$$P(G|U) = (0.50) \times (0.60) / [(0.50)(0.60) + (0.50)(0.15)]$$

$$P(G|U) = 0.3 / 0.375 = 0.8 = 80.0\%$$

(See Book 2, Topic 10)

16. d The minimum value for a European-style call option,  $c_T$ , is given by:

$$\max[0, S_T - X / (1 + R_f)^T] = \max[0, 86 - 80 / (1.03)^{3/12}] = \$6.59$$

An American-style call option must be worth at least as much as an otherwise identical European-style call option and has the same minimum value. Note that this fact alone

limits the possible correct responses to Choices a and d. Since the American-style call is in-the-money and therefore must be worth more than the \$6 difference between the strike price and the exercise price, you can eliminate Choice a and select Choice d without calculating the exact minimum value. (See Book 3, Topic 27)

17. **c** Fields violated the Professional Integrity and Ethical Conduct section of the Code of Conduct by misrepresenting the bonds as being safe and secure when in fact they were investing in risky projects and backed only by the revenue generated from those projects. According to the Code, GARP Members shall not knowingly misrepresent details relating to analysis, recommendations, actions, or other professional activities. (See Book 1, Topic 9)
18. **a** The daily delta-normal VaR is calculated as  $[R_p - (z)(\sigma)](\text{value of portfolio})$ , where  $R_p$  is the expected return on the portfolio,  $z$  is the  $z$ -value corresponding to the desired level of significance, and  $\sigma$  is the standard deviation. Annual VaR =  $[0.1 - (2.33 \times 0.15)] \times 10,000,000 = -\text{€}2,495,000$ . In order to convert annual VaR to daily VaR, we need to scale the standard deviation by the square root of time and the mean by 250 trading days. VaR =  $\{0.1 / 250 - [(2.33 \times 0.15) / 250^{(1/2)}]\} \times 10,000,000 = -\text{€}217,043$ . (See Book 4, Topic 34)
19. **d** Investors achieve the best combinations of risk and return by holding some combination of the risk-free asset and the market portfolio of risky assets. (See Book 1, Topic 2)
20. **d** Assuming no default risk, the domestic return is 6.25%. The return on the UK investments, however, is equal to the amount invested today (USD25,000,000) / (USD1.642/GBP) = GBP15,225,335, which turns into GBP15,225,335  $\times$  1.07 = GBP16,291,108 one year from now. Since the forward contract guarantees the exchange rate in the future, that amount of GBP translates into GBP16,291,108  $\times$  USD1.5800 / GBP = USD25,739,951. This is a dollar return to the bank of USD25,739,951 / USD25,000,000 - 1 = 2.96%. Hence, the weighted average return to the bank's investments is  $(0.5)(6.25\%) + (0.5)(2.96\%) = 4.61\%$ . (See Book 3, Topic 31)
21. **d** The classical linear regression model assumes homoskedasticity, which means that the variance does not vary across the sample and would not depend on the value of the independent variable. (See Book 2, Topic 15)
22. **b** Economic capital = EV - P(c), where EV is the expected value of the portfolio and P(c) is the portfolio value at the "c" percent confidence level. Thus, \$350 million - \$250 million = \$100 million. (See Book 4, Topic 50)
23. **b** Defining  $F^R$  and  $F^N$  as the face amounts of the real and nominal bonds, respectively, and their corresponding DV01s as DV01<sup>R</sup> and DV01<sup>N</sup>, a DV01 hedge is adjusted by the hedge adjustment factor, or beta, as follows:

$$F^R = F^N \times \left( \frac{DV01^N}{DV01^R} \right) \times \beta$$

$$F^R = 100,000 \times \left( \frac{0.072}{0.051} \right) \times 1.2 = 169,412$$

(See Book 4, Topic 45)

24. **a**  $N = 2 \times 22$ ;  $PMT = 40 / 2$ ;  $FV = 1,000$ ;  $I/Y = 5/2$ ;  $CPT \rightarrow PV = 867.481 = V_0$   
 $N = 2 \times 22$ ;  $PMT = 40 / 2$ ;  $FV = 1,000$ ;  $I/Y = 5.05/2$ ;  $CPT \rightarrow PV = 861.484 = V_+$   
 $N = 2 \times 22$ ;  $PMT = 40 / 2$ ;  $FV = 1,000$ ;  $I/Y = 4.95/2$ ;  $CPT \rightarrow PV = 873.534 = V_-$

$$\text{Convexity} = \frac{V_- + V_+ - 2V_0}{V_0(\Delta y)^2} = \frac{873.534 + 861.484 - 2(867.481)}{(867.481)(0.0005)^2} = 258.22$$

(See Book 4, Topic 43)

25. c All of the statements are correct except for the one relating to SIMEX. Nick Leeson was eligible to trade on the SIMEX. (See Book 1, Topic 7)

26. a The current value of the contract per ton by the formula:

$$V_t = S_t - Ke^{-rt}$$

$$V_t = \$110 - (\$105)e^{-0.04 \times (5/12)} = \$6.735$$

For a 100-ton contract, the value would be \$673.55. (See Book 3, Topic 24)

27. b The  $z$ -statistic equals:

$$(x - \mu) / \sigma$$

where  $x$  is the value for a randomly selected observation from the population,  $\mu$  is the mean value for the population, and  $\sigma$  is the standard deviation of the population. Therefore, as indicated by the formula, the  $z$ -statistic is the number of standard deviations  $x$  is from the mean (Ecko is correct).

According to the normal distribution, 95% of the observations lie within 1.96 standard deviations of the mean, which implies that 95% of the  $z$ -statistics lie within plus and minus 1.96. Therefore, 5% of the  $z$ -statistics lie above plus 1.96 and below minus 1.96 and since the normal distribution is symmetrical, then 2.5% of the  $z$ -statistics lie below minus 1.96. As a result, 97.5% (not 95%) of the  $z$ -statistics lie above minus 1.96. (Charles is not correct). (See Book 2, Topic 12)

28. a Metallgesellschaft implemented a stack-and-roll hedging strategy, which uses short-term futures contracts to hedge long-term risk exposure. The stack-and-roll hedge strategy proved ineffective due to interim funding cash outflows created by margin calls and other factors. No offsetting interim cash inflows were available on their long-term customer contracts, creating a liquidity crisis that was exacerbated by their size of their futures positions in relation to the liquidity of the market. However, many economists believe that such a hedging strategy is fundamentally sound. Gains and losses on its customer contracts were realized if and when the customers took delivery, which would occur over a 5- to 10-year period. (See Book 1, Topic 7)

29. a Income bonds pay at most the specified interest, but they may pay less if the company's income is not sufficient. Participating bonds pay at least the specified interest rate but may pay more if the company's profits increase. Zero-coupon bonds pay the face value/principal at maturity but is not a cash payment. It is an implied rate of return earned by the bondholder by purchasing the bond at a discount to face value and receiving the full face value at maturity. The interest paid on floating-rate bonds is generally linked to some widely used reference rate such as LIBOR. Although the amount of interest may decrease with LIBOR, the payment is still technically at the specified interest. (See Book 3, Topic 32)

30. a  $1,015e^{(0.041 - 0.02)(0.25)} = 1,020.34$ . (See Book 3, Topic 24)

31. b At the end of every 12 month period, Bell-Con will pay EUR 7 million to Bro-Con ( $3.5\% \times \text{EUR } 200 \text{ million}$ ), Bro-Con will pay USD 7.5 million to Bell-Con ( $3\% \times \text{USD } 250 \text{ million}$ ). At the swap's conclusion, the principal amounts are re-exchanged. (See Book 3, Topic 26)



32. **b** The institution is paying USD and receiving JPY so the value of this swap will equal the current exchange rate times the value of the JPY portion minus the value of the USD portion.

$$\text{The JPY portion of this swap} = 70e^{(-0.005)} + 3,570e^{(-0.005 \times 2)} = \text{JPY}3,604,130,000.$$

$$\text{The USD portion of the swap} = 5.4e^{(-0.03)} + 125.4e^{(-0.03 \times 2)} = \text{USD}123,340,000.$$

The value to the institution = [JPY3604.13 million / (JPY120/USD)] – USD123.34 million = –USD93.3 million. (See Book 3, Topic 26)

33. **d** The lower pricing bound of an American put on a non-dividend-paying stock is  $P \geq \max(X - S_0, 0)$ . In this case, the lower bound is  $P \geq (\$110 - \$106) = \$4.00$ . (See Book 3, Topic 27)
34. **c** Large institutions can potentially profit from STRIP mispricings relative to the underlying bonds. They can do this by either buying Treasuries and stripping them or reconstituting STRIPS. Because of the cost involved with stripping/reconstituting, investors generally pay a premium for zero-coupon bonds. (See Book 4, Topic 40)
35. **b** Vega is an option's sensitivity to changes in volatility of the underlying stock. Vega is close to zero for deep in- or deep out-of-the-money puts and calls. Rho is an option's sensitivity to changes in interest rates and tends to be the highest for in-the-money calls and puts. Increases in rates will cause larger increases for in-the-money calls, but larger decreases for in-the-money puts. Given this info, choice b will work because it is a deep in-the-money call, and choice c will not work because it is a short position in an at-the-money put. Choice a will not work because it is an at-the-money call (which would be highly sensitive to vega), and choice d will not work because rising rates will have little impact on the position since it is an out-of-the-money put. (See Book 4, Topic 39)
36. **d** Shorting the ABC call with the \$55 strike price will be out-of-the-money, thus, the profit will be the option premium (\$1.10). Going long the XYZ put option with the \$10 strike price will be in-the-money, and the profit will be:  $10 - 8.13 - 0.75 = 1.12$ . (See Book 3, Topic 20)
37. **b** The population variance is known (in this case 100), so the standard error of the sample mean is:  $\frac{\sigma}{\sqrt{n}} = \frac{\sqrt{100}}{\sqrt{225}} = \frac{10}{15} = 0.67$ . (See Book 2, Topic 13)
38. **b**  $\{[p \times 98.45] + [(1 - p) \times 96.00]\} / [1 + (0.025 / 2)] = 97.00$   
 $p = 0.9$  and  $(1 - p) = 0.1$   
 (See Book 4, Topic 37)
39. **a** Based on the CAPM, the portfolio should earn:  $E(R) = 0.05 + 0.7(0.10) = 12\%$ . On a risk-adjusted basis, this portfolio lies on the security market line (SML) and thus is earning the proper risk-adjusted rate of return. (See Book 1, Topic 3)
40. **c** The daily delta-normal VaR is calculated as  $[R_p - (z)(\sigma)] \times (\text{Value of Portfolio})$ , where  $R_p$  is the expected 1-day return on the portfolio,  $z$  is the  $z$ -value corresponding to the desired level of significance, and  $\sigma$  is the standard deviation of 1-day.

$$-1,907,500 = [(0.0004 - (2.05)(0.0095)]100,000,000$$

The historical simulation VaR for 2% is the 5<sup>th</sup> lowest return, which is -2.59%; therefore, the correct VaR is:

$$-2,590,000 = (-0.0259)(100,000,000)$$

(See Book 4, Topic 34)

41. c The bank lent USD5,000,000  $\times$  1.12 = EUR5,600,000 to its German client. At the end of the year, the client repaid, with interest, 5,600,000  $\times$  1.06 = EUR5,936,000, which was then worth USD5,936,000 / 0.84 = USD7,066,667. The bank repaid USD5,000,000  $\times$  1.045 = USD5,225,000, including interest on its borrowed money, which generated a return of (7,066,667 - 5,225,000) / 5,000,000 = 36.8% on the loan. Alternate method: (1.12 / 0.84)(1.06) - 1.045 = 0.368. (See Book 3, Topic 31)

42. b To find the correct price of the futures contract, we use the formula:

$$F_{0,T} \geq S_0 e^{rT} + \lambda(0,T)$$

$$F_{0,T} = \left\{ 0.325 e^{0.03 \times \frac{3}{12}} + [0.002 + 0.002(1.0025) + 0.002(1.0025)^2] \right\} = 0.3335$$

Since the actual futures price of 0.3368 is higher than the correct price, there is an arbitrage opportunity that can be exploited by selling the overpriced contract. The investor would want to sell the futures contract, borrow at the risk-free rate, and buy the spot asset. The investor would pay off the loan in three months with the proceeds from delivering the cotton against the futures and would have a risk-free profit.

(See Book 3, Topic 30)

43. c The delta of a call option that is deep in-the-money is close to 1. The addition of the 2,500 long options to bring about gamma neutrality disturbed the original delta neutral position of the portfolio. Since 2,500 options have been added, (2,500)(1.0) = 2,500 shares of the underlying must be sold to restore delta neutrality to the portfolio. Note that answer A could be correct only if the options were at-the-money where delta is 0.5. (See Book 4, Topic 39)

44. d Note that the recovery rate is given as 40% which implies the LGD is 60%.

We can calculate adjusted exposure as follows.

$$\begin{aligned} \text{Adjusted exposure} &= OS + (COM_U - OS) \times UGD \\ &= \$2,000,000 + (\$8,000,000) \times (0.60) \\ &= \$6,800,000 \end{aligned}$$

$$UL = AE \times \sqrt{EDF \times \sigma_{LGD}^2 + LGD^2 \times \sigma_{EDF}^2}$$

$$UL = (6,800,000) \times \sqrt{0.02 \times 0.3^2 + 0.6^2 \times 0.05^2} = \$353,338$$

(See Book 4, Topic 49)

45. d The implementation of a regime switching model is appropriate in cases such as this example where there appears to be fat-tails and deviations from normality caused by shifts in volatility to high and low levels. The regime-shifting model may resolve the fat-tail issues, and the return distributions will be conditionally normally distributed assuming time-varying volatility of interest rates. (See Book 4, Topic 35)

46. **b** Yasuo Hamanaka, the lead copper trader for Sumitomo, established a dominant long position in futures contracts and simultaneously purchased large quantities of physical copper. As the future contracts approached delivery, the party with the short position would find little physical copper available for delivery and would be forced to either pay a large premium for physical copper or unwind their short position at unfavorable prices by taking an offsetting long futures position. Either way, the price of copper and/or copper futures would rise and create handsome profits. (See Book 1, Topic 7)
47. **a** A binomial random variable has an expected value or mean equal to  $np$  and variance equal to  $np(1 - p)$ . Mean =  $12(0.4) = 4.8$ ; variance =  $12(0.4)(1 - 0.4) = 2.88$ . (See Book 2, Topic 12)
48. **c** European options can only be exercised at maturity. American call options are more likely to be exercised when dividends are large and expiration is close. American put options are less likely to be exercised when dividends are large. (See Book 4, Topic 38)
49. **d** This is an out-of-the-money covered call. The stock can go up \$2 to the strike price, and then the writer will get \$3 for the premium. Thus, the maximum profit is \$5. (See Book 3, Topic 28)
50. **a** The change in asset value would be a decrease of  $[(\$500,000,000)(7)(0.005)] = \$17,500,000$ , whereas the change in liability value would be a decrease of  $[(\$400,000,000)(5)(0.005)] = \$10,000,000$ . The net effect would be a decline in equity value of \$7.5 million. (See Book 4, Topic 43)
51. **b** With the business process view, for each business process, the scorecard has complex metrics that quantify the impact of each data quality problem. This allows for the ability to determine exactly where in the business process the data problem is originating. (See Book 1, Topic 6)
52. **d** Calculate the price of the February (6-month) and May (9-month) forward prices using the following pricing formula which accounts for storage costs:

$$\text{storage costs } (\lambda) = 0.45 / 5.05 = 8.91\%$$

$$\text{forward prices } (F_{0,T}) = S_0 e^{(R_F + \lambda)T}$$

$$F_{0,0.50} = 5.05 e^{(0.08 + 0.0891)(.50)} = \$5.50$$

$$F_{0,0.75} = 5.05 e^{(0.08 + 0.0891)(.75)} = \$5.73$$

The soybean farmer would only be willing to store half the crop until February if the February futures contract price is at least \$5.50/bushel. Similarly, the soybean farmer would only be willing to store the other half of the crop until May if the May futures contract price is at least \$5.73/bushel. (See Book 3, Topic 30)

53. **b**  $\$10,000 \left[ 1 - (0.068) \left( \frac{91}{360} \right) \right] = \$9,828.11$  (See Book 3, Topic 25)

54. c People risk relates to the risk associated with fraud perpetrated by internal employees and/or external individuals. It does not relate to incompetence and lack of suitable training. Presettlement risk is lower than settlement risk because the former allows for offsetting of payments while the latter requires settlement of the full value of payments. Non-directional risks have non-linear exposures to changes in economic or financial variables which is clearly the case with options. Asset-liquidity risk (not funding liquidity risk) results from a large position size forcing transactions to influence the price of securities. (See Book 1, Topic 1)
55. a The firm owns its own production resources and sells wholesale with long-term contracts at fixed prices, so it does not face commodity price risk in acquiring crude oil. Hence, a commodity swap based on oil will not reduce earnings volatility. The firm has issued floating rate bonds, however, so its earnings will be sensitive to changes in interest rates. Entering into the pay-fixed side of an interest-rate swap would reduce this source of earnings volatility. (See Book 3, Topic 26)
56. c Sharpe ratio (SR) =  $\frac{\text{average return on portfolio} - \text{risk-free rate}}{\text{standard deviation}}$
- $$(\text{SR}) = \frac{13.75 - 5.35}{16.9} = 0.497$$
- Sortino ratio (SOR) =  $\frac{\text{average return on portfolio} - \text{risk threshold}}{\text{semi-standard deviation}}$
- $$(\text{SOR}) = \frac{13.75 - 5.35}{13.72} = 0.612$$
- information ratio (IR) =  $\frac{\text{average return on portfolio} - \text{average return on benchmark}}{\text{tracking error}}$
- $$(\text{IR}) = \frac{13.75 - 12.36}{7.21} = 0.192$$
- (See Book 1, Topic 5)
57. b The  $t$ -statistics for the intercept and coefficient on  $X_{2i}$  are significant as indicated by the associated  $p$ -values being less than 0.05: 0.0007 and 0.0004 respectively. Therefore,  $H_0: B_0 = 0$  and  $H_0: B_2 = 0$  can be rejected. The  $F$ -statistic on the ANOVA table has a  $p$ -value equal to 0.0012; therefore,  $H_0: B_1 = B_2 = 0$  can be rejected. The  $p$ -value for the coefficient on  $X_{1i}$  is greater than five percent; therefore,  $H_0: B_1 = 0$  cannot be rejected. (See Book 2, Topic 17)
58. b LTCM required their investors to invest for three years, thereby decreasing (not increasing) funding risk. Although the risk of their positions was quite small in theory, the size of their positions resulted in them selling at large discounts. They borrowed at favorable terms in their repurchase agreements, but the firm had high leverage which magnified the degree of their losses. (See Book 1, Topic 7)
59. b GARP Members shall make full and fair disclosure of all matters that could reasonably be expected to impair independence and objectivity or interfere with respective duties to their employer, clients, and prospective clients. (See Book 1, Topic 9)

60. c Because the options dealer has sold options, the dealer will have a negative gamma and negative vega exposure. When sold, the options are at-the-money, but over time the options will move in- or out-of-the-money. Gamma and vega decline as the options move away from an at-the-money position, so gamma and vega will have less of an impact on the value of the option over time. Hence the correct answer is both I and II. (See Book 4, Topic 39)

61. a Correlation of risk factors is included and is therefore not a problem. (See Book 4, Topic 51)

62. d The first step is to estimate the number of expected defects in 1,000 runs as follows:  $(1,000)(0.005) = 5$ . Next the mathematical formula for the Poisson distribution for estimating 7 defects given that 5 are expected is:

$$P(X = 7) = \frac{5^7 e^{-5}}{7!} = \frac{78125 \times 0.006738}{7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1} = 0.104$$

(See Book 2, Topic 12)

63. d The Brennan and Schwartz model is more effective when portfolios become complex. (See Book 2, Topic 18)

64. b 1. Jensen's alpha = actual return – expected return using CAPM

2. CAPM  $E(R) = \text{risk-free rate} + \text{beta} \times (\text{return on the market} - \text{risk-free rate})^*$

\*Return on the market – risk-free rate = market risk premium.

Use Jensen's alpha of 4.75% and the actual return of 14.2%. The expected return from CAPM must be  $14.2\% - 4.75\% = 9.45\%$ .

Use this value in the CAPM to find the beta of the portfolio.

expected return = risk-free rate + beta × market risk premium

$9.45\% = 4.25\% + \beta \times 6\%$ , therefore  $\beta = \text{approximately } 0.87$

(See Book 1, Topic 5)

65. c The GARCH(1,1) estimate of volatility (standard deviation) will be:

$$\text{variance} = 0.000008 + (0.16)(0.034)^2 + (0.78)(0.026)^2$$

$$\text{variance} = 0.000008 + 0.00018496 + 0.00052728$$

$$\text{variance} = 0.00072024$$

$$\text{volatility (standard deviation)} = \sqrt{\text{variance}}$$

$$\text{volatility} = \sqrt{0.00072024} = 2.68\%$$

(See Book 2, Topic 19)

66. a Cost of delivery:

$$\text{Bond 1: } 98 - (91.50 \times 1.02) = \$4.67$$

$$\text{Bond 2: } 122 - (91.50 \times 1.27) = \$5.80$$

$$\text{Bond 3: } 105 - (91.50 \times 1.08) = \$6.18$$

$$\text{Bond 4 } 112 - (91.50 \times 1.15) = \$6.78$$

Therefore, Bond 1 is the cheapest-to-deliver bond.

(See Book 3, Topic 25)

67. a A stack hedge is less effective than a strip hedge if the yield curve undergoes any other move than a parallel shift. (See Book 3, Topic 30)
68. a GARP Members shall make a distinction between fact and opinion in the presentation of analysis and recommendations. The analyst must inform the clients of the change and tell them it is based upon an opinion and not a fact. (See Book 1, Topic 9)
69. c The basic formula is  $V_{\text{swap}}(\text{USD}) = B_{\text{USD}} - (S_0 \times B_{\text{EUR}})$

$$B_{\text{USD}} = 3.64e^{-0.02 \times 1} + 133.64e^{-0.0225 \times 2} = 3.57 + 127.76 = \$131.33$$

$$B_{\text{EUR}} = 3.50e^{-0.04 \times 1} + 103.5e^{-0.045 \times 2} = 3.36 + 94.59 = 97.95$$

$$V_{\text{swap}}(\text{USD}) = B_{\text{USD}} - (S_0 \times B_{\text{EUR}}) = \$131.33 - (1.33 \times 97.95) = \$131.33 - \$130.27 = \$1.06 \text{ million}$$

(See Book 3, Topic 26)

70. c Starr's supervisor states that "the mean 1-year Treasury bill rate should equal four percent." Therefore, the null hypothesis is:  $H_0$ : mean Treasury bill rate equals 4%; and the alternative hypothesis is  $H_A$ : mean Treasury bill rate does not equal 4%, which is a two-tailed test. Starr's supervisor also states that "the mean market risk premium should be positive." Therefore, the null hypothesis is:  $H_0$ : mean market risk premium is less than or equal to zero; and the alternative hypothesis is  $H_A$ : mean market risk premium is greater than zero, which is a one-tailed test. (See Book 2, Topic 13)
71. a The following formula is used to calculate the VaR for a linear derivative:  
 $VaR_p = \Delta VaR_f$ .

The delta in the formula is a sensitivity factor that reflects the change in value of the derivatives contract for a given change in the value of the underlying. The delta adjustment to the VaR of the underlying asset accounts for the fact that the relative changes in value between the underlying and the derivatives may not be one for one but nevertheless are linear in nature. Note that options are non-linear.

(See Book 4, Topic 36)

72. **d** At the 5% level of significance the critical  $z$ -statistic for a two-tailed test is 1.96 (assuming a large sample size).

The null hypothesis is  $H_0: x = 10\%$ . The alternative hypothesis is  $H_A: x \neq 10\%$ . Because the computed  $z$ -statistic is greater than the critical  $z$ -statistic ( $2.3 > 1.96$ ), we reject the null hypothesis and we conclude that small cap returns are significantly different than 10%. (See Book 2, Topic 13)

73. **a** To identify if there is mispricing in the 2-year zero-coupon bond, back out its yield using your financial calculator. Using annual compounding:  $FV = 100$ ;  $PV = -82.6446$ ,  $N = 2$ ;  $CPT I/Y = 10.00\%$ .

Because its yield is too low (compared to the spot rate of 10.263%), this implies that its price is too high. So we will short this zero-coupon and buy the 2-year coupon bond. We would also short the 1-year zero-coupon bond because its principal repayment can be covered with the first year coupon on the coupon bond.

The following calculations provide the arbitrage profit, assuming \$1,000,000 of the coupon bond is bought.

The 1-year zero-coupon bond will be shorted in an amount corresponding to the first year coupon on the coupon bond, which is  $10\% \times \$1,000,000 = \$100,000$ . We will short the PV of this amount, which using the discount factor of 0.952381 (from the zero-coupon bond's price) is \$95,238.10.

The 2-year zero-coupon bond will be shorted in an amount corresponding to the second year coupon and principal on the coupon bond, which is \$1,100,000. We will short the PV of this amount, which using the discount factor of 0.826446 (from the zero-coupon bond's price) is \$909,090.60.

The total receipt from the short sale is  $\$95,238.10 + \$909,090.60 = \$1,004,328.70$ . After buying \$1,000,000 of the coupon bond, the arbitrage profit is \$4,328.70.

You can verify that if the yield on the 2-year zero-coupon bond were 10.263%, its price would fall to 82.2508, eliminating the arbitrage profit. (See Book 4, Topic 40)

74. **c** The usual approach is to specify a hypothesis that the researcher wishes to disprove. (See Book 2, Topic 13)

75. **c**  $c = \$25 (0.9737) - \$20 (e^{-0.045 \times 0.25})(0.9652) = \$5.25$ . (See Book 4, Topic 38)

76. **b** Decreased correlations in market downturns would not be a concern. Typically, correlations increase during a market downturn, which reduces the diversification of a portfolio or group of investments. In this example, Capital is subject to counterparty risk, the risk of expanding in areas where risk is not accounted for, and the failure to discover all risks. (See Book 1, Topic 8)

77. d Bull and bear spreads are both constructed with either two calls or two puts with a lower and higher strike price.

Bull spread: buy the option with lower strike price, sell the option with higher strike price.

Bear spread: buy the option with higher strike price, sell the option with lower strike price.

This investor is selling an option with low strike price and buying an option with high strike price so it is a bear spread.

The maximum profit is found at a price of 50. The profit consists of:

- Profit on the long 65 put is \$15.
- Loss on the net premium is \$2 (i.e., paid -5, earned +3).
- Overall profit = +\$13.

(See Book 3, Topic 28)

$$78. a \quad \text{discount factor} = \frac{\text{price}}{\text{total cash flows (principal + remaining coupon)}}$$

$$\text{discount factor}_{6 \text{ months}} = 101.426 / (100 + 5.7 / 2)$$

$$\text{discount factor}_{6 \text{ months}} = 101.426 / 102.85 = 0.98615$$

$$1\text{-year bond price} = \text{coupon}_{6 \text{ months}} \times \text{DF}_{6 \text{ months}} + \text{principal} + \text{coupon}_{12 \text{ months}} \times \text{DF}_{12 \text{ months}}$$

$$102.642 = 7.5 \times 0.98615 + 107.5 \times \text{DF}_{12 \text{ months}}$$

$$\text{DF}_{12 \text{ months}} = \frac{95.245875}{107.5}$$

$$\text{DF}_{12 \text{ months}} = 0.8860$$

Note: we normally use discount factors to find the present value of future cash flows. In the case of bonds the present value of future cash flows is the price.

$$\text{price (present value)} = \text{total cash flows} \times \text{discount factor}$$

(See Book 4, Topic 41)

79. b Since the median is higher than the mean, the distribution is negatively skewed. If the mean were higher than the median the distribution would be positively skewed. Since the excess kurtosis is negative, the distribution is platykurtic or less peaked/flatter than a normal distribution. Leptokurtic is defined as a distribution which is more peaked than a normal distribution and would have a positive excess kurtosis. (See Book 2, Topic 11)

80. b Invoice price is: clean price + accrued interest.

$$\$100,000 \times 0.7 \times 1.3 + \$1,500 = \$92,500$$

(See Book 3, Topic 25)



81. a Corn is an example of a commodity with seasonal production and a constant demand. Corn is produced in the fall of every year, but it is consumed throughout the year. Natural gas is an example of a commodity with constant production but seasonal demand. Natural gas is expensive to store, and demand in the United States peaks during high periods of use in the winter months. In addition, the price of natural gas is different for various regions due to high international transportation costs. The demand and production of oil is more constant relative to natural gas due to the ability to transport and store oil more cheaply than natural gas. Therefore, the worldwide demand and production is relatively more constant even though it is subject to supply and demand stocks.

| <i>Commodities</i> | <i>Oil</i>          | <i>Corn</i> | <i>Natural Gas</i> |
|--------------------|---------------------|-------------|--------------------|
| Production         | Constant            | Seasonal    | Constant           |
| Demand             | Relatively constant | Constant    | Seasonal           |
| Storage Costs      | Relatively moderate | Moderate    | Expensive          |

(See Book 3, Topic 30)

82. a The optimal hedge ratio is  $\rho_{1,2} \frac{\sigma_1}{\sigma_2} = 0.5 \left( \frac{1}{2} \right) = 0.25$ . (See Book 3, Topic 22)
83. b At the end of year 1, there is a 5% chance of default and an 80% chance that the firm will maintain a Baa rating. In year 2, there is a 5% chance of default if the firm was rated Baa after 1 year ( $80\% \times 5\% = 4\%$ ). There is a 0% chance of default if the firm was rated Aaa after 1 year ( $10\% \times 0\% = 0\%$ ). Also, there is a 15% chance of default if the firm was rated Caa after 1 year ( $5\% \times 15\% = 0.75\%$ ). The probability of default is 5% from year 1 plus 4.75% chance of default from year 2 (i.e.,  $4\% + 0\% + 0.75\%$ ) for a total probability of default over a 2-year period of 9.75%. (See Book 4, Topic 47)
84. a Expected loss is calculated as follows:  $EL = AE \times LGD \times EDF$ . Therefore, increasing LGD directly increases expected loss.
- Usage given default (UGD) is calculated as the percentage of draw down. Therefore, increasing draw down will increase UGD and hence increase AE from the increased draw down in default. It follows that the expected loss will increase as well.  
(See Book 4, Topic 48)
85. a The payoff from exercising the option is the exercise price minus the current stock price:  $\$40 - \$36 = \$4$ . The discounted value of the expected future payoff is:

$$\frac{(\$0.00 \times 0.75) + (\$10.00 \times 0.25)}{e^{(0.05)(1)}} = \$2.38$$

It is optimal to exercise the option early because it is worth more exercised (\$4.00) than if not exercised (\$2.38). (See Book 4, Topic 37)

86. d The dollar amount translates to:

$$\$10,000[100 - 0.25(100 - \text{quoted price})] = \$10,000[100 - 0.25(100 - 96.89)] = \$992,225$$

(See Book 3, Topic 25)

87. **b** All of the expressions apply to the sum of squared residuals except for choice b. The expression in choice b should be squared. (See Book 2, Topic 14)
88. **c** A negative net exposure position means that we are net short in a currency. On-balance-sheet hedging is achieved when a financial institution has a matched maturity and currency foreign asset-liability book. Both of the statements are correct. (See Book 3, Topic 31)
89. **b** Having a single, quantifiable metric is generally required as a guideline to indicate when risk should be increased or decreased. There are many possible shortcomings, however, such as the measure not incorporating the human element of the market. Scenario analysis can improve the process by attempting to account for human activity such as predatory trading and including the possibility and consequences of extreme events. (See Book 1, Topic 8)
90. **b** Calculate the standardized variable corresponding to the outcomes:  
 $Z_1 = (91.13 - 50) / 25 = 1.645$ , and  $Z_2 = (108.25 - 50) / 25 = 2.33$   
The cumulative normal distribution gives cumulative probabilities of:  
 $F(1.645) = 0.95$  and  $F(2.33) = 0.99$   
The probability that the outcome will lie between  $Z_1$  and  $Z_2$  is the difference:  
 $0.99 - 0.95 = 0.04$   
(See Book 2, Topic 12)
91. **b** Clearinghouses act as a central counterparty by positioning themselves between buyer and seller in financial transactions and guaranteeing trades. (See Book 3, Topic 20)
92. **c** Statements II, III, and IV are correct. Statement I is incorrect because supervisors should make stress testing assessments more frequently than annually. (See Book 4, Topic 52)
93. **d** Stock A =  $8\% + 1.5(7\%) = 18.5\%$ . Because the estimated return of 15.0% is less than the required return of 18.5%, Stock A is *overvalued*.  
Stock C =  $8\% + 0.6(7\%) = 12.2\%$ . Because the estimated return of 14.2% is greater than the required return of 12.2%, Stock C is *undervalued*.  
(See Book 1, Topic 2)
94. **c** Since there are a total of 40 observations, the sample is large enough to qualify to use the  $z$ -test. The calculated  $z$ -statistic for the industry index =  $(2.2 - 0) / 0.58 = 3.79$ . That is greater than the critical value of 2.58 so the industry index is significant at the 99% level. The calculated  $z$ -statistic for the intercept =  $(3.8 - 0) / 2.25 = 1.68$ . That is less than the critical value of 1.96 so the intercept is not significant at the 95% level.  
 $TSS = ESS + SSR$ ;  $1,264.72 = ESS + 272.49$ , therefore,  $ESS = 992.23$ .  $R^2 = \text{coefficient of determination} = ESS / TSS = 992.23 / 1,264.72 = 0.7845$ . Correlation coefficient is the square root of  $R^2$  and therefore, it is 0.8857.  
(See Book 2, Topic 14)

95. d Step 1: compute the 2-year spot rate:

$$\begin{aligned} N &= 4 \\ PV &= -93.2775 \\ PMT &= 0 \\ FV &= 100 \\ \text{CPT I/Y} &= 1.755\% \text{ (semi-annual) therefore } \times 2 = 3.51\% \text{ annual yield} \end{aligned}$$

Step 2: compute the forward rate:

$$(1 + \text{semi-annual spot}_{1.5})^3 \times (1 + \text{forward rate}_{1.5F2}) = (1 + \text{semi-annual spot}_2)^4$$

$$\text{forward rate} = 1.072069 / 1.049701 - 1 = 2.13\% \text{ per half year}$$

$$\text{annual forward rate} = 2.13\% \times 2 = 4.26\%$$

(See Book 4, Topic 41)

96. a  $NPV = PV(\text{cash inflows}) - CF_0 = (\$1.8 \text{ million} / 0.105) - \$15 \text{ million} = \$2,142,857$   
(See Book 1, Topic 1)

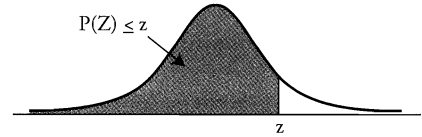
97. a  $(1,025)e^{(0.0275-0.012)(0.25)} = 1,028.98$ . The market rate of interest is irrelevant here.  
(See Book 3, Topic 24)

98. b An unbiased estimator has an expected value equal to the true value of the population parameter. A consistent estimator is more accurate the greater the sample size. An efficient estimator has the sampling distribution that is less than that of any other unbiased estimator. (See Book 2, Topic 11)

99. a A delta hedge *will* be required as it is extremely likely that the exchange rate will change. When the exchange rate changes, so does the delta. When the delta changes, the portfolio will no longer be hedged and so a dynamic hedging strategy is required. This involves rebalancing (i.e., either purchasing or selling the underlying asset) on a continual basis to maintain the delta-neutral hedged position. (See Book 4, Topic 39)

100. c With YTM = 10.45% (I/Y = 5.225), PMT = 40, N = 24, FV = 1,000, PV = \$834.61.  
With YTM = 10.07% (I/Y = 5.035), PV = \$857.67, an increase of \$23.06.  
(See Book 4, Topic 42)

# CUMULATIVE Z-TABLE



$$P(Z \leq z) = N(z) \text{ for } z \geq 0$$

$$P(Z \leq -z) = 1 - N(z)$$

| z   | 0      | 0.01   | 0.02   | 0.03   | 0.04   | 0.05   | 0.06   | 0.07   | 0.08   | 0.09   |
|-----|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 0   | 0.5000 | 0.5040 | 0.5080 | 0.5120 | 0.5160 | 0.5199 | 0.5239 | 0.5279 | 0.5319 | 0.5359 |
| 0.1 | 0.5398 | 0.5438 | 0.5478 | 0.5517 | 0.5557 | 0.5596 | 0.5636 | 0.5675 | 0.5714 | 0.5753 |
| 0.2 | 0.5793 | 0.5832 | 0.5871 | 0.5910 | 0.5948 | 0.5987 | 0.6026 | 0.6064 | 0.6103 | 0.6141 |
| 0.3 | 0.6179 | 0.6217 | 0.6255 | 0.6293 | 0.6331 | 0.6368 | 0.6406 | 0.6443 | 0.6480 | 0.6517 |
| 0.4 | 0.6554 | 0.6591 | 0.6628 | 0.6664 | 0.6700 | 0.6736 | 0.6772 | 0.6808 | 0.6844 | 0.6879 |
| 0.5 | 0.6915 | 0.6950 | 0.6985 | 0.7019 | 0.7054 | 0.7088 | 0.7123 | 0.7157 | 0.7190 | 0.7224 |
| 0.6 | 0.7257 | 0.7291 | 0.7324 | 0.7357 | 0.7389 | 0.7422 | 0.7454 | 0.7486 | 0.7517 | 0.7549 |
| 0.7 | 0.7580 | 0.7611 | 0.7642 | 0.7673 | 0.7704 | 0.7734 | 0.7764 | 0.7794 | 0.7823 | 0.7852 |
| 0.8 | 0.7881 | 0.7910 | 0.7939 | 0.7967 | 0.7995 | 0.8023 | 0.8051 | 0.8078 | 0.8106 | 0.8133 |
| 0.9 | 0.8159 | 0.8186 | 0.8212 | 0.8238 | 0.8264 | 0.8289 | 0.8315 | 0.8340 | 0.8365 | 0.8389 |
| 1   | 0.8413 | 0.8438 | 0.8461 | 0.8485 | 0.8508 | 0.8531 | 0.8554 | 0.8577 | 0.8599 | 0.8621 |
| 1.1 | 0.8643 | 0.8665 | 0.8686 | 0.8708 | 0.8729 | 0.8749 | 0.8770 | 0.8790 | 0.8810 | 0.8830 |
| 1.2 | 0.8849 | 0.8869 | 0.8888 | 0.8907 | 0.8925 | 0.8944 | 0.8962 | 0.8980 | 0.8997 | 0.9015 |
| 1.3 | 0.9032 | 0.9049 | 0.9066 | 0.9082 | 0.9099 | 0.9115 | 0.9131 | 0.9147 | 0.9162 | 0.9177 |
| 1.4 | 0.9192 | 0.9207 | 0.9222 | 0.9236 | 0.9251 | 0.9265 | 0.9279 | 0.9292 | 0.9306 | 0.9319 |
| 1.5 | 0.9332 | 0.9345 | 0.9357 | 0.937  | 0.9382 | 0.9394 | 0.9406 | 0.9418 | 0.9429 | 0.9441 |
| 1.6 | 0.9452 | 0.9463 | 0.9474 | 0.9484 | 0.9495 | 0.9505 | 0.9515 | 0.9525 | 0.9535 | 0.9545 |
| 1.7 | 0.9554 | 0.9564 | 0.9573 | 0.9582 | 0.9591 | 0.9599 | 0.9608 | 0.9616 | 0.9625 | 0.9633 |
| 1.8 | 0.9641 | 0.9649 | 0.9656 | 0.9664 | 0.9671 | 0.9678 | 0.9686 | 0.9693 | 0.9699 | 0.9706 |
| 1.9 | 0.9713 | 0.9719 | 0.9726 | 0.9732 | 0.9738 | 0.9744 | 0.9750 | 0.9756 | 0.9761 | 0.9767 |
| 2   | 0.9772 | 0.9778 | 0.9783 | 0.9788 | 0.9793 | 0.9798 | 0.9803 | 0.9808 | 0.9812 | 0.9817 |
| 2.1 | 0.9821 | 0.9826 | 0.983  | 0.9834 | 0.9838 | 0.9842 | 0.9846 | 0.985  | 0.9854 | 0.9857 |
| 2.2 | 0.9861 | 0.9864 | 0.9868 | 0.9871 | 0.9875 | 0.9878 | 0.9881 | 0.9884 | 0.9887 | 0.989  |
| 2.3 | 0.9893 | 0.9896 | 0.9898 | 0.9901 | 0.9904 | 0.9906 | 0.9909 | 0.9911 | 0.9913 | 0.9916 |
| 2.4 | 0.9918 | 0.9920 | 0.9922 | 0.9925 | 0.9927 | 0.9929 | 0.9931 | 0.9932 | 0.9934 | 0.9936 |
| 2.5 | 0.9938 | 0.994  | 0.9941 | 0.9943 | 0.9945 | 0.9946 | 0.9948 | 0.9949 | 0.9951 | 0.9952 |
| 2.6 | 0.9953 | 0.9955 | 0.9956 | 0.9957 | 0.9959 | 0.9960 | 0.9961 | 0.9962 | 0.9963 | 0.9964 |
| 2.7 | 0.9965 | 0.9966 | 0.9967 | 0.9968 | 0.9969 | 0.9970 | 0.9971 | 0.9972 | 0.9973 | 0.9974 |
| 2.8 | 0.9974 | 0.9975 | 0.9976 | 0.9977 | 0.9977 | 0.9978 | 0.9979 | 0.9979 | 0.9980 | 0.9981 |
| 2.9 | 0.9981 | 0.9982 | 0.9982 | 0.9983 | 0.9984 | 0.9984 | 0.9985 | 0.9985 | 0.9986 | 0.9986 |
| 3   | 0.9987 | 0.9987 | 0.9987 | 0.9988 | 0.9988 | 0.9989 | 0.9989 | 0.9989 | 0.9990 | 0.9990 |

# STUDENT'S T-DISTRIBUTION

| Level of Significance for One-Tailed Test |       |       |        |        |        |         |
|-------------------------------------------|-------|-------|--------|--------|--------|---------|
| df                                        | 0.100 | 0.050 | 0.025  | 0.01   | 0.005  | 0.0005  |
| Level of Significance for Two-Tailed Test |       |       |        |        |        |         |
| df                                        | 0.20  | 0.10  | 0.05   | 0.02   | 0.01   | 0.001   |
| 1                                         | 3.078 | 6.314 | 12.706 | 31.821 | 63.657 | 636.619 |
| 2                                         | 1.886 | 2.920 | 4.303  | 6.965  | 9.925  | 31.599  |
| 3                                         | 1.638 | 2.353 | 3.182  | 4.541  | 5.841  | 12.294  |
| 4                                         | 1.533 | 2.132 | 2.776  | 3.747  | 4.604  | 8.610   |
| 5                                         | 1.476 | 2.015 | 2.571  | 3.365  | 4.032  | 6.869   |
| 6                                         | 1.440 | 1.943 | 2.447  | 3.143  | 3.707  | 5.959   |
| 7                                         | 1.415 | 1.895 | 2.365  | 2.998  | 3.499  | 5.408   |
| 8                                         | 1.397 | 1.860 | 2.306  | 2.896  | 3.355  | 5.041   |
| 9                                         | 1.383 | 1.833 | 2.262  | 2.821  | 3.250  | 4.781   |
| 10                                        | 1.372 | 1.812 | 2.228  | 2.764  | 3.169  | 4.587   |
| 11                                        | 1.363 | 1.796 | 2.201  | 2.718  | 3.106  | 4.437   |
| 12                                        | 1.356 | 1.782 | 2.179  | 2.681  | 3.055  | 4.318   |
| 13                                        | 1.350 | 1.771 | 2.160  | 2.650  | 3.012  | 4.221   |
| 14                                        | 1.345 | 1.761 | 2.145  | 2.624  | 2.977  | 4.140   |
| 15                                        | 1.341 | 1.753 | 2.131  | 2.602  | 2.947  | 4.073   |
| 16                                        | 1.337 | 1.746 | 2.120  | 2.583  | 2.921  | 4.015   |
| 17                                        | 1.333 | 1.740 | 2.110  | 2.567  | 2.898  | 3.965   |
| 18                                        | 1.330 | 1.734 | 2.101  | 2.552  | 2.878  | 3.922   |
| 19                                        | 1.328 | 1.729 | 2.093  | 2.539  | 2.861  | 3.883   |
| 20                                        | 1.325 | 1.725 | 2.086  | 2.528  | 2.845  | 3.850   |
| 21                                        | 1.323 | 1.721 | 2.080  | 2.518  | 2.831  | 3.819   |
| 22                                        | 1.321 | 1.717 | 2.074  | 2.508  | 2.819  | 3.792   |
| 23                                        | 1.319 | 1.714 | 2.069  | 2.500  | 2.807  | 3.768   |
| 24                                        | 1.318 | 1.711 | 2.064  | 2.492  | 2.797  | 3.745   |
| 25                                        | 1.316 | 1.708 | 2.060  | 2.485  | 2.787  | 3.725   |
| 26                                        | 1.315 | 1.706 | 2.056  | 2.479  | 2.779  | 3.707   |
| 27                                        | 1.314 | 1.703 | 2.052  | 2.473  | 2.771  | 3.690   |
| 28                                        | 1.313 | 1.701 | 2.048  | 2.467  | 2.763  | 3.674   |
| 29                                        | 1.311 | 1.699 | 2.045  | 2.462  | 2.756  | 3.659   |
| 30                                        | 1.310 | 1.697 | 2.042  | 2.457  | 2.750  | 3.646   |
| 40                                        | 1.303 | 1.684 | 2.021  | 2.423  | 2.704  | 3.551   |
| 60                                        | 1.296 | 1.671 | 2.000  | 2.390  | 2.660  | 3.460   |
| 120                                       | 1.289 | 1.658 | 1.980  | 2.358  | 2.617  | 3.373   |
| ∞                                         | 1.282 | 1.645 | 1.960  | 2.326  | 2.576  | 3.291   |

# F-TABLE AT 5%

Critical values of the F-distribution at a 5% level of significance  
 Degrees of freedom for the numerator along top row  
 Degrees of freedom for the denominator along side row

|     | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 12   | 15   | 20   | 24   | 30   | 40   |
|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 1   | 161  | 200  | 216  | 225  | 230  | 234  | 237  | 239  | 241  | 242  | 244  | 246  | 248  | 249  | 250  | 251  |
| 2   | 18.5 | 19.0 | 19.2 | 19.2 | 19.3 | 19.3 | 19.4 | 19.4 | 19.4 | 19.4 | 19.4 | 19.4 | 19.4 | 19.5 | 19.5 | 19.5 |
| 3   | 10.1 | 9.55 | 9.28 | 9.12 | 9.01 | 8.94 | 8.89 | 8.85 | 8.81 | 8.79 | 8.74 | 8.70 | 8.66 | 8.64 | 8.62 | 8.59 |
| 4   | 7.71 | 6.94 | 6.59 | 6.39 | 6.26 | 6.16 | 6.09 | 6.04 | 6.00 | 5.96 | 5.91 | 5.86 | 5.80 | 5.77 | 5.75 | 5.72 |
| 5   | 6.61 | 5.79 | 5.41 | 5.19 | 5.05 | 4.95 | 4.88 | 4.82 | 4.77 | 4.74 | 4.68 | 4.62 | 4.56 | 4.53 | 4.50 | 4.46 |
| 6   | 5.99 | 5.14 | 4.76 | 4.53 | 4.39 | 4.28 | 4.21 | 4.15 | 4.10 | 4.06 | 4.00 | 3.94 | 3.87 | 3.84 | 3.81 | 3.77 |
| 7   | 5.59 | 4.74 | 4.35 | 4.12 | 3.97 | 3.87 | 3.79 | 3.73 | 3.68 | 3.64 | 3.57 | 3.51 | 3.44 | 3.41 | 3.38 | 3.34 |
| 8   | 5.32 | 4.46 | 4.07 | 3.84 | 3.69 | 3.58 | 3.50 | 3.44 | 3.39 | 3.35 | 3.28 | 3.22 | 3.15 | 3.12 | 3.08 | 3.04 |
| 9   | 5.12 | 4.26 | 3.86 | 3.63 | 3.48 | 3.37 | 3.29 | 3.23 | 3.18 | 3.14 | 3.07 | 3.01 | 2.94 | 2.90 | 2.86 | 2.83 |
| 10  | 4.96 | 4.10 | 3.71 | 3.48 | 3.33 | 3.22 | 3.14 | 3.07 | 3.02 | 2.98 | 2.91 | 2.85 | 2.77 | 2.74 | 2.70 | 2.66 |
| 11  | 4.84 | 3.98 | 3.59 | 3.36 | 3.20 | 3.09 | 3.01 | 2.95 | 2.90 | 2.85 | 2.79 | 2.72 | 2.65 | 2.61 | 2.57 | 2.53 |
| 12  | 4.75 | 3.89 | 3.49 | 3.26 | 3.11 | 3.00 | 2.91 | 2.85 | 2.80 | 2.75 | 2.69 | 2.62 | 2.54 | 2.51 | 2.47 | 2.43 |
| 13  | 4.67 | 3.81 | 3.41 | 3.18 | 3.03 | 2.92 | 2.83 | 2.77 | 2.71 | 2.67 | 2.60 | 2.53 | 2.46 | 2.42 | 2.38 | 2.34 |
| 14  | 4.60 | 3.74 | 3.34 | 3.11 | 2.96 | 2.85 | 2.76 | 2.70 | 2.65 | 2.60 | 2.53 | 2.46 | 2.39 | 2.35 | 2.31 | 2.27 |
| 15  | 4.54 | 3.68 | 3.29 | 3.06 | 2.90 | 2.79 | 2.71 | 2.64 | 2.59 | 2.54 | 2.48 | 2.40 | 2.33 | 2.29 | 2.25 | 2.20 |
| 16  | 4.49 | 3.63 | 3.24 | 3.01 | 2.85 | 2.74 | 2.66 | 2.59 | 2.54 | 2.49 | 2.42 | 2.35 | 2.28 | 2.24 | 2.19 | 2.15 |
| 17  | 4.45 | 3.59 | 3.20 | 2.96 | 2.81 | 2.70 | 2.61 | 2.55 | 2.49 | 2.45 | 2.38 | 2.31 | 2.23 | 2.19 | 2.15 | 2.10 |
| 18  | 4.41 | 3.55 | 3.16 | 2.93 | 2.77 | 2.66 | 2.58 | 2.51 | 2.46 | 2.41 | 2.34 | 2.27 | 2.19 | 2.15 | 2.11 | 2.06 |
| 19  | 4.38 | 3.52 | 3.13 | 2.90 | 2.74 | 2.63 | 2.54 | 2.48 | 2.42 | 2.38 | 2.31 | 2.23 | 2.16 | 2.11 | 2.07 | 2.03 |
| 20  | 4.35 | 3.49 | 3.10 | 2.87 | 2.71 | 2.60 | 2.51 | 2.45 | 2.39 | 2.35 | 2.28 | 2.20 | 2.12 | 2.08 | 2.04 | 1.99 |
| 21  | 4.32 | 3.47 | 3.07 | 2.84 | 2.68 | 2.57 | 2.49 | 2.42 | 2.37 | 2.32 | 2.25 | 2.18 | 2.10 | 2.05 | 2.01 | 1.96 |
| 22  | 4.30 | 3.44 | 3.05 | 2.82 | 2.66 | 2.55 | 2.46 | 2.40 | 2.34 | 2.30 | 2.23 | 2.15 | 2.07 | 2.03 | 1.98 | 1.94 |
| 23  | 4.28 | 3.42 | 3.03 | 2.80 | 2.64 | 2.53 | 2.44 | 2.37 | 2.32 | 2.27 | 2.20 | 2.13 | 2.05 | 2.01 | 1.96 | 1.91 |
| 24  | 4.26 | 3.40 | 3.01 | 2.78 | 2.62 | 2.51 | 2.42 | 2.36 | 2.30 | 2.25 | 2.18 | 2.11 | 2.03 | 1.98 | 1.94 | 1.89 |
| 25  | 4.24 | 3.39 | 2.99 | 2.76 | 2.60 | 2.49 | 2.40 | 2.34 | 2.28 | 2.24 | 2.16 | 2.09 | 2.01 | 1.96 | 1.92 | 1.87 |
| 30  | 4.17 | 3.32 | 2.92 | 2.69 | 2.53 | 2.42 | 2.33 | 2.27 | 2.21 | 2.16 | 2.09 | 2.01 | 1.93 | 1.89 | 1.84 | 1.79 |
| 40  | 4.08 | 3.23 | 2.84 | 2.61 | 2.45 | 2.34 | 2.25 | 2.18 | 2.12 | 2.08 | 2.00 | 1.92 | 1.84 | 1.79 | 1.74 | 1.69 |
| 60  | 4.00 | 3.15 | 2.76 | 2.53 | 2.37 | 2.25 | 2.17 | 2.10 | 2.04 | 1.99 | 1.92 | 1.84 | 1.75 | 1.70 | 1.65 | 1.59 |
| 120 | 3.92 | 3.07 | 2.68 | 2.45 | 2.29 | 2.18 | 2.09 | 2.02 | 1.96 | 1.91 | 1.83 | 1.75 | 1.66 | 1.61 | 1.55 | 1.50 |
| ∞   | 3.84 | 3.00 | 2.60 | 2.37 | 2.21 | 2.10 | 2.01 | 1.94 | 1.88 | 1.83 | 1.75 | 1.67 | 1.57 | 1.52 | 1.46 | 1.39 |

# F-TABLE AT 2.5%

Critical values of the F-distribution at a 2.5% level of significance  
 Degrees of freedom for the numerator along top row  
 Degrees of freedom for the denominator along side row

|     | 1     | 2     | 3     | 4     | 5     | 6     | 7     | 8     | 9     | 10    | 12    | 15    | 20    | 24    | 30    | 40    |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1   | 648   | 799   | 864   | 900   | 922   | 937   | 948   | 957   | 963   | 969   | 977   | 985   | 993   | 997   | 1001  | 1006  |
| 2   | 38.51 | 39.00 | 39.17 | 39.25 | 39.30 | 39.33 | 39.36 | 39.37 | 39.39 | 39.40 | 39.41 | 39.43 | 39.45 | 39.46 | 39.46 | 39.47 |
| 3   | 17.44 | 16.04 | 15.44 | 15.10 | 14.88 | 14.73 | 14.62 | 14.54 | 14.47 | 14.42 | 14.34 | 14.25 | 14.17 | 14.12 | 14.08 | 14.04 |
| 4   | 12.22 | 10.65 | 9.98  | 9.60  | 9.36  | 9.20  | 9.07  | 8.98  | 8.90  | 8.84  | 8.75  | 8.66  | 8.56  | 8.51  | 8.46  | 8.41  |
| 5   | 10.01 | 8.43  | 7.76  | 7.39  | 7.15  | 6.98  | 6.85  | 6.76  | 6.68  | 6.62  | 6.52  | 6.43  | 6.33  | 6.28  | 6.23  | 6.18  |
| 6   | 8.81  | 7.26  | 6.60  | 6.23  | 5.99  | 5.82  | 5.70  | 5.60  | 5.52  | 5.46  | 5.37  | 5.27  | 5.17  | 5.12  | 5.07  | 5.01  |
| 7   | 8.07  | 6.54  | 5.89  | 5.52  | 5.29  | 5.12  | 4.99  | 4.90  | 4.82  | 4.76  | 4.67  | 4.57  | 4.47  | 4.41  | 4.36  | 4.31  |
| 8   | 7.57  | 6.06  | 5.42  | 5.05  | 4.82  | 4.65  | 4.53  | 4.43  | 4.36  | 4.30  | 4.20  | 4.10  | 4.00  | 3.95  | 3.89  | 3.84  |
| 9   | 7.21  | 5.71  | 5.08  | 4.72  | 4.48  | 4.32  | 4.20  | 4.10  | 4.03  | 3.96  | 3.87  | 3.77  | 3.67  | 3.61  | 3.56  | 3.51  |
| 10  | 6.94  | 5.46  | 4.83  | 4.47  | 4.24  | 4.07  | 3.95  | 3.85  | 3.78  | 3.72  | 3.62  | 3.52  | 3.42  | 3.37  | 3.31  | 3.26  |
| 11  | 6.72  | 5.26  | 4.63  | 4.28  | 4.04  | 3.88  | 3.76  | 3.66  | 3.59  | 3.53  | 3.43  | 3.33  | 3.23  | 3.17  | 3.12  | 3.06  |
| 12  | 6.55  | 5.10  | 4.47  | 4.12  | 3.89  | 3.73  | 3.61  | 3.51  | 3.44  | 3.37  | 3.28  | 3.18  | 3.07  | 3.02  | 2.96  | 2.91  |
| 13  | 6.41  | 4.97  | 4.35  | 4.00  | 3.77  | 3.60  | 3.48  | 3.39  | 3.31  | 3.25  | 3.15  | 3.05  | 2.95  | 2.89  | 2.84  | 2.78  |
| 14  | 6.30  | 4.86  | 4.24  | 3.89  | 3.66  | 3.50  | 3.38  | 3.29  | 3.21  | 3.15  | 3.05  | 2.95  | 2.84  | 2.79  | 2.73  | 2.67  |
| 15  | 6.20  | 4.77  | 4.15  | 3.80  | 3.58  | 3.41  | 3.29  | 3.20  | 3.12  | 3.06  | 2.96  | 2.86  | 2.76  | 2.70  | 2.64  | 2.59  |
| 16  | 6.12  | 4.69  | 4.08  | 3.73  | 3.50  | 3.34  | 3.22  | 3.12  | 3.05  | 2.99  | 2.89  | 2.79  | 2.68  | 2.63  | 2.57  | 2.51  |
| 17  | 6.04  | 4.62  | 4.01  | 3.66  | 3.44  | 3.28  | 3.16  | 3.06  | 2.98  | 2.92  | 2.82  | 2.72  | 2.62  | 2.56  | 2.50  | 2.44  |
| 18  | 5.98  | 4.56  | 3.95  | 3.61  | 3.38  | 3.22  | 3.10  | 3.01  | 2.93  | 2.87  | 2.77  | 2.67  | 2.56  | 2.50  | 2.44  | 2.38  |
| 19  | 5.92  | 4.51  | 3.90  | 3.56  | 3.33  | 3.17  | 3.05  | 2.96  | 2.88  | 2.82  | 2.72  | 2.62  | 2.51  | 2.45  | 2.39  | 2.33  |
| 20  | 5.87  | 4.46  | 3.86  | 3.51  | 3.29  | 3.13  | 3.01  | 2.91  | 2.84  | 2.77  | 2.68  | 2.57  | 2.46  | 2.41  | 2.35  | 2.29  |
| 21  | 5.83  | 4.42  | 3.82  | 3.48  | 3.25  | 3.09  | 2.97  | 2.87  | 2.80  | 2.73  | 2.64  | 2.53  | 2.42  | 2.37  | 2.31  | 2.25  |
| 22  | 5.79  | 4.38  | 3.78  | 3.44  | 3.22  | 3.05  | 2.93  | 2.84  | 2.76  | 2.70  | 2.60  | 2.50  | 2.39  | 2.33  | 2.27  | 2.21  |
| 23  | 5.75  | 4.35  | 3.75  | 3.41  | 3.18  | 3.02  | 2.90  | 2.81  | 2.73  | 2.67  | 2.57  | 2.47  | 2.36  | 2.30  | 2.24  | 2.18  |
| 24  | 5.72  | 4.32  | 3.72  | 3.38  | 3.15  | 2.99  | 2.87  | 2.78  | 2.70  | 2.64  | 2.54  | 2.44  | 2.33  | 2.27  | 2.21  | 2.15  |
| 25  | 5.69  | 4.29  | 3.69  | 3.35  | 3.13  | 2.97  | 2.85  | 2.75  | 2.68  | 2.61  | 2.51  | 2.41  | 2.30  | 2.24  | 2.18  | 2.12  |
| 30  | 5.57  | 4.18  | 3.59  | 3.25  | 3.03  | 2.87  | 2.75  | 2.65  | 2.57  | 2.51  | 2.41  | 2.31  | 2.20  | 2.14  | 2.07  | 2.01  |
| 40  | 5.42  | 4.05  | 3.46  | 3.13  | 2.90  | 2.74  | 2.62  | 2.53  | 2.45  | 2.39  | 2.29  | 2.18  | 2.07  | 2.01  | 1.94  | 1.88  |
| 60  | 5.29  | 3.93  | 3.34  | 3.01  | 2.79  | 2.63  | 2.51  | 2.41  | 2.33  | 2.27  | 2.17  | 2.06  | 1.94  | 1.88  | 1.82  | 1.74  |
| 120 | 5.15  | 3.80  | 3.23  | 2.89  | 2.67  | 2.52  | 2.39  | 2.30  | 2.22  | 2.16  | 2.05  | 1.94  | 1.82  | 1.76  | 1.69  | 1.61  |
| ∞   | 5.02  | 3.69  | 3.12  | 2.79  | 2.57  | 2.41  | 2.29  | 2.19  | 2.11  | 2.05  | 1.94  | 1.83  | 1.71  | 1.64  | 1.57  | 1.48  |

# CHI-SQUARED TABLE

Values of  $\chi^2$  (Degrees of Freedom, Level of Significance)  
Probability in Right Tail

| Degrees of Freedom | 0.99     | 0.975    | 0.95     | 0.9    | 0.1     | 0.05    | 0.025   | 0.01    | 0.005   |
|--------------------|----------|----------|----------|--------|---------|---------|---------|---------|---------|
| 1                  | 0.000157 | 0.000982 | 0.003932 | 0.0158 | 2.706   | 3.841   | 5.024   | 6.635   | 7.879   |
| 2                  | 0.020100 | 0.050636 | 0.102586 | 0.2107 | 4.605   | 5.991   | 7.378   | 9.210   | 10.597  |
| 3                  | 0.1148   | 0.2158   | 0.3518   | 0.5844 | 6.251   | 7.815   | 9.348   | 11.345  | 12.838  |
| 4                  | 0.297    | 0.484    | 0.711    | 1.064  | 7.779   | 9.488   | 11.143  | 13.277  | 14.860  |
| 5                  | 0.554    | 0.831    | 1.145    | 1.610  | 9.236   | 11.070  | 12.832  | 15.086  | 16.750  |
| 6                  | 0.872    | 1.237    | 1.635    | 2.204  | 10.645  | 12.592  | 14.449  | 16.812  | 18.548  |
| 7                  | 1.239    | 1.690    | 2.167    | 2.833  | 12.017  | 14.067  | 16.013  | 18.475  | 20.278  |
| 8                  | 1.647    | 2.180    | 2.733    | 3.490  | 13.362  | 15.507  | 17.535  | 20.090  | 21.955  |
| 9                  | 2.088    | 2.700    | 3.325    | 4.168  | 14.684  | 16.919  | 19.023  | 21.666  | 23.589  |
| 10                 | 2.558    | 3.247    | 3.940    | 4.865  | 15.987  | 18.307  | 20.483  | 23.209  | 25.188  |
| 11                 | 3.053    | 3.816    | 4.575    | 5.578  | 17.275  | 19.675  | 21.920  | 24.725  | 26.757  |
| 12                 | 3.571    | 4.404    | 5.226    | 6.304  | 18.549  | 21.026  | 23.337  | 26.217  | 28.300  |
| 13                 | 4.107    | 5.009    | 5.892    | 7.041  | 19.812  | 22.362  | 24.736  | 27.688  | 29.819  |
| 14                 | 4.660    | 5.629    | 6.571    | 7.790  | 21.064  | 23.685  | 26.119  | 29.141  | 31.319  |
| 15                 | 5.229    | 6.262    | 7.261    | 8.547  | 22.307  | 24.996  | 27.488  | 30.578  | 32.801  |
| 16                 | 5.812    | 6.908    | 7.962    | 9.312  | 23.542  | 26.296  | 28.845  | 32.000  | 34.267  |
| 17                 | 6.408    | 7.564    | 8.672    | 10.085 | 24.769  | 27.587  | 30.191  | 33.409  | 35.718  |
| 18                 | 7.015    | 8.231    | 9.390    | 10.865 | 25.989  | 28.869  | 31.526  | 34.805  | 37.156  |
| 19                 | 7.633    | 8.907    | 10.117   | 11.651 | 27.204  | 30.144  | 32.852  | 36.191  | 38.582  |
| 20                 | 8.260    | 9.591    | 10.851   | 12.443 | 28.412  | 31.410  | 34.170  | 37.566  | 39.997  |
| 21                 | 8.897    | 10.283   | 11.591   | 13.240 | 29.615  | 32.671  | 35.479  | 38.932  | 41.401  |
| 22                 | 9.542    | 10.982   | 12.338   | 14.041 | 30.813  | 33.924  | 36.781  | 40.289  | 42.796  |
| 23                 | 10.196   | 11.689   | 13.091   | 14.848 | 32.007  | 35.172  | 38.076  | 41.638  | 44.181  |
| 24                 | 10.856   | 12.401   | 13.848   | 15.659 | 33.196  | 36.415  | 39.364  | 42.980  | 45.558  |
| 25                 | 11.524   | 13.120   | 14.611   | 16.473 | 34.382  | 37.652  | 40.646  | 44.314  | 46.928  |
| 26                 | 12.198   | 13.844   | 15.379   | 17.292 | 35.563  | 38.885  | 41.923  | 45.642  | 48.290  |
| 27                 | 12.878   | 14.573   | 16.151   | 18.114 | 36.741  | 40.113  | 43.195  | 46.963  | 49.645  |
| 28                 | 13.565   | 15.308   | 16.928   | 18.939 | 37.916  | 41.337  | 44.461  | 48.278  | 50.994  |
| 29                 | 14.256   | 16.047   | 17.708   | 19.768 | 39.087  | 42.557  | 45.722  | 49.588  | 52.335  |
| 30                 | 14.953   | 16.791   | 18.493   | 20.599 | 40.256  | 43.773  | 46.979  | 50.892  | 53.672  |
| 50                 | 29.707   | 32.357   | 34.764   | 37.689 | 63.167  | 67.505  | 71.420  | 76.154  | 79.490  |
| 60                 | 37.485   | 40.482   | 43.188   | 46.459 | 74.397  | 79.082  | 83.298  | 88.379  | 91.952  |
| 80                 | 53.540   | 57.153   | 60.391   | 64.278 | 96.578  | 101.879 | 106.629 | 112.329 | 116.321 |
| 100                | 70.065   | 74.222   | 77.929   | 82.358 | 118.498 | 124.342 | 129.561 | 135.807 | 140.170 |



# Notes

Required Disclaimers:

CFA Institute does not endorse, promote, or warrant the accuracy or quality of the products or services offered by Kaplan Schweser. CFA Institute, CFA®, and Chartered Financial Analyst® are trademarks owned by CFA Institute.

Certified Financial Planner Board of Standards Inc. owns the certification marks CFP®, CERTIFIED FINANCIAL PLANNER™, and federally registered CFP (with flame design) in the U.S., which it awards to individuals who successfully complete initial and ongoing certification requirements. Kaplan University does not certify individuals to use the CFP®, CERTIFIED FINANCIAL PLANNER™, and CFP (with flame design) certification marks. CFP® certification is granted only by Certified Financial Planner Board of Standards Inc. to those persons who, in addition to completing an educational requirement such as this CFP® Board-Registered Program, have met its ethics, experience, and examination requirements.

Kaplan Schweser and Kaplan University are review course providers for the CFP® Certification Examination administered by Certified Financial Planner Board of Standards Inc. CFP Board does not endorse any review course or receive financial remuneration from review course providers.

GARP® does not endorse, promote, review, or warrant the accuracy of the products or services offered by Kaplan Schweser of FRM® related information, nor does it endorse any pass rates claimed by the provider. Further, GARP® is not responsible for any fees or costs paid by the user to Kaplan Schweser, nor is GARP® responsible for any fees or costs of any person or entity providing any services to Kaplan Schweser. FRM®, GARP®, and Global Association of Risk Professionals™ are trademarks owned by the Global Association of Risk Professionals, Inc.

CAIAA does not endorse, promote, review or warrant the accuracy of the products or services offered by Kaplan Schweser, nor does it endorse any pass rates claimed by the provider. CAIAA is not responsible for any fees or costs paid by the user to Kaplan Schweser nor is CAIAA responsible for any fees or costs of any person or entity providing any services to Kaplan Schweser. CAIA®, CAIA Association®, Chartered Alternative Investment Analyst™, and Chartered Alternative Investment Analyst Association® are service marks and trademarks owned by CHARTERED ALTERNATIVE INVESTMENT ANALYST ASSOCIATION, INC., a Massachusetts non-profit corporation with its principal place of business at Amherst, Massachusetts, and are used by permission.