

CHAPTER 5

RISK AND RATES OF RETURN

(Difficulty: E = Easy, M = Medium, and T = Tough)

Multiple Choice: Conceptual

Easy:

Risk concepts

Answer: e Diff: E

1. Which of the following statements is most correct?
- a. Risk refers to the chance that some unfavorable event will occur, and a probability distribution is completely described by a listing of the likelihood of unfavorable events.
 - b. Portfolio diversification reduces the variability of returns on an individual stock.
 - c. When company-specific risk has been diversified the inherent risk that remains is market risk, which is constant for all securities in the market.
 - d. A stock with a beta of -1.0 has zero market risk.
 - e. The SML relates required returns to firms' market risk. The slope and intercept of this line cannot be controlled by the financial manager.

Risk measures

Answer: a Diff: E

2. You observe the following information regarding Company X and Company Y:
- Company X has a higher expected mean return than Company Y.
 - Company X has a lower standard deviation than Company Y.
 - Company X has a higher beta than Company Y.
- Given this information, which of the following statements is most correct?
- a. Company X has a lower coefficient of variation than Company Y.
 - b. Company X has more company-specific risk than Company Y.
 - c. Company X is a better stock to buy than Company Y.
 - d. Statements a and b are correct.
 - e. Statements a, b, and c are correct.

Market risk premium**Answer: c Diff: E**

3. Which of the following statements is most correct? (Assume that the risk-free rate remains constant.)
- a. If the market risk premium increases by 1 percentage point, then the required return on all stocks will rise by 1 percentage point.
 - b. If the market risk premium increases by 1 percentage point, then the required return will increase for stocks that have a beta greater than 1.0, but it will decrease for stocks that have a beta less than 1.0.
 - c. If the market risk premium increases by 1 percentage point, then the required return will increase by 1 percentage point for a stock that has a beta equal to 1.0.
 - d. Statements a and c are correct.
 - e. None of the statements above is correct.

Standard deviation**Answer: b Diff: E**

4. A highly risk-averse investor is considering the addition of an asset to a 10-stock portfolio. The two securities under consideration both have an expected return, \hat{k} , equal to 15 percent. However, the distribution of possible returns associated with Asset A has a standard deviation of 12 percent, while Asset B's standard deviation is 8 percent. Both assets are correlated with the market with r equal to 0.75. Which asset should the risk-averse investor add to his/her portfolio?
- a. Asset A.
 - b. Asset B.
 - c. Both A and B.
 - d. Neither A nor B.
 - e. Cannot tell without more information.

Beta coefficient**Answer: d Diff: E**

5. Stock A has a beta of 1.5 and Stock B has a beta of 0.5. Which of the following statements must be true about these securities? (Assume the market is in equilibrium.)
- a. When held in isolation, Stock A has greater risk than Stock B.
 - b. Stock B would be a more desirable addition to a portfolio than Stock A.
 - c. Stock A would be a more desirable addition to a portfolio than Stock B.
 - d. The expected return on Stock A will be greater than that on Stock B.
 - e. The expected return on Stock B will be greater than that on Stock A.

Beta coefficient**Answer: c Diff: E**

6. Stock X has a beta of 0.5 and Stock Y has a beta of 1.5. Which of the following statements is most correct?
- a. Stock Y's return this year will be higher than Stock X's return.
 - b. Stock Y's return has a higher standard deviation than Stock X.
 - c. If expected inflation increases (but the market risk premium is unchanged), the required returns on the two stocks will increase by the same amount.
 - d. If the market risk premium declines (leaving the risk-free rate unchanged), Stock X will have a larger decline in its required return than will Stock Y.
 - e. If you invest \$50,000 in Stock X and \$50,000 in Stock Y, your portfolio will have a beta less than 1.0, provided the stock returns on the two stocks are not perfectly correlated.

Required return**Answer: b Diff: E**

7. In the years ahead the market risk premium, $(k_M - k_{RF})$, is expected to fall, while the risk-free rate, k_{RF} , is expected to remain at current levels. Given this forecast, which of the following statements is most correct?
- a. The required return for all stocks will fall by the same amount.
 - b. The required return will fall for all stocks but will fall more for stocks with higher betas.
 - c. The required return will fall for all stocks but will fall less for stocks with higher betas.
 - d. The required return will increase for stocks with a beta less than 1.0 and will decrease for stocks with a beta greater than 1.0.
 - e. The required return on all stocks will remain unchanged.

Risk and return**Answer: a Diff: E N**

8. Over the past 75 years, we have observed that investments with higher average annual returns also tend to have the highest standard deviations in their annual returns. This observation supports the notion that there is a positive correlation between risk and return. Which of the following lists correctly ranks investments from having the highest returns and risk to those with the lowest returns and risk?
- a. Small-company stocks, large-company stocks, long-term corporate bonds, long-term government bonds, U.S. Treasury bills.
 - b. Small-company stocks, long-term corporate bonds, large-company stocks, long-term government bonds, U.S. Treasury bills.
 - c. Large-company stocks, small-company stocks, long-term corporate bonds, U.S. Treasury bills, long-term government bonds.
 - d. U.S. Treasury bills, long-term government bonds, long-term corporate bonds, small-company stocks, large-company stocks.
 - e. Large-company stocks, small-company stocks, long-term corporate bonds, long-term government bonds, U.S. Treasury bills.

Portfolio risk**Answer: b Diff: E**

9. Stock A and Stock B both have an expected return of 10 percent and a standard deviation of 25 percent. Stock A has a beta of 0.8 and Stock B has a beta of 1.2. The correlation coefficient, r , between the two stocks is 0.6. Portfolio P is a portfolio with 50 percent invested in Stock A and 50 percent invested in Stock B. Which of the following statements is most correct?
- a. Portfolio P has a coefficient of variation equal to 2.5.
 - b. Portfolio P has more market risk than Stock A but less market risk than Stock B.
 - c. Portfolio P has a standard deviation of 25 percent and a beta of 1.0.
 - d. All of the statements above are correct.
 - e. None of the statements above is correct.

Portfolio risk, return, and beta**Answer: e Diff: E**

10. Which of the following statements is most correct?
- a. A two-stock portfolio will always have a lower standard deviation than a one-stock portfolio.
 - b. A two-stock portfolio will always have a lower beta than a one-stock portfolio.
 - c. If portfolios are formed by randomly selecting stocks, a 10-stock portfolio will always have a lower beta than a one-stock portfolio.
 - d. All of the statements above are correct.
 - e. None of the statements above is correct.

Portfolio risk and return**Answer: a Diff: E**

11. Which of the following statements best describes what would be expected to happen as you randomly add stocks to your portfolio?
- a. Adding more stocks to your portfolio reduces the portfolio's company-specific risk.
 - b. Adding more stocks to your portfolio reduces the beta of your portfolio.
 - c. Adding more stocks to your portfolio increases the portfolio's expected return.
 - d. Statements a and c are correct.
 - e. All of the statements above are correct.

Portfolio risk and return**Answer: e Diff: E**

12. Bob has a \$50,000 stock portfolio with a beta of 1.2, an expected return of 10.8 percent, and a standard deviation of 25 percent. Becky has a \$50,000 portfolio with a beta of 0.8, an expected return of 9.2 percent, and a standard deviation of 25 percent. The correlation coefficient, r , between Bob's and Becky's portfolios is 0. Bob and Becky are engaged to be married. Which of the following best describes their combined \$100,000 portfolio?
- a. The combined portfolio's expected return is a simple average of the expected returns of the two individual portfolios (10%).
 - b. The combined portfolio's beta is a simple average of the betas of the two individual portfolios (1.0).
 - c. The combined portfolio's standard deviation is less than a simple average of the two portfolios' standard deviations (25%), even though there is no correlation between the returns of the two portfolios.
 - d. Statements a and b are correct.
 - e. All of the statements above are correct.

Portfolio risk and return**Answer: a Diff: E**

13. Your portfolio consists of \$50,000 invested in Stock X and \$50,000 invested in Stock Y. Both stocks have an expected return of 15 percent, a beta of 1.6, and a standard deviation of 30 percent. The returns of the two stocks are independent--the correlation coefficient, r , is zero. Which of the following statements best describes the characteristics of your portfolio?
- a. Your portfolio has a beta equal to 1.6 and its expected return is 15 percent.
 - b. Your portfolio has a standard deviation of 30 percent and its expected return is 15 percent.
 - c. Your portfolio has a standard deviation less than 30 percent and its beta is greater than 1.6.
 - d. Your portfolio has a standard deviation greater than 30 percent and a beta equal to 1.6.
 - e. Your portfolio has a beta greater than 1.6 and an expected return greater than 15 percent.

Portfolio risk and return**Answer: b Diff: E**

14. In general, which of the following will tend to occur if you randomly add additional stocks to your portfolio, which currently consists of only three stocks?
- a. The expected return of your portfolio will usually decline.
 - b. The company-specific risk of your portfolio will usually decline, but the market risk will tend to remain the same.
 - c. Both the company-specific risk and the market risk of your portfolio will decline.
 - d. The market risk and expected return of the portfolio will decline.
 - e. The company-specific risk will remain the same, but the market risk will tend to decline.

Portfolio risk and return**Answer: b Diff: E**

15. Stock X has a beta of 0.7 and Stock Y has a beta of 1.3. The standard deviation of each stock's returns is 20 percent. The returns are independent of each other. (In other words, the correlation coefficient, r , between Stock X and Stock Y is zero.) Portfolio P has 50 percent of its wealth invested in Stock X and the other 50 percent is invested in Stock Y. Given this information, which of the following statements is most correct?
- a. Portfolio P has a standard deviation of 20 percent.
 - b. The required return on Portfolio P is the same as the required return on the market (k_M).
 - c. The required return on Portfolio P is equal to the market risk premium ($k_M - k_{RF}$).
 - d. Statements a and b are correct.
 - e. Statements a and c are correct.

Portfolio risk and return**Answer: e Diff: E**

16. Jane has randomly selected a portfolio of 20 stocks, and Dick has randomly selected a portfolio of two stocks. Which of the following statements is most correct?
- a. The required return on Jane's portfolio must be higher than the required return on Dick's portfolio because Jane is more diversified.
 - b. If the two portfolios have the same beta, Jane's portfolio will have less market risk but the same amount of company-specific risk as Dick's portfolio.
 - c. If the two portfolios have the same beta, their required returns will be the same but Jane's portfolio will have more company-specific risk than Dick's.
 - d. All of the statements above are correct.
 - e. None of the statements above is correct.

Portfolio risk and return**Answer: d Diff: E**

17. Stock A and Stock B each have an expected return of 12 percent, a beta of 1.2, and a standard deviation of 25 percent. The returns on the two stocks have a correlation of 0.6. Portfolio P has half of its money invested in Stock A and half in Stock B. Which of the following statements is most correct?
- a. Portfolio P has an expected return of 12 percent.
 - b. Portfolio P has a standard deviation of 25 percent.
 - c. Portfolio P has a beta of 1.2.
 - d. Statements a and c are correct.
 - e. All of the statements above are correct.

Portfolio risk and return

Answer: e Diff: E

18. Stocks A, B, and C all have an expected return of 10 percent and a standard deviation of 25 percent. Stocks A and B have returns that are independent of one another. (Their correlation coefficient, r , equals zero.) Stocks A and C have returns that are negatively correlated with one another (that is, $r < 0$). Portfolio AB is a portfolio with half its money invested in Stock A and half invested in Stock B. Portfolio AC is a portfolio with half its money invested in Stock A and half invested in Stock C. Which of the following statements is most correct?
- a. Portfolio AB has an expected return of 10 percent.
 - b. Portfolio AB has a standard deviation of 25 percent.
 - c. Portfolio AC has a standard deviation that is less than 25 percent.
 - d. Statements a and b are correct.
 - e. Statements a and c are correct.

Portfolio risk and return

Answer: a Diff: E

19. Stock A and Stock B each have an expected return of 15 percent, a standard deviation of 20 percent, and a beta of 1.2. The returns of the two stocks are not perfectly correlated; the correlation coefficient is 0.6. You have put together a portfolio that consists of 50 percent Stock A and 50 percent Stock B. Which of the following statements is most correct?
- a. The portfolio's expected return is 15 percent.
 - b. The portfolio's beta is less than 1.2.
 - c. The portfolio's standard deviation is 20 percent.
 - d. Statements a and b are correct.
 - e. All of the statements above are correct.

Portfolio risk and return

Answer: d Diff: E N

20. Stock A has a beta of 0.8, Stock B has a beta of 1.0, and Stock C has a beta of 1.2. Portfolio P has equal amounts invested in each of the three stocks. Each of the stocks has a standard deviation of 25 percent. The returns of the three stocks are independent of one another (i.e., the correlation coefficients all equal zero). Which of the following statements is most correct?
- a. Portfolio P's expected return is less than the expected return of Stock C.
 - b. Portfolio P's standard deviation is less than 25 percent.
 - c. Portfolio P's realized return will always exceed the realized return of Stock A.
 - d. Statements a and b are correct.
 - e. Statements b and c are correct.

CAPM**Answer: b Diff: E**

21. The risk-free rate is 6 percent. Stock A has a beta of 1.0, while Stock B has a beta of 2.0. The market risk premium ($k_M - k_{RF}$) is positive. Which of the following statements is most correct?
- a. Stock B's required rate of return is twice that of Stock A.
 - b. If Stock A's required return is 11 percent, the market risk premium is 5 percent.
 - c. If the risk-free rate increases (but the market risk premium stays unchanged), Stock B's required return will increase by more than Stock A's.
 - d. Statements b and c are correct.
 - e. All of the statements above are correct.

CAPM and required return**Answer: c Diff: E**

22. In recent years, both expected inflation and the market risk premium ($k_M - k_{RF}$) have declined. Assume that all stocks have positive betas. Which of the following is likely to have occurred as a result of these changes?
- a. The average required return on the market, k_M , has remained constant, but the required returns have fallen for stocks that have betas greater than 1.0.
 - b. The required returns on all stocks have fallen by the same amount.
 - c. The required returns on all stocks have fallen, but the decline has been greater for stocks with higher betas.
 - d. The required returns on all stocks have fallen, but the decline has been greater for stocks with lower betas.
 - e. The required returns have increased for stocks with betas greater than 1.0 but have declined for stocks with betas less than 1.0.

CAPM and required return**Answer: c Diff: E N**

23. Assume that the risk-free rate is 5 percent. Which of the following statements is most correct?
- a. If a stock's beta doubles, the stock's required return will also double.
 - b. If a stock's beta is less than 1.0, the stock's required return is less than 5 percent.
 - c. If a stock has a negative beta, the stock's required return is less than 5 percent.
 - d. All of the statements above are correct.
 - e. None of the statements above is correct.

CAPM and required return**Answer: e Diff: E N**

24. Stock X has a beta of 1.5 and Stock Y has a beta of 0.5. The market is in equilibrium (that is, required returns equal expected returns). Which of the following statements is most correct?
- a. Since the market is in equilibrium, the required returns of the two stocks should be the same.
 - b. If both expected inflation and the market risk premium ($k_M - k_{RF}$) increase, the required returns of both stocks will increase by the same amount.
 - c. If expected inflation remains constant but the market risk premium ($k_M - k_{RF}$) declines, the required return of Stock X will decline but the required return of Stock Y will increase.
 - d. All of the statements above are correct.
 - e. None of the statements above is correct.

CAPM and required return**Answer: b Diff: E N**

25. Stock A has a beta of 0.8, Stock B has a beta of 1.0, and Stock C has a beta of 1.2. Portfolio P has equal amounts invested in each of the three stocks. Each of the stocks has a standard deviation of 25 percent. The returns of the three stocks are independent of one another (i.e., the correlation coefficients all equal zero). Assume that there is an increase in the market risk premium, but that the risk-free rate remains unchanged. Which of the following statements is most correct?
- a. The required return of all three stocks will increase by the amount of the increase in the market risk premium.
 - b. The required return on Stock A will increase by less than the increase in the market risk premium, while the required return on Stock C will increase by more than the increase in the market risk premium.
 - c. The required return of all stocks will remain unchanged since there was no change in their betas.
 - d. The required return of the average stock will remain unchanged, but the returns of riskier stocks (such as Stock C) will decrease while the returns of safer stocks (such as Stock A) will increase.
 - e. The required return of the average stock will remain unchanged, but the returns of riskier stocks (such as Stock C) will increase while the returns of safer stocks (such as Stock A) will decrease.

CAPM, beta, and required return**Answer: c Diff: E**

26. Currently, the risk-free rate is 6 percent and the market risk premium is 5 percent. On the basis of this information, which of the following statements is most correct?
- a. If a stock has a negative beta, its required return must also be negative.
 - b. If a stock's beta doubles, its required return must also double.
 - c. An index fund with beta = 1.0 has a required return of 11 percent.
 - d. Statements a and c are correct.
 - e. Statements b and c are correct.

SML

Answer: a Diff: E

27. Which of the following statements is incorrect?

- a. The slope of the security market line is measured by beta.
- b. Two securities with the same stand-alone risk can have different betas.
- c. Company-specific risk can be diversified away.
- d. The market risk premium is affected by attitudes about risk.
- e. Higher beta stocks have a higher required return.

SML

Answer: b Diff: E

28. Which of the following statements is most correct?

- a. The slope of the security market line is beta.
- b. The slope of the security market line is the market risk premium, $(k_M - k_{RF})$.
- c. If you double a company's beta its required return more than doubles.
- d. Statements a and c are correct.
- e. Statements b and c are correct.

SML

Answer: c Diff: E

29. Stock A has a beta of 1.2 and a standard deviation of 20 percent. Stock B has a beta of 0.8 and a standard deviation of 25 percent. Portfolio P is a \$200,000 portfolio consisting of \$100,000 invested in Stock A and \$100,000 invested in Stock B. Which of the following statements is most correct? (Assume that the required return is determined by the Security Market Line.)

- a. Stock B has a higher required rate of return than Stock A.
- b. Portfolio P has a standard deviation of 22.5 percent.
- c. Portfolio P has a beta equal to 1.0.
- d. Statements a and b are correct.
- e. Statements a and c are correct.

SML

Answer: e Diff: E

30. Nile Foods' stock has a beta of 1.4 and Elbe Eateries' stock has a beta of 0.7. Assume that the risk-free rate, k_{RF} , is 5.5 percent and the market risk premium, $(k_M - k_{RF})$, equals 4 percent. Which of the following statements is most correct?

- a. Since Nile's beta is twice that of Elbe's, its required rate of return will also be twice that of Elbe's.
- b. If the risk-free rate increases but the market risk premium remains unchanged, the required return will increase for both stocks but the increase will be larger for Nile since it has a higher beta.
- c. If the market risk premium increases but the risk-free rate remains unchanged, Nile's required return will increase (since it has a beta greater than 1.0) but Elbe's will decline (since it has a beta less than 1.0).
- d. All of the statements above are correct.
- e. None of the statements above is correct.

SML

Answer: c Diff: E

31. Stock X has a beta of 0.6, while Stock Y has a beta of 1.4. Which of the following statements is most correct?
- a. Stock Y must have a higher expected return and a higher standard deviation than Stock X.
 - b. A portfolio consisting of \$50,000 invested in Stock X and \$50,000 invested in Stock Y will have a required return that exceeds that of the overall market.
 - c. If the market risk premium decreases (but expected inflation is unchanged), the required return on both stocks will decrease but the decrease will be greater for Stock Y.
 - d. If expected inflation increases (but the market risk premium is unchanged), the required return on both stocks will decrease by the same amount.
 - e. If expected inflation decreases (but the market risk premium is unchanged), the required return on both stocks will decrease but the decrease will be greater for Stock Y.

SML

Answer: b Diff: E

32. Stock A has a beta of 0.8 and Stock B has a beta of 1.2. 50 percent of Portfolio P is invested in Stock A and 50 percent is invested in Stock B. If the market risk premium ($k_M - k_{RF}$) were to increase but the risk-free rate (k_{RF}) remained constant, which of the following would occur?
- a. The required return will decrease by the same amount for both Stock A and Stock B.
 - b. The required return will increase for both stocks but the increase will be greater for Stock B than for Stock A.
 - c. The required return will increase for Stock A but will decrease for Stock B.
 - d. The required return will increase for Stock B but will decrease for Stock A.
 - e. The required return on Portfolio P will remain unchanged.

SML

Answer: e Diff: E

33. Stock A has a beta of 0.7, whereas Stock B has a beta of 1.3. Portfolio P has 50 percent invested in both Stocks A and B. Which of the following would occur if the market risk premium increased by 1 percentage point? (Assume that the risk-free rate remains constant.)
- a. The required return for Stock A would fall but the required return for Stock B would increase.
 - b. The required return for Portfolio P would remain unchanged.
 - c. The required return for both stocks would increase by 1 percentage point.
 - d. The required return for Stock A would increase by more than 1 percentage point, while the return for Stock B would increase by less than 1 percentage point.
 - e. The required return for Portfolio P would increase by 1 percentage point.

SML**Answer: b Diff: E N**

34. Assume that the risk-free rate remains constant, but that the market risk premium declines. Which of the following is likely to occur?
- a. The required return on a stock with a beta = 1.0 will remain the same.
 - b. The required return on a stock with a beta < 1.0 will decline.
 - c. The required return on a stock with a beta > 1.0 will increase.
 - d. Statements b and c are correct.
 - e. All of the statements above are correct.

SML, CAPM, and beta**Answer: e Diff: E**

35. Which of the following statements is most correct?
- a. The slope of the security market line is beta.
 - b. A stock with a negative beta must have a negative required rate of return.
 - c. If a stock's beta doubles its required rate of return must double.
 - d. If a stock has a beta equal to 1.0, its required rate of return will be unaffected by changes in the market risk premium.
 - e. None of the statements above is correct.

Risk analysis and portfolio diversification**Answer: d Diff: E**

36. Which of the following statements is most correct?
- a. Portfolio diversification reduces the variability of the returns on the individual stocks held in the portfolio.
 - b. If an investor buys enough stocks, he or she can, through diversification, eliminate virtually all of the nonmarket (or company-specific) risk inherent in owning stocks. Indeed, if the portfolio contained all publicly traded stocks, it would be riskless.
 - c. The required return on a firm's common stock is determined by its systematic (or market) risk. If the systematic risk is known, and if that risk is expected to remain constant, then no other information is required to specify the firm's required return.
 - d. A security's beta measures its nondiversifiable (systematic, or market) risk relative to that of an average stock.
 - e. A stock's beta is less relevant as a measure of risk to an investor with a well-diversified portfolio than to an investor who holds only that one stock.

Miscellaneous risk concepts**Answer: c Diff: E N**

37. Consider the following information for three stocks, Stock A, Stock B, and Stock C. The returns on each of the three stocks are positively correlated, but they are not perfectly correlated. (That is, all of the correlation coefficients are between 0 and 1.)

<u>Stock</u>	<u>Expected Return</u>	<u>Standard Deviation</u>	<u>Beta</u>
Stock A	10%	20%	1.0
Stock B	10	20	1.0
Stock C	12	20	1.4

Portfolio P has half of its funds invested in Stock A and half invested in Stock B. Portfolio Q has one third of its funds invested in each of the three stocks. The risk-free rate is 5 percent, and the market is in equilibrium. (That is, required returns equal expected returns.) Which of the following statements is most correct?

- a. Portfolio P has a standard deviation of 20 percent.
- b. Portfolio P's coefficient of variation is greater than 2.0.
- c. Portfolio Q's expected return is 10.67 percent.
- d. Portfolio Q has a standard deviation of 20 percent.
- e. Portfolio P's required return is greater than the required return on Stock A.

Medium:**Risk aversion****Answer: b Diff: M**

38. You have developed the following data on three stocks:

<u>Stock</u>	<u>Standard Deviation</u>	<u>Beta</u>
A	0.15	0.79
B	0.25	0.61
C	0.20	1.29

If you are a risk minimizer, you should choose Stock ____ if it is to be held in isolation and Stock ____ if it is to be held as part of a well-diversified portfolio.

- a. A; A
- b. A; B
- c. B; A
- d. C; A
- e. C; B

SML and risk aversion**Answer: e Diff: M**

39. Assume that investors become increasingly risk averse, so that the market risk premium increases. Also, assume that the risk-free rate and expected inflation remain the same. Which of the following is most likely to occur?
- a. The required rate of return will decline for stocks that have betas less than 1.0.
 - b. The required rate of return on the market, k_M , will remain the same.
 - c. The required rate of return for each stock in the market will increase by an amount equal to the increase in the market risk premium.
 - d. Statements a and b are correct.
 - e. None of the statements above is correct.

Portfolio risk and return**Answer: c Diff: M**

40. In a portfolio of three different stocks, which of the following could not be true?
- a. The riskiness of the portfolio is less than the riskiness of each of the stocks if each were held in isolation.
 - b. The riskiness of the portfolio is greater than the riskiness of one or two of the stocks.
 - c. The beta of the portfolio is less than the beta of each of the individual stocks.
 - d. The beta of the portfolio is greater than the beta of one or two of the individual stocks' betas.
 - e. None of the above (that is, they all could be true, but not necessarily at the same time).

Portfolio risk and return**Answer: d Diff: M N**

41. Stock A has an expected return of 10 percent and a standard deviation of 20 percent. Stock B has an expected return of 12 percent and a standard deviation of 30 percent. The risk-free rate is 5 percent and the market risk premium, $k_M - k_{RF}$, is 6 percent. Assume that the market is in equilibrium. Portfolio P has 50 percent invested in Stock A and 50 percent invested in Stock B. The returns of Stock A and Stock B are independent of one another. (That is, their correlation coefficient equals zero.) Which of the following statements is most correct?
- a. Portfolio P's expected return is 11 percent.
 - b. Portfolio P's standard deviation is less than 25 percent.
 - c. Stock B's beta is 1.25.
 - d. Statements a and b are correct.
 - e. All of the statements above are correct.

Portfolio risk and return**Answer: d Diff: M N**

42. Stock A has a beta of 1.2 and a standard deviation of 25 percent. Stock B has a beta of 1.4 and a standard deviation of 20 percent. Portfolio P was created by investing in a combination of Stocks A and B. Portfolio P has a beta of 1.25 and a standard deviation of 18 percent. Which of the following statements is most correct?
- a. Portfolio P has the same amount of money invested in each of the two stocks.
 - b. The returns of the two stocks are perfectly positively correlated ($r = 1.0$).
 - c. Stock A has more market risk than Stock B but less stand-alone risk.
 - d. Portfolio P's required return is greater than Stock A's required return.
 - e. Stock A has more market risk than Portfolio P.

Portfolio risk**Answer: e Diff: M**

43. Which of the following statements is most correct?
- a. Market participants are able to eliminate virtually all market risk if they hold a large diversified portfolio of stocks.
 - b. Market participants are able to eliminate virtually all company-specific risk if they hold a large diversified portfolio of stocks.
 - c. It is possible to have a situation where the market risk of a single stock is less than that of a well diversified portfolio.
 - d. Statements a and c are correct.
 - e. Statements b and c are correct.

Portfolio risk and beta**Answer: c Diff: M**

44. Stock A has a beta = 0.8, while Stock B has a beta = 1.6. Which of the following statements is most correct?
- a. Stock B's required return is double that of Stock A's.
 - b. An equally weighted portfolio of Stock A and Stock B will have a beta less than 1.2.
 - c. If market participants become more risk averse, the required return on Stock B will increase more than the required return for Stock A.
 - d. All of the statements above are correct.
 - e. Statements a and c are correct.

Portfolio risk and beta**Answer: e Diff: M**

45. Which of the following statements is most correct?

- a. If you add enough randomly selected stocks to a portfolio, you can completely eliminate all the market risk from the portfolio.
- b. If you formed a portfolio that included a large number of low-beta stocks (stocks with betas less than 1.0 but greater than -1.0), the portfolio would itself have a beta coefficient that is equal to the weighted average beta of the stocks in the portfolio, so the portfolio would have a relatively low degree of risk.
- c. If you were restricted to investing in publicly traded common stocks, yet you wanted to minimize the riskiness of your portfolio as measured by its beta, then according to the CAPM theory you should invest some of your money in each stock in the market. That is, if there were 10,000 traded stocks in the world, the least risky portfolio would include some shares in each of them.
- d. Diversifiable risk can be eliminated by forming a large portfolio, but normally even highly-diversified portfolios are subject to market risk.
- e. Statements b and d are correct.

Market risk**Answer: b Diff: M**

46. Inflation, recession, and high interest rates are economic events that are characterized as

- a. Company-specific risk that can be diversified away.
- b. Market risk.
- c. Systematic risk that can be diversified away.
- d. Diversifiable risk.
- e. Unsystematic risk that can be diversified away.

Beta coefficient**Answer: a Diff: M**

47. Which of the following statements is most correct?

- a. The beta coefficient of a stock is normally found by running a regression of past returns on the stock against past returns on a stock market index. One could also construct a scatter diagram of returns on the stock versus those on the market, estimate the slope of the line of best fit, and use it as beta.
- b. It is theoretically possible for a stock to have a beta of 1.0. If a stock did have a beta of 1.0, then, at least in theory, its required rate of return would be equal to the risk-free (default-free) rate of return, k_{RF} .
- c. If you found a stock with a zero beta and held it as the only stock in your portfolio, you would by definition have a riskless portfolio. Your 1-stock portfolio would be even less risky if the stock had a negative beta.
- d. The beta of a portfolio of stocks is always larger than the betas of any of the individual stocks.
- e. All of the statements above are correct.

Beta coefficient**Answer: d Diff: M**

48. You have developed data that give (1) the average annual returns on the market for the past five years, and (2) similar information on Stocks A and B. If these data are as follows, which of the possible answers best describes the historical betas for A and B?

<u>Years</u>	<u>Market</u>	<u>Stock A</u>	<u>Stock B</u>
1	0.03	0.16	0.05
2	-0.05	0.20	0.05
3	0.01	0.18	0.05
4	-0.10	0.25	0.05
5	0.06	0.14	0.05

- a. $b_A > 0$; $b_B = 1$
- b. $b_A > +1$; $b_B = 0$
- c. $b_A = 0$; $b_B = -1$
- d. $b_A < 0$; $b_B = 0$
- e. $b_A < -1$; $b_B = 1$

Beta coefficient**Answer: a Diff: M**

49. Which of the following statements is most correct?
- a. Suppose the returns on two stocks are negatively correlated. One has a beta of 1.2 as determined in a regression analysis, while the other has a beta of -0.6. The returns on the stock with the negative beta will be negatively correlated with returns on most other stocks in the market.
 - b. Suppose you are managing a stock portfolio, and you have information that leads you to believe the stock market is likely to be very strong in the immediate future. That is, you are confident the market is about to rise sharply. You should sell your high-beta stocks and buy low-beta stocks in order to take advantage of the expected market move.
 - c. Collections Inc. is in the business of collecting past-due accounts for other companies; that is, it is a collection agency. Collections' revenues, profits, and stock price tend to rise during recessions. This suggests that Collections Inc.'s beta should be quite high, say 2.0, because it does so much better than most other companies when the economy is weak.
 - d. Statements a and b are correct.
 - e. Statements a and c are correct.

Beta coefficient**Answer: c Diff: M**

50. Which of the following is not a difficulty concerning beta and its estimation?
- a. Sometimes a security or project does not have a past history that can be used as a basis for calculating beta.
 - b. Sometimes, during a period when the company is undergoing a change such as toward more leverage or riskier assets, the calculated beta will be drastically different than the "true" or "expected future" beta.
 - c. The beta of an "average stock," or "the market," can change over time, sometimes drastically.
 - d. Sometimes the past data used to calculate beta do not reflect the likely risk of the firm for the future because conditions have changed.

Beta coefficient**Answer: d Diff: M N**

51. Certain firms and industries are characterized by consistently low or high betas, depending on the particular situation. On the basis of that notion, which of the following companies seems out of place with its stated beta? (That is, one of the following companies definitely could not have the indicated beta, while the other companies seem well matched with their stated betas.)
- a. Sun Microsystems, Beta = 1.59.
 - b. Amazon.com, Beta = 1.70.
 - c. Ford Motor Company, Beta = 0.92.
 - d. Florida Power & Light, Beta = 1.52.
 - e. Wal-Mart, Beta = 1.15.

SML**Answer: e Diff: M**

52. Which of the following statements is most correct?
- a. The SML relates required returns to firms' market risk. The slope and intercept of this line cannot be controlled by the financial manager.
 - b. The slope of the SML is determined by the value of beta.
 - c. If you plotted the returns of a given stock against those of the market, and you found that the slope of the regression line was negative, the CAPM would indicate that the required rate of return on the stock should be less than the risk-free rate for a well-diversified investor, assuming that the observed relationship is expected to continue on into the future.
 - d. If investors become less risk averse, the slope of the Security Market Line will increase.
 - e. Statements a and c are correct.

SML

Answer: a Diff: M

53. Other things held constant, (1) if the expected inflation rate decreases, and (2) investors become more risk averse, the Security Market Line would shift
- a. Down and have a steeper slope.
 - b. Up and have a less steep slope.
 - c. Up and keep the same slope.
 - d. Down and keep the same slope.
 - e. Down and have a less steep slope.

SML

Answer: b Diff: M

54. Which of the following statements is most correct about a stock that has a $\beta = 1.2$?
- a. If the stock's β doubles its expected return will double.
 - b. If expected inflation increases 3 percent, the stock's expected return will increase by 3 percent.
 - c. If the market risk premium increases by 3 percent the stock's expected return will increase by less than 3 percent.
 - d. All of the statements above are correct.
 - e. Statements b and c are correct.

SML

Answer: b Diff: M N

55. Assume that the risk-free rate, k_{RF} , increases but the market risk premium, $(k_M - k_{RF})$ declines. The net effect is that the overall expected return on the market, k_M , remains constant. Which of the following statements is most correct?
- a. The required return will decline for stocks that have a β less than 1.0 but will increase for stocks that have a β greater than 1.0.
 - b. The required return will increase for stocks that have a β less than 1.0 but will decline for stocks that have a β greater than 1.0.
 - c. The required return of all stocks will fall by the amount of the decline in the market risk premium.
 - d. The required return of all stocks will increase by the amount of the increase in the risk-free rate.
 - e. Since the overall return on the market stays constant, the required return on all stocks will remain the same.

SML, CAPM, and portfolio risk**Answer: a Diff: M**

56. Which of the following statements is most correct?

- a. An increase in expected inflation could be expected to increase the required return on a riskless asset and on an average stock by the same amount, other things held constant.
- b. A graph of the SML would show required rates of return on the vertical axis and standard deviations of returns on the horizontal axis.
- c. If two "normal" or "typical" stocks were combined to form a 2-stock portfolio, the portfolio's expected return would be a weighted average of the stocks' expected returns, but the portfolio's standard deviation would probably be greater than the average of the stocks' standard deviations.
- d. If investors became more risk averse, then (1) the slope of the SML would increase and (2) the required rate of return on low-beta stocks would increase by more than the required return on high-beta stocks.
- e. The CAPM has been thoroughly tested, and the theory has been confirmed beyond any reasonable doubt.

Portfolio return, CAPM, and beta**Answer: e Diff: M**

57. Which of the following statements is most correct?

- a. If the returns from two stocks are perfectly positively correlated (that is, the correlation coefficient is +1) and the two stocks have equal variance, an equally weighted portfolio of the two stocks will have a variance that is less than that of the individual stocks.
- b. If a stock has a negative beta, its expected return must be negative.
- c. According to the CAPM, stocks with higher standard deviations of returns will have higher expected returns.
- d. A portfolio with a large number of randomly selected stocks will have less market risk than a single stock that has a beta equal to 0.5.
- e. None of the statements above is correct.

CAPM and required return**Answer: d Diff: M**

58. Which of the following statements is most correct?

- a. We would observe a downward shift in the required returns of all stocks if investors believed that there would be deflation in the economy.
- b. If investors became more risk averse, then the new security market line would have a steeper slope.
- c. If the beta of a company doubles, then the required rate of return will also double.
- d. Statements a and b are correct.
- e. All of the statements above are correct.

Risk analysis and portfolio diversification**Answer: e Diff: M**

59. Which of the following statements is most correct?

- a. If you add enough randomly selected stocks to a portfolio, you can completely eliminate all the market risk from the portfolio.
- b. If you form a large portfolio of stocks each with a beta greater than 1.0, this portfolio will have more market risk than a single stock with a beta = 0.8.
- c. Company-specific (or unsystematic) risk can be reduced by forming a large portfolio, but normally even highly-diversified portfolios are subject to market (or systematic) risk.
- d. All of the statements above are correct.
- e. Statements b and c are correct.

Portfolio diversification**Answer: c Diff: M**

60. Jane holds a large diversified portfolio of 100 randomly selected stocks and the portfolio's beta = 1.2. Each of the individual stocks in her portfolio has a standard deviation of 20 percent. Jack has the same amount of money invested in a single stock with a beta equal to 1.6 and a standard deviation of 20 percent. Which of the following statements is most correct?

- a. Jane's portfolio has a larger amount of company-specific risk since she is holding more stocks in her portfolio.
- b. Jane has a higher required rate of return, since she is more diversified.
- c. Jane's portfolio has less market risk since it has a lower beta.
- d. Statements b and c are correct.
- e. None of the statements above is correct.

Portfolio risk and SML**Answer: e Diff: M**

61. Which of the following statements is most correct?

- a. It is possible to have a situation in which the market risk of a single stock is less than the market risk of a portfolio of stocks.
- b. The market risk premium will increase if, on average, market participants become more risk averse.
- c. If you selected a group of stocks whose returns are perfectly positively correlated, then you could end up with a portfolio for which none of the unsystematic risk is diversified away.
- d. Statements a and b are correct.
- e. All of the statements above are correct.

Tough:

CAPM

Answer: c Diff: T

62. Which of the following statements is most correct?

- a. According to CAPM theory, the required rate of return on a given stock can be found by use of the SML equation:

$$k_i = k_{RF} + (k_M - k_{RF})b_i.$$

Expectations for inflation are not reflected anywhere in this equation, even indirectly, and because of that the text notes that the CAPM may not be strictly correct.

- b. If the required rate of return is given by the SML equation as set forth in Statement a, there is nothing a financial manager can do to change his or her company's cost of capital, because each of the elements in the equation is determined exclusively by the market, not by the type of actions a company's management can take, even in the long run.
- c. Assume that the required rate of return on the market is currently $k_M = 15\%$, and that k_M remains fixed at that level. If the yield curve has a steep upward slope, the calculated market risk premium would be larger if the 30-day T-bill rate were used as the risk-free rate than if the 30-year T-bond rate were used as k_{RF} .
- d. Statements a and b are correct.
- e. Statements a and c are correct.

SML

Answer: d Diff: T

63. Which of the following statements is most correct?

- a. If investors become more risk averse but k_{RF} remains constant, the required rate of return on high-beta stocks will rise, the required return on low-beta stocks will decline, but the required return on an average-risk stock will not change.
- b. If Mutual Fund A held equal amounts of 100 stocks, each of which had a beta of 1.0, and Mutual Fund B held equal amounts of 10 stocks with betas of 1.0, then the two mutual funds would both have betas of 1.0. Thus, they would be equally risky from an investor's standpoint.
- c. An investor who holds just one stock will be exposed to more risk than an investor who holds a portfolio of stocks, assuming the stocks are all equally risky. Since the holder of the 1-stock portfolio is exposed to more risk, he or she can expect to earn a higher rate of return to compensate for the greater risk.
- d. Assume that the required rate of return on the market, k_M , is given and fixed. If the yield curve were upward-sloping, then the Security Market Line (SML) would have a steeper slope if 1-year Treasury securities were used as the risk-free rate than if 30-year Treasury bonds were used for k_{RF} .
- e. None of the statements above is correct.

Multiple Choice: Problems

Easy:

Required return

Answer: d Diff: E N

64. The risk-free rate of interest, k_{RF} , is 6 percent. The overall stock market has an expected return of 12 percent. Hazlett, Inc. has a beta of 1.2. What is the required return of Hazlett, Inc. stock?

- a. 12.0%
- b. 12.2%
- c. 12.8%
- d. 13.2%
- e. 13.5%

Required return

Answer: b Diff: E N

65. The risk-free rate is 5 percent. Stock A has a beta = 1.0 and Stock B has a beta = 1.4. Stock A has a required return of 11 percent. What is Stock B's required return?

- a. 12.4%
- b. 13.4%
- c. 14.4%
- d. 15.4%
- e. 16.4%

CAPM and required return

Answer: d Diff: E

66. Calculate the required rate of return for Mercury Inc., assuming that investors expect a 5 percent rate of inflation in the future. The real risk-free rate is equal to 3 percent and the market risk premium is 5 percent. Mercury has a beta of 2.0, and its realized rate of return has averaged 15 percent over the last 5 years.

- a. 15%
- b. 16%
- c. 17%
- d. 18%
- e. 20%

CAPM and market risk premium**Answer: c Diff: E N**

67. Consider the following information for three stocks, Stock A, Stock B, and Stock C. The returns on each of the three stocks are positively correlated, but they are not perfectly correlated. (That is, all of the correlation coefficients are between 0 and 1.)

<u>Stock</u>	<u>Expected Return</u>	<u>Standard Deviation</u>	<u>Beta</u>
Stock A	10%	20%	1.0
Stock B	10	20	1.0
Stock C	12	20	1.4

Portfolio P has half of its funds invested in Stock A and half invested in Stock B. Portfolio Q has one third of its funds invested in each of the three stocks. The risk-free rate is 5 percent, and the market is in equilibrium. (That is, required returns equal expected returns.) What is the market risk premium ($k_M - k_{RF}$)?

- a. 4.0%
- b. 4.5%
- c. 5.0%
- d. 5.5%
- e. 6.0%

Market risk premium**Answer: d Diff: E**

68. A stock has an expected return of 12.25 percent. The beta of the stock is 1.15 and the risk-free rate is 5 percent. What is the market risk premium?

- a. 1.30%
- b. 6.50%
- c. 15.00%
- d. 6.30%
- e. 7.25%

Beta coefficient**Answer: b Diff: E**

69. Given the following information, determine which beta coefficient for Stock A is consistent with equilibrium:

$$\hat{k}_A = 11.3\%; k_{RF} = 5\%; k_M = 10\%$$

- a. 0.86
- b. 1.26
- c. 1.10
- d. 0.80
- e. 1.35

Beta coefficient**Answer: a Diff: E**

70. Assume that the risk-free rate is 5 percent and that the market risk premium is 7 percent. If a stock has a required rate of return of 13.75 percent, what is its beta?
- a. 1.25
 - b. 1.35
 - c. 1.37
 - d. 1.60
 - e. 1.96

Portfolio beta**Answer: b Diff: E**

71. You hold a diversified portfolio consisting of a \$10,000 investment in each of 20 different common stocks (that is, your total investment is \$200,000). The portfolio beta is equal to 1.2. You have decided to sell one of your stocks that has a beta equal to 0.7 for \$10,000. You plan to use the proceeds to purchase another stock that has a beta equal to 1.4. What will be the beta of the new portfolio?
- a. 1.165
 - b. 1.235
 - c. 1.250
 - d. 1.284
 - e. 1.333

Portfolio return**Answer: a Diff: E**

72. An investor is forming a portfolio by investing \$50,000 in stock A that has a beta of 1.50, and \$25,000 in stock B that has a beta of 0.90. The return on the market is equal to 6 percent and Treasury bonds have a yield of 4 percent. What is the required rate of return on the investor's portfolio?
- a. 6.6%
 - b. 6.8%
 - c. 5.8%
 - d. 7.0%
 - e. 7.5%

Portfolio return**Answer: b Diff: E**

73. You are an investor in common stocks, and you currently hold a well-diversified portfolio that has an expected return of 12 percent, a beta of 1.2, and a total value of \$9,000. You plan to increase your portfolio by buying 100 shares of AT&E at \$10 a share. AT&E has an expected return of 20 percent with a beta of 2.0. What will be the expected return and the beta of your portfolio after you purchase the new stock?
- a. $\hat{k}_p = 20.0\%$; $b_p = 2.00$
 - b. $\hat{k}_p = 12.8\%$; $b_p = 1.28$
 - c. $\hat{k}_p = 12.0\%$; $b_p = 1.20$
 - d. $\hat{k}_p = 13.2\%$; $b_p = 1.40$
 - e. $\hat{k}_p = 14.0\%$; $b_p = 1.32$

Portfolio risk and return**Answer: a Diff: E N**

74. Stock A has an expected return of 12 percent, a beta of 1.2, and a standard deviation of 20 percent. Stock B has an expected return of 10 percent, a beta of 1.2, and a standard deviation of 15 percent. Portfolio P has \$900,000 invested in Stock A and \$300,000 invested in Stock B. The correlation between Stock A's returns and Stock B's returns is zero (that is, $r = 0$). Which of the following statements is most correct?
- a. Portfolio P's expected return is 11.5 percent.
 - b. Portfolio P's standard deviation is 18.75 percent.
 - c. Portfolio P's beta is less than 1.2.
 - d. Statements a and b are correct.
 - e. Statements a and c are correct.

Coefficient of variation**Answer: b Diff: E**

75. Below are the stock returns for the past five years for Agnew Industries:

<u>Year</u>	<u>Stock Return</u>
2002	22%
2001	33
2000	1
1999	-12
1998	10

What was the stock's coefficient of variation during this 5-year period? (Use the population standard deviation to calculate the coefficient of variation.)

- a. 10.80
- b. 1.46
- c. 15.72
- d. 0.69
- e. 4.22

Medium:

Expected return

Answer: e Diff: M

76. Assume a new law is passed that restricts investors to holding only one asset. A risk-averse investor is considering two possible assets as the asset to be held in isolation. The assets' possible returns and related probabilities (that is, the probability distributions) are as follows:

Asset X		Asset Y	
P	k	P	k
0.10	-3%	0.05	-3%
0.10	2	0.10	2
0.25	5	0.30	5
0.25	8	0.30	8
0.30	10	0.25	10

Which asset should be preferred?

- a. Asset X, since its expected return is higher.
- b. Asset Y, since its beta is probably lower.
- c. Either one, since the expected returns are the same.
- d. Asset X, since its standard deviation is lower.
- e. Asset Y, since its coefficient of variation is lower and its expected return is higher.

Expected return

Answer: c Diff: M

77. Given the following probability distribution, what are the expected return and the standard deviation of returns for Security J?

State	P_i	k_J
1	0.2	10%
2	0.6	15
3	0.2	20

- a. 15%; 6.50%
- b. 12%; 5.18%
- c. 15%; 3.16%
- d. 15%; 10.00%
- e. 20%; 5.00%

Required return

Answer: c Diff: M

78. You are holding a stock that has a beta of 2.0 and is currently in equilibrium. The required return on the stock is 15 percent, and the return on an average stock is 10 percent. What would be the percentage change in the return on the stock, if the return on an average stock increased by 30 percent while the risk-free rate remained unchanged?

- a. +20%
- b. +30%
- c. +40%
- d. +50%
- e. +60%

Required return**Answer: c Diff: M**

79. Oakdale Furniture Inc. has a beta coefficient of 0.7 and a required rate of return of 15 percent. The market risk premium is currently 5 percent. If the inflation premium increases by 2 percentage points, and Oakdale acquires new assets that increase its beta by 50 percent, what will be Oakdale's new required rate of return?
- a. 13.50%
 - b. 22.80%
 - c. 18.75%
 - d. 15.25%
 - e. 17.00%

Required return**Answer: e Diff: M**

80. Partridge Plastic's stock has an estimated beta of 1.4, and its required rate of return is 13 percent. Cleaver Motors' stock has a beta of 0.8, and the risk-free rate is 6 percent. What is the required rate of return on Cleaver Motors' stock?
- a. 7.0%
 - b. 10.4%
 - c. 12.0%
 - d. 11.0%
 - e. 10.0%

Expected and required returns**Answer: c Diff: M**

81. The realized returns for the market and Stock J for the last four years are given below:

<u>Year</u>	<u>Market</u>	<u>Stock J</u>
1	10%	5%
2	15	0
3	-5	14
4	0	10

An average stock has an expected return of 12 percent and the market risk premium is 4 percent. If Stock J's expected rate of return as viewed by a marginal investor is 8 percent, what is the difference between J's expected and required rates of return?

- a. 0.66%
- b. 1.25%
- c. 2.64%
- d. 3.72%
- e. 5.36%

Expected and required returns**Answer: b Diff: M**

82. You have been scouring *The Wall Street Journal* looking for stocks that are "good values" and have calculated expected returns for five stocks. Assume the risk-free rate (k_{RF}) is 7 percent and the market risk premium ($k_M - k_{RF}$) is 2 percent. Which security would be the best investment? (Assume you must choose just one.)

<u>Expected Return</u>	<u>Beta</u>
a. 9.01%	1.70
b. 7.06%	0.00
c. 5.04%	-0.67
d. 8.74%	0.87
e. 11.50%	2.50

CAPM and required return**Answer: e Diff: M**

83. HR Corporation has a beta of 2.0, while LR Corporation's beta is 0.5. The risk-free rate is 10 percent, and the required rate of return on an average stock is 15 percent. Now the expected rate of inflation built into k_{RF} falls by 3 percentage points, the real risk-free rate remains constant, the required return on the market falls to 11 percent, and the betas remain constant. When all of these changes are made, what will be the difference in the required returns on HR's and LR's stocks?

- a. 1.0%
- b. 2.5%
- c. 4.5%
- d. 5.4%
- e. 6.0%

CAPM and required return**Answer: a Diff: M N**

84. Bradley Hotels has a beta of 1.3, while Douglas Farms has a beta of 0.7. The required return on an index fund that holds the entire stock market is 12 percent. The risk-free rate of interest is 7 percent. By how much does Bradley's required return exceed Douglas' required return?

- a. 3.0%
- b. 6.5%
- c. 5.0%
- d. 6.0%
- e. 7.0%

CAPM and required return**Answer: d Diff: M**

85. Company X has a beta of 1.6, while Company Y's beta is 0.7. The risk-free rate is 7 percent, and the required rate of return on an average stock is 12 percent. Now the expected rate of inflation built into k_{RF} rises by 1 percentage point, the real risk-free rate remains constant, the required return on the market rises to 14 percent, and betas remain constant. After all of these changes have been reflected in the data, by how much will the required return on Stock X exceed that on Stock Y?

- a. 3.75%
- b. 4.20%
- c. 4.82%
- d. 5.40%
- e. 5.75%

CAPM and required return**Answer: e Diff: M**

86. Historical rates of return for the market and for Stock A are given below:

<u>Year</u>	<u>Market</u>	<u>Stock A</u>
1	6.0%	8.0%
2	-8.0	3.0
3	-8.0	-2.0
4	18.0	12.0

If the required return on the market is 11 percent and the risk-free rate is 6 percent, what is the required return on Stock A, according to CAPM/SML theory?

- a. 6.00%
- b. 6.57%
- c. 7.25%
- d. 7.79%
- e. 8.27%

CAPM and required return**Answer: a Diff: M**

87. Some returns data for the market and for Countercyclical Corp. are given below:

<u>Year</u>	<u>Market</u>	<u>Countercyclical</u>
1999	-2.0%	8.0%
2000	12.0	3.0
2001	-8.0	18.0
2002	21.0	-7.0

The required return on the market is 14 percent and the risk-free rate is 8 percent. What is the required return on Countercyclical Corp. according to CAPM/SML theory?

- a. 3.42%
- b. 4.58%
- c. 8.00%
- d. 11.76%
- e. 14.00%

Portfolio return**Answer: c Diff: M**

88. Stock X, Stock Y, and the market have had the following returns over the past four years.

<u>Year</u>	<u>Market</u>	<u>X</u>	<u>Y</u>
1999	11%	10%	12%
2000	7	4	-3
2001	17	12	21
2002	-3	-2	-5

The risk-free rate is 7 percent. The market risk premium is 5 percent. What is the required rate of return for a portfolio that consists of \$14,000 invested in Stock X and \$6,000 invested in Stock Y?

- a. 9.94%
- b. 10.68%
- c. 11.58%
- d. 12.41%
- e. 13.67%

Portfolio return**Answer: b Diff: M**

89. The risk-free rate, k_{RF} , is 6 percent and the market risk premium, $(k_M - k_{RF})$, is 5 percent. Assume that required returns are based on the CAPM. Your \$1 million portfolio consists of \$700,000 invested in a stock that has a beta of 1.2 and \$300,000 invested in a stock that has a beta of 0.8. Which of the following statements is most correct?
- a. The portfolio's required return is less than 11 percent.
 - b. If the risk-free rate remains unchanged but the market risk premium increases by 2 percentage points, the required return on your portfolio will increase by more than 2 percentage points.
 - c. If the market risk premium remains unchanged but expected inflation increases by 2 percentage points, the required return on your portfolio will increase by more than 2 percentage points.
 - d. If the stock market is efficient, your portfolio's expected return should equal the expected return on the market, which is 11 percent.
 - e. None of the statements above is correct.

Portfolio return**Answer: c Diff: M**

90. A portfolio manager is holding the following investments:

<u>Stock</u>	<u>Amount Invested</u>	<u>Beta</u>
X	\$10 million	1.4
Y	20 million	1.0
Z	40 million	0.8

The manager plans to sell his holdings of Stock Y. The money from the sale will be used to purchase another \$15 million of Stock X and another \$5 million of Stock Z. The risk-free rate is 5 percent and the market risk premium is 5.5 percent. How many percentage points higher will the required return on the portfolio be after he completes this transaction?

- a. 0.07%
- b. 0.18%
- c. 0.39%
- d. 0.67%
- e. 1.34%

Portfolio return**Answer: b Diff: M N**

91. Assume that the risk-free rate is 5.5 percent and the market risk premium is 6 percent. A money manager has \$10 million invested in a portfolio that has a required return of 12 percent. The manager plans to sell \$3 million of stock with a beta of 1.6 that is part of the portfolio. She plans to reinvest this \$3 million into another stock that has a beta of 0.7. If she goes ahead with this planned transaction, what will be the required return of her new portfolio?
- a. 10.52%
 - b. 10.38%
 - c. 11.31%
 - d. 10.90%
 - e. 8.28%

Portfolio return**Answer: a Diff: M N**

92. The current risk-free rate is 6 percent and the market risk premium is 5 percent. Erika is preparing to invest \$30,000 in the market and she wants her portfolio to have an expected return of 12.5 percent. Erika is concerned about bearing too much stand-alone risk; therefore, she will diversify her portfolio by investing in three different assets (two mutual funds and a risk-free security). The three assets she will be investing in are an aggressive growth mutual fund that has a beta of 1.6, an S&P 500 index fund with a beta of 1, and a risk-free security that has a beta of 0. She has already decided that she will invest 10 percent of her money in the risk-free asset. In order to achieve the desired expected return of 12.5 percent, what proportion of Erika's portfolio must be invested in the S&P 500 index fund?
- a. 23.33%
 - b. 33.33%
 - c. 53.33%
 - d. 66.66%
 - e. 76.66%

CAPM and portfolio return**Answer: d Diff: M**

93. Your portfolio consists of \$100,000 invested in a stock that has a beta = 0.8, \$150,000 invested in a stock that has a beta = 1.2, and \$50,000 invested in a stock that has a beta = 1.8. The risk-free rate is 7 percent. Last year this portfolio had a required rate of return of 13 percent. This year nothing has changed except for the fact that the market risk premium has increased by 2 percent (two percentage points). What is the portfolio's current required rate of return?
- a. 5.14%
 - b. 7.14%
 - c. 11.45%
 - d. 15.33%
 - e. 16.25%

CAPM and portfolio return**Answer: b Diff: M**

94. Currently, the risk-free rate is 5 percent and the market risk premium is 6 percent. You have your money invested in three assets: an index fund that has a beta of 1.0, a risk-free security that has a beta of 0, and an international fund that has a beta of 1.5. You want to have 20 percent of your portfolio invested in the risk-free asset, and you want your overall portfolio to have an expected return of 11 percent. What portion of your overall portfolio should you invest in the international fund?
- a. 0%
 - b. 40%
 - c. 50%
 - d. 60%
 - e. 80%

CAPM and portfolio return**Answer: c Diff: M**

95. A money manager is holding a \$10 million portfolio that consists of the following five stocks:

<u>Stock</u>	<u>Amount Invested</u>	<u>Beta</u>
A	\$4 million	1.2
B	2 million	1.1
C	2 million	1.0
D	1 million	0.7
E	1 million	0.5

The portfolio has a required return of 11 percent, and the market risk premium, $k_M - k_{RF}$, is 5 percent. What is the required return on Stock C?

- a. 7.2%
- b. 10.0%
- c. 10.9%
- d. 11.0%
- e. 11.5%

CAPM and portfolio return**Answer: c Diff: M**

96. You have been managing a \$1 million portfolio. The portfolio has a beta of 1.6 and a required rate of return of 14 percent. The current risk-free rate is 6 percent. Assume that you receive another \$200,000. If you invest the money in a stock that has a beta of 0.6, what will be the required return on your \$1.2 million portfolio?

- a. 12.00%
- b. 12.25%
- c. 13.17%
- d. 14.12%
- e. 13.67%

CAPM and portfolio return**Answer: c Diff: M**

97. Currently, the risk-free rate, k_{RF} , is 5 percent and the required return on the market, k_M , is 11 percent. Your portfolio has a required rate of return of 9 percent. Your sister has a portfolio with a beta that is twice the beta of your portfolio. What is the required rate of return on your sister's portfolio?

- a. 12.0%
- b. 12.5%
- c. 13.0%
- d. 17.0%
- e. 18.0%

CAPM and portfolio return**Answer: b Diff: M N**

98. Stock A has an expected return of 10 percent and a beta of 1.0. Stock B has a beta of 2.0. Portfolio P is a two-stock portfolio, where part of the portfolio is invested in Stock A and the other part is invested in Stock B. Assume that the risk-free rate is 5 percent, that required returns are determined by the CAPM, and that the market is in equilibrium so that expected returns equal required returns. Portfolio P has an expected return of 12 percent. What proportion of Portfolio P consists of Stock B?
- a. 20%
 - b. 40%
 - c. 50%
 - d. 60%
 - e. 80%

Portfolio beta**Answer: b Diff: M**

99. You hold a diversified portfolio consisting of a \$5,000 investment in each of 20 different common stocks. The portfolio beta is equal to 1.15. You have decided to sell one of your stocks, a lead mining stock whose β is equal to 1.0, for \$5,000 net and to use the proceeds to buy \$5,000 of stock in a steel company whose β is equal to 2.0. What will be the new beta of the portfolio?
- a. 1.12
 - b. 1.20
 - c. 1.22
 - d. 1.10
 - e. 1.15

Portfolio beta**Answer: c Diff: M**

100. A mutual fund manager has a \$200,000,000 portfolio with a $\beta = 1.2$. Assume that the risk-free rate is 6 percent and that the market risk premium is also 6 percent. The manager expects to receive an additional \$50,000,000 in funds soon. She wants to invest these funds in a variety of stocks. After making these additional investments she wants the fund's expected return to be 13.5 percent. What should be the average beta of the new stocks added to the portfolio?
- a. 1.10
 - b. 1.33
 - c. 1.45
 - d. 1.64
 - e. 1.87

Portfolio beta**Answer: e Diff: M**

101. Walter Jasper currently manages a \$500,000 portfolio. He is expecting to receive an additional \$250,000 from a new client. The existing portfolio has a required return of 10.75 percent. The risk-free rate is 4 percent and the return on the market is 9 percent. If Walter wants the required return on the new portfolio to be 11.5 percent, what should be the average beta for the new stocks added to the portfolio?

- a. 1.50
- b. 2.00
- c. 1.67
- d. 1.35
- e. 1.80

Portfolio return and beta**Answer: a Diff: M**

102. A portfolio manager is holding the following investments in her portfolio:

<u>Stock</u>	<u>Amount Invested</u>	<u>Beta</u>
1	\$300 million	0.7
2	200 million	1.0
3	500 million	1.6

The risk-free rate, k_{RF} , is 5 percent and the portfolio has a required return of 11.655 percent. The manager is thinking about selling all of her holdings of Stock 3, and instead investing the money in Stock 4, which has a beta of 0.9. If she were to do this, what would be the new portfolio's required return?

- a. 9.73%
- b. 11.09%
- c. 9.91%
- d. 7.81%
- e. 10.24%

Portfolio return and beta**Answer: e Diff: M**

103. A fund manager is holding the following stocks:

<u>Stock</u>	<u>Amount Invested</u>	<u>Beta</u>
1	\$300 million	1.2
2	560 million	1.4
3	320 million	0.7
4	230 million	1.8

The risk-free rate is 5 percent and the market risk premium is also 5 percent. If the manager sells half of her investment in Stock 2 (\$280 million) and puts the money in Stock 4, by how many percentage points will her portfolio's required return increase?

- a. 0.36%
- b. 0.22%
- c. 2.00%
- d. 0.20%
- e. 0.40%

Portfolio return and beta**Answer: e Diff: M N**

104. A portfolio manager is managing a \$10 million portfolio. Currently the portfolio is invested in the following manner:

<u>Investment</u>	<u>Dollar Amount Invested</u>	<u>Beta</u>
Stock 1	\$2 million	0.6
Stock 2	3 million	0.8
Stock 3	3 million	1.2
Stock 4	2 million	1.4

Currently, the risk-free rate is 5 percent and the portfolio has an expected return of 10 percent. Assume that the market is in equilibrium so that expected returns equal required returns. The manager is willing to take on additional risk and wants to instead earn an expected return of 12 percent on the portfolio. Her plan is to sell Stock 1 and use the proceeds to buy another stock. In order to reach her goal, what should be the beta of the stock that the manager selects to replace Stock 1?

- a. 1.40
- b. 1.75
- c. 2.05
- d. 2.40
- e. 2.60

Portfolio standard deviation**Answer: a Diff: M**

105. Here are the expected returns on two stocks:

<u>Probability</u>	<u>Returns</u>	
	<u>X</u>	<u>Y</u>
0.1	-20%	10%
0.8	20	15
0.1	40	20

If you form a 50-50 portfolio of the two stocks, what is the portfolio's standard deviation?

- a. 8.1%
- b. 10.5%
- c. 13.4%
- d. 16.5%
- e. 20.0%

Coefficient of variation**Answer: e Diff: M N**

106. The CFO of Brady Boots has estimated the rates of return to Brady's stock, depending on the state of the economy. He has also compiled analysts' expectations for the economy.

<u>Economy</u>	<u>Probability</u>	<u>Return</u>
Recession	0.1	-23%
Below average	0.1	-8
Average	0.4	6
Above average	0.2	17
Boom	0.2	24

Given this data, what is the company's coefficient of variation? (Use the population standard deviation, not the sample standard deviation when calculating the coefficient of variation.)

- a. 1.94
- b. 25.39
- c. 2.26
- d. 5.31
- e. 1.84

Coefficient of variation**Answer: b Diff: M**

107. Ripken Iron Works faces the following probability distribution:

<u>State of the Economy</u>	<u>Probability of State Occurring</u>	<u>Stock's Expected Return if this State Occurs</u>
Boom	0.25	25%
Normal	0.50	15
Recession	0.25	5

What is the coefficient of variation on the company's stock?

- a. 0.06
- b. 0.47
- c. 0.54
- d. 0.67
- e. 0.71

Coefficient of variation**Answer: c Diff: M**

108. An analyst has estimated how a particular stock's return will vary depending on what will happen to the economy:

<u>State of the Economy</u>	<u>Probability of State Occurring</u>	<u>Stock's Expected Return if this State Occurs</u>
Recession	0.10	-60%
Below Average	0.20	-10
Average	0.40	15
Above Average	0.20	40
Boom	0.10	90

What is the coefficient of variation on the company's stock?

- a. 2.121
- b. 2.201
- c. 2.472
- d. 3.334
- e. 3.727

Coefficient of variation**Answer: c Diff: M**

109. The following probability distributions of returns for two stocks have been estimated:

<u>Probability</u>	<u>Returns</u>	
	<u>Stock A</u>	<u>Stock B</u>
0.3	12%	5%
0.4	8	4
0.3	6	3

What is the coefficient of variation for the stock that is less risky, assuming you use the coefficient of variation to rank riskiness?

- a. 3.62
- b. 0.28
- c. 0.19
- d. 0.66
- e. 5.16

Coefficient of variation**Answer: d Diff: M**

110. A financial analyst is forecasting the expected return for the stock of Himalayan Motors. The analyst estimates the following probability distribution of returns:

<u>Probability</u>	<u>Return</u>
20%	-5%
40	10
20	20
10	25
10	50

On the basis of this analyst's forecast, what is the stock's coefficient of variation?

- a. 0.80
- b. 0.91
- c. 0.96
- d. 1.04
- e. 1.10

Coefficient of variation**Answer: b Diff: M**

111. A stock market analyst estimates that there is a 25 percent chance the economy will be weak, a 50 percent chance the economy will be average, and a 25 percent chance the economy will be strong. The analyst estimates that Hartley Industries' stock will have a 5 percent return if the economy is weak, a 15 percent return if the economy is average, and a 30 percent return if the economy is strong. On the basis of this estimate, what is the coefficient of variation for Hartley Industries' stock?

- a. 0.61644
- b. 0.54934
- c. 0.75498
- d. 3.62306
- e. 0.63432

Coefficient of variation**Answer: b Diff: M**

112. An analyst has estimated Williamsport Equipment's returns under the following economic states:

<u>Economic State</u>	<u>Probability</u>	<u>Expected Return</u>
Recession	0.20	-24%
Below average	0.30	-3
Above average	0.30	+15
Boom	0.20	+50

What is Williamsport's estimated coefficient of variation?

- a. 0.36
- b. 2.80
- c. 2.86
- d. 2.95
- e. 3.30

Coefficient of variation**Answer: e Diff: M**

113. Stock Z has had the following returns over the past five years:

<u>Year</u>	<u>Return</u>
1998	10%
1999	12
2000	27
2001	-15
2002	30

What is the company's coefficient of variation (CV)? (Use the population standard deviation to calculate CV.)

- a. 99.91
- b. 35.76
- c. 9.88
- d. 2.79
- e. 1.25

Beta coefficient**Answer: a Diff: M**

114. An investor has \$5,000 invested in a stock that has an estimated beta of 1.2, and another \$15,000 invested in the stock of the company for which she works. The risk-free rate is 6 percent and the market risk premium is also 6 percent. The investor calculates that the required rate of return on her total (\$20,000) portfolio is 15 percent. What is the beta of the company for which she works?

- a. 1.6
- b. 1.7
- c. 1.8
- d. 1.9
- e. 2.0

Beta coefficient**Answer: e Diff: M**

115. Portfolio P has 30 percent invested in Stock X and 70 percent in Stock Y. The risk-free rate of interest is 6 percent and the market risk premium is 5 percent. Portfolio P has a required return of 12 percent and Stock X has a beta of 0.75. What is the beta of Stock Y?

- a. 0.21
- b. 1.20
- c. 0.96
- d. 1.65
- e. 1.39

CAPM and beta coefficient**Answer: d Diff: M**

116. A money manager is managing the account of a large investor. The investor holds the following stocks:

<u>Stock</u>	<u>Amount Invested</u>	<u>Estimated Beta</u>
A	\$2,000,000	0.80
B	5,000,000	1.10
C	3,000,000	1.40
D	5,000,000	????

The portfolio's required rate of return is 17 percent. The risk-free rate, k_{RF} , is 7 percent and the return on the market, k_M , is 14 percent. What is Stock D's estimated beta?

- a. 1.256
- b. 1.389
- c. 1.429
- d. 2.026
- e. 2.154

Market return**Answer: d Diff: M**

117. The returns of United Railroad Inc. (URI) are listed below, along with the returns on "the market":

<u>Year</u>	<u>URI</u>	<u>Market</u>
1	-14%	-9%
2	16	11
3	22	15
4	7	5
5	-2	-1

If the risk-free rate is 9 percent and the required return on URI's stock is 15 percent, what is the required return on the market? Assume the market is in equilibrium. (Hint: Think rise over run.)

- a. 4%
- b. 9%
- c. 10%
- d. 13%
- e. 16%

Tough:

Portfolio required return

Answer: a Diff: T

118. A money manager is holding the following portfolio:

<u>Stock</u>	<u>Amount Invested</u>	<u>Beta</u>
1	\$300,000	0.6
2	300,000	1.0
3	500,000	1.4
4	500,000	1.8

The risk-free rate is 6 percent and the portfolio's required rate of return is 12.5 percent. The manager would like to sell all of her holdings of Stock 1 and use the proceeds to purchase more shares of Stock 4. What would be the portfolio's required rate of return following this change?

- a. 13.63%
- b. 10.29%
- c. 11.05%
- d. 12.52%
- e. 14.33%

Multiple Part:

(The following information applies to the next two problems.)

A portfolio manager has a \$10 million portfolio, which consists of \$1 million invested in 10 separate stocks. The portfolio beta is 1.2. The risk-free rate is 5 percent and the market risk premium is 6 percent.

CAPM and portfolio return

Answer: d Diff: E N

119. What is the portfolio's required return?

- a. 6.20%
- b. 9.85%
- c. 12.00%
- d. 12.20%
- e. 12.35%

CAPM and portfolio return

Answer: c Diff: M N

120. The manager sells one of the stocks in her portfolio for \$1 million. The stock she sold has a beta of 0.9. She takes the \$1 million and uses the money to purchase a new stock that has a beta of 1.6. What is the required return of her portfolio after purchasing this new stock?

- a. 10.75%
- b. 12.35%
- c. 12.62%
- d. 13.35%
- e. 14.60%

Web Appendix 5A

Multiple Choice: Conceptual

Medium:

Beta calculation

Answer: b Diff: M

5A-1. Which of the following statements is most correct?

- a. The CAPM is an ex ante model, which means that all of the variables should be historical values that can reasonably be projected into the future.
- b. The beta coefficient used in the SML equation should reflect the expected volatility of a given stock's return versus the return on the market during some future period.
- c. The general equation: $Y = a + bX + e$, is the standard form of a simple linear regression where $b = \text{beta}$, and X equals the independent return on an individual security being compared to Y , the return on the market, which is the dependent variable.
- d. The rise-over-run method is not a legitimate method of estimating beta because it measures changes in an individual security's return regressed against time.

Multiple Choice: Problems

Easy:

Beta calculation

Answer: c Diff: E

5A-2. Given the following returns on Stock J and "the market" during the last three years, what is the beta coefficient of Stock J? (Hint: Think rise over run.)

<u>Year</u>	<u>Stock J</u>	<u>Market</u>
1	-13.85%	-8.63%
2	22.90	12.37
3	35.15	19.37

- a. 0.92
- b. 1.10
- c. 1.75
- d. 2.24
- e. 1.45

Medium:

Beta and base year sensitivity

Answer: a Diff: M

- 5A-3. Given the following returns on Stock Q and "the market" during the last three years, what is the difference in the calculated beta coefficient of Stock Q when Year 1-Year 2 data are used as compared to Year 2-Year 3 data? (Hint: Think rise over run.)

<u>Year</u>	<u>Stock Q</u>	<u>Market</u>
1	6.30%	6.10%
2	-3.70	12.90
3	21.71	16.20

- a. 9.17
- b. 1.06
- c. 6.23
- d. 0.81
- e. 0.56

Beta calculation

Answer: b Diff: M

- 5A-4. Stock X, and "the market" have had the following rates of returns over the past four years.

<u>Year</u>	<u>Stock X</u>	<u>Market</u>
1999	12%	14%
2000	5	2
2001	11	14
2002	-7	-3

60 percent of your portfolio is invested in Stock X, and the remaining 40 percent is invested in Stock Y. The risk-free rate is 6 percent and the market risk premium is also 6 percent. You estimate that 14 percent is the required rate of return on your portfolio. What is the beta of Stock Y?

- a. 1.33
- b. 1.91
- c. 2.00
- d. 2.15
- e. 2.33

Beta calculation**Answer: c Diff: E**

5A-5. Hanratty Inc.'s stock and the stock market have generated the following returns over the past five years:

<u>Year</u>	<u>Hanratty</u>	<u>Market (k_M)</u>
1	13%	9%
2	18	15
3	-5	-2
4	23	19
5	6	12

On the basis of these historical returns, what is the estimated beta of Hanratty Inc.'s stock?

- a. 0.7839
- b. 0.9988
- c. 1.2757
- d. 1.3452
- e. 1.5000

Beta calculation**Answer: a Diff: E**

5A-6. Below are the returns for the past five years for Stock S and for the overall market:

<u>Year</u>	<u>Stock S</u>	<u>Market (k_M)</u>
1998	12%	8%
1999	34	28
2000	-29	-20
2001	-11	-4
2002	45	30

What is Stock S's estimated beta?

- a. 1.43
- b. 0.69
- c. 0.91
- d. 1.10
- e. 1.50

Multiple Part:

(The following information applies to the next two problems.)

You have been asked to use a CAPM analysis to choose between Stocks R and S, with your choice being the one whose expected rate of return exceeds its required rate of return by the widest margin. The risk-free rate is 6 percent, and the required return on an average stock (or "the market") is 10 percent. Your security analyst tells you that Stock S's expected rate of return, \hat{k} , is equal to 11 percent, while Stock R's expected rate of return, \hat{k} , is equal to 12 percent. The CAPM is assumed to be a valid method for selecting stocks, but the expected return for any given investor (such as you) can differ from the required rate of return for a given stock. The following past rates of return are to be used to calculate the two stocks' beta coefficients, which are then to be used to determine the stocks' required rates of return:

Year	Stock R	Stock S	Market
1	-15%	0%	-5%
2	5	5	5
3	25	10	15

Note: The averages of the historical returns are not needed, and they are generally not equal to the expected future returns.

Beta calculation

Answer: c Diff: M

5A-7. Calculate both stocks' betas. What is the difference between the betas? That is, what is the value of $\beta_R - \beta_S$? (Hint: The graphical method of calculating the rise over run, or $(Y_2 - Y_1)$ divided by $(X_2 - X_1)$ may aid you.)

- a. 0.0
- b. 1.0
- c. 1.5
- d. 2.0
- e. 2.5

Required rate of return

Answer: e Diff: M

5A-8. Set up the SML equation and use it to calculate both stocks' required rates of return, and compare those required returns with the expected returns given above. You should invest in the stock whose expected return exceeds its required return by the widest margin. What is the widest margin, or greatest excess return ($\hat{k} - k$)?

- a. 0.0%
- b. 0.5%
- c. 1.0%
- d. 2.0%
- e. 3.0%

CHAPTER 5 ANSWERS AND SOLUTIONS

1. Risk concepts Answer: e Diff: E

2. Risk measures Answer: a Diff: E

Statement a is correct, since the coefficient of variation is equal to the standard deviation divided by the mean. The remaining statements are false.

3. Market risk premium Answer: c Diff: E

CAPM equation: $k_s = k_{RF} + (k_M - k_{RF})b$

If the market risk premium (measured by $k_M - k_{RF}$) goes up by 1.0, then the required return for each stock will change by its beta times 1.0. Therefore, a stock with a beta of 0.5 will see its required return go up by 0.5 percentage point. Therefore, statement a is false. As just shown in statement a, a stock with a beta of 0.5 will see its required return increase by 0.5 percentage point. All stocks with positive betas will see their required returns increase. Therefore, statement b is false. If the market risk premium increases by 1 percentage point, then the required return increases by 1.0 times the stock's beta. Therefore, the required return of a stock with a beta coefficient equal to 1.0 will increase by 1 percentage point, and statement c is correct.

4. Standard deviation Answer: b Diff: E

5. Beta coefficient Answer: d Diff: E

6. Beta coefficient Answer: c Diff: E

Statement a is false; Y has a higher required return because it is more risky, but it may still end up actually earning a lower return than X. Statement b is false; beta tells us about the covariance of the stock with the market. It tells us nothing about the stocks' individual standard deviations. Statement c is correct from the CAPM: $k_s = k_{RF} + (k_M - k_{RF})b$. Statement d is false from the CAPM. Statement e is false; the portfolio beta, b_p , is calculated as $(0.5 \times 0.5) + (0.5 \times 1.5) = 1.0$.

7. Required return Answer: b Diff: E

The easiest way to see this is to write out the CAPM: $k_s = k_{RF} + (k_M - k_{RF})b$. Clearly, a change in the market risk premium is going to have the most effect on firms with high betas. Consequently, statement b is the correct choice.

8. Risk and return Answer: a Diff: E N

The correct answer is statement a. Stocks are riskier than bonds, with stocks in small companies being riskier than stocks in larger companies. From there, corporate bonds are riskier than government bonds, and longer-term government bonds are riskier than shorter-term ones.

9. Portfolio risk

Answer: b Diff: E

The standard deviation of the portfolio will be less than the weighted average of the two stocks' standard deviations because the correlation coefficient is less than one. Therefore, although the expected return on the portfolio will be the weighted average of the two returns (10 percent), the CV will not be equal to 25%/10%. Therefore, statement a is false. Remember, market risk is measured by beta. The beta of the portfolio will be the weighted average of the two betas; therefore, it will be less than the beta of the high-beta stock (B), but more than the beta of the low-beta stock (A). Therefore, the market risk of the portfolio will be higher than A's, but lower than B's. Therefore, statement b is correct. Because the correlation between the two stocks is less than one, the portfolio's standard deviation will be less than 25 percent. Therefore, statement c is false.

10. Portfolio risk, return, and beta

Answer: e Diff: E

The trick here is to notice the word always in each of the answers. If you can find even one exception to the statement, then the statement will not "always" be true.

The exception to statement a is if the correlation coefficient, r , = 1.0. While this is unlikely to ever happen, theoretically it is still possible. Therefore, there is an exception, so we cannot necessarily say always. Therefore, statement a is false. Beta has nothing to do with the number of stocks in a portfolio. You can take a stock with a beta of 0.4, and a stock with a beta of 1.6, and combine them (with equal weights) in a portfolio. The portfolio beta will now be 1.0, which is higher than a portfolio of just the first stock. Therefore, statement b is false. Statement c is false for the same reason that statement b is false. Consequently, the correct choice is statement e.

11. Portfolio risk and return

Answer: a Diff: E

Statements b and c are false. Randomly adding more stocks will have no effect on the portfolio's beta or expected return.

12. Portfolio risk and return

Answer: e Diff: E

13. Portfolio risk and return

Answer: a Diff: E

The portfolio will have an expected return equal to the weighted average of the individual stock returns. The portfolio's beta will also be equal to the weighted average of the individual stock betas. The standard deviation of the portfolio will be less than 30 percent, because the stocks have a correlation coefficient of less than one. Therefore, the portfolio's beta will equal 1.6, its standard deviation is less than 30 percent, and its expected return is 15 percent. The correct answer must be statement a.

14. Portfolio risk and return**Answer: b Diff: E**

Since we are randomly adding stocks, eventually your portfolio will have the same expected return as the market, on average. Therefore, unless we are told that the current expected return is higher than the market average, we have no reason to believe that the expected return will decline. Therefore, statement a is false. If we randomly add stocks to the portfolio, the company-specific risk will decline because the standard deviation of the portfolio will be declining. However, the market risk (as measured by beta) will tend to remain the same, for the same reason that in statement a the expected return was unlikely to change. Therefore, statement b is correct. As in statement a, we know there is no reason to believe that the market risk of the portfolio (as measured by beta) will decline. Therefore, statement c is false. Neither the market risk nor the expected return on the portfolio are expected to decline (see above), so statement d is false. The company-specific risk (as measured by the standard deviation of the portfolio) will decline and market risk is not expected to change. Therefore, statement e is false.

15. Portfolio risk and return**Answer: b Diff: E**

Statement a is false. Since the correlation coefficient is less than one, there is a benefit from diversification so the portfolio's standard deviation is less than 20 percent. Statement b is correct. The beta of the portfolio is the weighted average of the two betas. So the portfolio's beta is calculated as: $0.5 \times 0.7 + 0.5 \times 1.3 = 1.0$. Since the beta of the portfolio is equal to 1.0 and the beta of the market is equal to 1.0, the portfolio must have the same return as the market. Statement c is false. The required return would be equal to: $k_p = k_{RF} + (k_M - k_{RF})b_p$.

16. Portfolio risk and return**Answer: e Diff: E**

A portfolio of randomly-selected stocks should, on average, have a beta of 1.0. Therefore, both portfolios should have the same required return. Therefore, statement a is false. Beta is the measure of market risk, while standard deviation is the measure of diversifiable risk. Since both portfolios have the same beta, they will have the same market risk. Since Jane has more stocks in her portfolio, she is more diversified and will have less company-specific risk than Dick. Therefore, statement b is false. Jane has more stocks in her portfolio, so she is more diversified and will have less company-specific risk than Dick. Therefore, statement c is false. Since statements a, b, and c are false, the correct choice is statement e.

17. Portfolio risk and return**Answer: d Diff: E**

Remember, for portfolios you can take averages of betas and returns, but not standard deviations. So, the portfolio will have a return of 12 percent (because both stocks have returns of 12 percent) and a beta of 1.2 (both stocks have betas of 1.2). However, since the correlation coefficient is less than 1.0, the portfolio's standard deviation will be less than the average of the two stocks' standard deviations. (That is, the portfolio's standard deviation will be less than 25 percent.) So, statements a and c are correct; therefore, the correct choice is statement d.

18. Portfolio risk and return

Answer: e Diff: E

Remember, you can always find the portfolio required return by finding the weighted average return of the stocks in the portfolio. You can always find the portfolio beta by finding the weighted average beta of the stocks in the portfolio. You cannot find the standard deviation by finding the weighted average standard deviation of the stocks in the portfolio, unless $r = 1.0$. The portfolio standard deviation is not a weighted average of the individual stocks' standard deviations. However, since the 2 correlation coefficients are less than 1, we know the portfolio's standard deviation will be less than 25 percent. Since statements a and c are correct, the correct choice is statement e.

19. Portfolio risk and return

Answer: a Diff: E

Statement a is true; the others are false. Since both stocks' betas are equal to 1.2, the portfolio beta will equal 1.2. Because the stocks' correlation coefficient is less than one, the portfolio's standard deviation will be lower than 20 percent.

20. Portfolio risk and return

Answer: d Diff: E N

The correct answer is statement d. Statement a is correct; Stock C has a higher beta than Portfolio P. Statement b is correct; the stocks are less than perfectly correlated ($r \neq 1$), hence the portfolio standard deviation must be less than 25%. Statement c is incorrect; the expected returns of Portfolio P are greater than the expected returns of Stock A, but the realized returns cannot be known ex ante. Therefore statement d is the correct choice.

21. CAPM

Answer: b Diff: E

The CAPM is written as: $k_s = k_{RF} + (k_M - k_{RF})b$. Statement a is false based on the CAPM equation. Statement b is correct on the basis of the CAPM equation. Statement c is false; the required returns will increase by the same amount.

22. CAPM and required return

Answer: c Diff: E

You need to think about the CAPM to answer this question: $k_s = k_{RF} + (k_M - k_{RF})b$. From the statement in the question k_{RF} and $(k_M - k_{RF})$ have both declined. Statement a is false; the average required return on the market must have declined too. Statement b is false; the size of the decline depends on the beta of the stock. Statement c is correct. Statement d is false. This must be, if statement c is correct. Statement e is false because the required returns will have fallen for all stocks.

23. CAPM and required return**Answer: c Diff: E N**

The correct answer is statement c. Here, the required rate is $k_s = 5\% + b \times RP_M$. If a stock's beta doubles, b becomes $2b$. So, $k_s = 5\% + 2b \times RP_M$. But doubling its required return would require the equation to be $2(5\% + b \times RP_M) = 10\% + 2b \times RP_M$. So, statement a is incorrect. Statement b would be correct only if the beta coefficient were negative. Therefore, statement b is incorrect. Statement c is correct. If $b < 0$ and $RP_M > 0$, then $(b \times RP_M) < 0$. So, $k_s < 5\%$.

24. CAPM and required return**Answer: e Diff: E N**

The correct answer is statement e. Since Stock X is riskier, its required return should be higher, so statement a is incorrect. Since the betas of Stock A and Stock B are different, statement b will be incorrect in most circumstances. Although some situations exist where this holds, in general, it will not be true. So, statement b is not always correct. Statement c is always incorrect. The required return for both stocks will decline. So, statement e is the correct choice.

25. CAPM and required return**Answer: b Diff: E N**

The correct answer is statement b. Remember, the market risk premium is the slope of the Security Market Line. This means high-beta stocks experience greater increases in their required returns, while low-beta stocks experience smaller increases in their required returns. Statement a is incorrect. Statement b is correct; stocks with a beta less than 1 increase by less than the increase in the market risk premium, and vice versa. Statement c is incorrect; since the market risk premium is changing, required returns must change too. Statements d and e are incorrect for the same reason that statement c is incorrect.

26. CAPM, beta, and required return**Answer: c Diff: E**

$k_{RF} = 6\%$; $RP_M = 5\%$; CAPM equation: $k_s = k_{RF} + (k_M - k_{RF})b$.

Statement a is false. Just because a stock has a negative beta does not mean its return is also negative. For example, if its beta were -0.5 , its return would be as follows:

$$\begin{aligned} k &= k_{RF} + RP_M(b) \\ &= 6\% + 5\%(-0.5) \\ &= 6\% + (-2.5\%) \\ &= 3.5\%. \end{aligned}$$

Statement b is also false. If the beta doubles, the second term in the CAPM equation above will double; however, k_{RF} will not double, so the overall return will not double. Statement c is correct. If $b = 1.0$, then:

$$\begin{aligned} k &= k_{RF} + RP_M(b) \\ &= 6\% + 5\%(1.0) \\ &= 11\%. \end{aligned}$$

27. **SML** **Answer: a Diff: E**

The slope of the SML is determined by the size of the market risk premium, $k_M - k_{RF}$, which depends on investor risk aversion.

28. **SML** **Answer: b Diff: E**

Statement b is correct. Statement a is false, since the slope of the SML is $k_M - k_{RF}$. Statement c is false, since $k_s = k_{RF} + (k_M - k_{RF})b$. The remaining statements are false.

29. **SML** **Answer: c Diff: E**

Statement c is correct; the others are false. Stock A will have a higher required rate of return than B because A has the higher beta. The standard deviation of a portfolio is not the average of the standard deviations of the component stocks. The portfolio beta is a weighted average of the component stocks' betas; therefore, $b_p = 1.0$.

30. **SML** **Answer: e Diff: E**

The CAPM states $k_s = k_{RF} + (k_M - k_{RF})b$. Working through each statement, it is apparent that none of the statements is consistent with the formula. Therefore, statement e is the best choice.

31. **SML** **Answer: c Diff: E**

Stock Y will have a higher expected return than Stock X does (because its beta is higher), but we are told nothing about its standard deviation. Remember, beta has nothing to do with standard deviation. Therefore, statement a is false. The expected return of a portfolio of \$50,000 in each stock will have a required return that is the weighted average of the returns on both stocks. Since each one has a weight of $\frac{1}{2}$, it will be a simple average. The portfolio's beta will be the average of the two betas $((0.6 + 1.4)/2 = 1.0)$. The portfolio has the same beta that the market portfolio does and, therefore, the same required return that the market has. Therefore, statement b is false. If the market risk premium decreases, the slope of the SML will decrease. Therefore, the required returns of stocks with higher betas will decrease more. Therefore, Stock Y's required return will fall by more than Stock X's. Therefore, statement c is correct. If the expected inflation increases, the SML will have a parallel shift up, and the required returns on all stocks will increase by the same amount, not decrease. Therefore, statement d is false. If expected inflation decreases, the SML will have a parallel shift down, and the required returns on all stocks will decrease by the same amount. Therefore, statement e is false.

32. SML

Answer: b Diff: E

Remember, the market risk premium is the slope of the line in the SML diagram. The line is anchored at the y-axis, and when the market risk premium changes, the line "rotates" around that point. Also remember the SML equation is $k_s = k_{RF} + (k_M - k_{RF})b$. Statement a is implying a "parallel shift" of the line, and that is incorrect. A review of the equation shows that, because beta is multiplied by the market risk premium, changes in the market risk premium will affect stocks with different betas differently. Statement b is correct. The slope of the line will increase, so required returns on stocks with betas closer to 0 will increase by less than returns on stocks with higher betas. A review of the equation shows that if the beta were higher, a change in the market risk premium would have more effect on k_s than if the beta were lower. Statement c is false because it is the reverse of statement b, which we have already stated is true. Statement d is false because an increase in the market risk premium will increase the required return on all stocks with positive betas. Statement e is false. The portfolio beta is the weighted average of the individual stocks' betas. In this case, the portfolio beta will be 1.0. It is clear from the SML equation that a portfolio with a beta of 1.0 will be affected by changes in the market risk premium.

33. SML

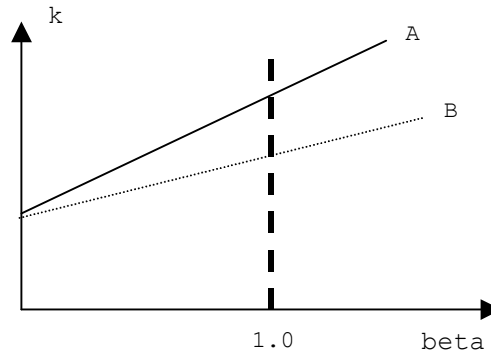
Answer: e Diff: E

If the market risk premium ($k_M - k_{RF}$) increases, the required return on all stocks with positive betas would increase. Therefore, statement a is false. Since the required return for all positive beta stocks will increase, the return for Portfolio P must increase as well. Therefore, statement b is false. The required return on Stock A will increase by 0.7 percent, and the required return on Stock B will increase by 1.3 percent. Therefore, statement c is false. Statement d is the opposite of what would actually happen, so statement d is false. The beta for Portfolio P is $1.0[(50\% \times 0.7) + (50\% \times 1.3)]$. Therefore, the change in the portfolio's required return will be $b \times \Delta(k_M - k_{RF}) = 1.0 \times 1\% = 1\%$. Therefore, statement e is correct.

34. SML

Answer: b Diff: E N

The correct answer is statement b. If the risk premium declines, then the slope of the SML declines.



At first, the line could be drawn at A. Then when the risk premium declines, it will look more like B. Statements a and c are incorrect. The required return on all stocks will fall. Therefore, statement b is correct.

35. SML, CAPM, and beta

Answer: e Diff: E

Statement e is correct; the others are false. The market risk premium is the slope of the SML. If a stock has a negative beta, this does not mean its required return is negative. A doubling of a stock's beta doesn't mean that its required return will double. The required return is a function of k_{RF} , k_M , and beta. The required return is affected by the market risk premium.

36. Risk analysis and portfolio diversification

Answer: d Diff: E

A security's beta does indeed measure market risk relative to that of an average stock. Diversification reduces the variability of the portfolio's return. An investor, through diversification, can eliminate company-specific risk; however, a portfolio containing all publicly-traded stocks would still be exposed to market risk. The CAPM specifies a stock's required return as: $k_s = k_{RF} + (k_M - k_{RF})b$. Thus, the risk-free rate and the market risk premium are needed along with a stock's beta to determine its required return. A stock's beta is more relevant as a measure of risk to an investor with a well-diversified portfolio than to an investor who holds only that one stock.

37. Miscellaneous risk concepts**Answer: c Diff: E N**

The correct answer is statement c. Statement a is incorrect. Since the correlation is not 1.00, the standard deviation of the portfolio is less than 20%. For the same reason, Statement d is also incorrect. Since Portfolio P's standard deviation is less than 20%, its CV (σ/\bar{X}) is less than 2.0. So, statement b is incorrect. And, statement e is incorrect since Portfolio P's required return equals that of Stock A. Portfolio Q's required return = $(10\% + 10\% + 12\%)/3 = 10.67\%$. So, statement c is the correct choice.

38. Risk aversion**Answer: b Diff: M****39. SML and risk aversion****Answer: e Diff: M****40. Portfolio risk and return****Answer: c Diff: M****41. Portfolio risk and return****Answer: d Diff: M N**

The correct answer is statement d. Statement a is correct; the expected return of a portfolio is a weighted average of the returns of each of the component stocks. Hence, $k_P = w_A k_A + w_B k_B = 0.5(10\%) + 0.5(12\%) = 11\%$. Statement b is also correct; since the correlation coefficient is zero, the standard deviation of the portfolio must be less than the weighted average of the standard deviations of each of the component stocks. Statement c is incorrect; Stock B's beta can be calculated using: $k_B = k_{RF} + (k_M - k_{RF})b$. $12\% = 5\% + (6\%)b$. Therefore, Stock B's beta is 1.16. So statement d is the correct choice.

42. Portfolio risk and return**Answer: d Diff: M N**

The correct answer is statement d. If the same amount were invested in Stocks A and B, the portfolio beta would be $(1/2) \times 1.2 + (1/2) \times 1.4 = 1.30$. This is not the beta of the portfolio, so statement a is incorrect. Since the standard deviation of the portfolio is less than the standard deviation of both Stock A and Stock B, they cannot be perfectly correlated. If they were, the standard deviation of the portfolio would be between 20% and 25%, inclusive. So, statement b is incorrect. Since the beta of Stock B is higher than that of Stock A, Stock B has more market risk; so, statement c is incorrect. Since the beta of the portfolio is higher than the beta of Stock A, the portfolio has a higher required return than Stock A; therefore, statement d is true. Statement e is incorrect; since the beta of Stock A is less than the beta of the portfolio, Stock A has less market risk than the portfolio.

43. Portfolio risk**Answer: e Diff: M****44. Portfolio risk and beta****Answer: c Diff: M****45. Portfolio risk and beta****Answer: e Diff: M****46. Market risk****Answer: b Diff: M**

47. Beta coefficient Answer: a Diff: M
48. Beta coefficient Answer: d Diff: M
49. Beta coefficient Answer: a Diff: M
50. Beta coefficient Answer: c Diff: M
51. Beta coefficient Answer: d Diff: M N

The correct answer is statement d. Except for Florida Power & Light (FP&L), the remaining four companies and betas are all in line with the nature of the firms and their industries. However, FP&L (a utility company) is out of place. Its indicated beta of 1.52 puts it in the same league as technology frontrunners Sun Microsystems and Amazon.com. A more reasonable beta estimate for FP&L would be somewhere between 0.50 and 0.70.

52. SML Answer: e Diff: M
53. SML Answer: a Diff: M
54. SML Answer: b Diff: M
55. SML Answer: b Diff: M N

The correct answer is statement b. A simple example helps here. Assume k_{RF} is originally 5%. And the RP_M is 3%. Then, $k_s = 5\% + (3\%)b$. Recall that the market has a beta of 1.0. So, the market requires a return of 8%. Let k_{RF} now be 6%, and the RP_M fall to 2%. The market still has a required return of 8%.

Statement a is incorrect; for any beta between zero and one, you can see that the new required return is higher. For example, a stock with a beta of 0.5 had an original required return of 6.5%, but now has a required return of 7%. Just the opposite happens for stocks with a beta greater than one. Statement b is correct, for just the opposite reason. For example, a stock with a beta of 2.0 originally had a required return = $5\% + (3\%)2.0 = 11\%$, but now has a required return of $6\% + (2\%)2.0 = 10\%$. It has fallen. A beta between zero and one will yield just the opposite result. From the explanations above, both statements c and d are clearly incorrect. For some stocks, the required return will rise; for others, the required return will fall.

56. SML, CAPM, and portfolio risk Answer: a Diff: M

An increase in expected inflation would lead to an increase in k_{RF} , the intercept of the SML. If risk aversion were unchanged, then the slope of the SML would remain constant. Therefore, there would be a parallel upward shift in the SML, which would result in an increase in k_M that is equal to the expected increase in inflation.

57. Portfolio return, CAPM, and beta**Answer: e Diff: M**

Statement e is correct because none of the statements are correct. Statement a is false because if the returns of 2 stocks were perfectly positively correlated the portfolio's variance would equal the variance of each of the stocks. Statement b is false. A stock can have a negative beta and still have a positive return because $k_s = k_{RF} + (k_M - k_{RF})b$. Statement c is false. According to the CAPM, stocks with higher betas have higher expected returns. Betas are a measure of market risk, while standard deviation is a measure of stand-alone risk--but not a good measure. The coefficient of variation is a better measure of stand-alone risk. The portfolio's beta (the measure of market risk) will be dependent on the beta of each of the randomly selected stocks in the portfolio. However, the portfolio's beta would probably approach $b_M = 1$, which would indicate higher market risk than a stock with a beta equal to 0.5.

58. CAPM and required return**Answer: d Diff: M****59. Risk analysis and portfolio diversification****Answer: e Diff: M****60. Portfolio diversification****Answer: c Diff: M**

Statement c is correct; the others are false. Holding a portfolio of stocks reduces company-specific risk. Diversification lowers risk; consequently, it reduces the required rate of return. Beta measures market risk, the lower the beta the lower the market risk.

61. Portfolio risk and SML**Answer: e Diff: M****62. CAPM****Answer: c Diff: T****63. SML****Answer: d Diff: T****64. Required return****Answer: d Diff: E N**

$$\begin{aligned}k_s &= k_{RF} + (k_M - k_{RF})b \\&= 6\% + (12\% - 6\%)1.2 \\&= 13.2\%.\end{aligned}$$

65. Required return**Answer: b Diff: E N**

Step 1: We must determine the market risk premium using the CAPM equation with data inputs for Stock A:

$$\begin{aligned}k_A &= k_{RF} + (k_M - k_{RF})b_A \\11\% &= 5\% + (k_M - k_{RF})1.0 \\6\% &= (k_M - k_{RF}).\end{aligned}$$

Step 2: We can now find the required return of Stock B using the CAPM equation with data inputs for Stock B:

$$\begin{aligned}k_B &= k_{RF} + (k_M - k_{RF})b_B \\k_B &= 5\% + (6\%)1.4 \\k_B &= 13.4\%.\end{aligned}$$

66. CAPM and required return

Answer: d Diff: E

$$k_{RF} = k^* + IP = 3\% + 5\% = 8\%.$$
$$k_s = 8\% + (5\%)2.0 = 18\%.$$

67. CAPM and market risk premium

Answer: c Diff: E N

Using Stock A (or any stock),

$$10\% = k_{RF} + (k_M - k_{RF})b_A$$
$$10\% = 5\% + (k_M - k_{RF})1.0$$
$$(k_M - k_{RF}) = 5\%.$$

68. Market risk premium

Answer: d Diff: E

$$12.25\% = 5\% + (RP_M)1.15$$
$$7.25\% = (RP_M)1.15$$
$$RP_M = 6.3043\% \approx 6.30\%.$$

69. Beta coefficient

Answer: b Diff: E

In equilibrium

$$k_A = \hat{k}_A = 11.3\%.$$
$$k_A = k_{RF} + (k_M - k_{RF})b$$
$$11.3\% = 5\% + (10\% - 5\%)b$$
$$b = 1.26.$$

70. Beta coefficient

Answer: a Diff: E

$$13.75\% = 5\% + (7\%)b$$
$$8.75\% = 7\%b$$
$$b = 1.25.$$

71. Portfolio beta

Answer: b Diff: E

$$1.2 = 1/20(0.7) + (19/20)b$$

b is average beta for other 19 stocks.

$$1.165 = (19/20)b.$$
$$\text{New Beta} = 1.165 + 1/20(1.4) = 1.235.$$

72. Portfolio return

Answer: a Diff: E

The portfolio's beta is a weighted average of the individual security betas as follows:

$$(\$50,000/\$75,000)1.5 + (\$25,000/\$75,000)0.9 = 1.3.$$

The required rate of return is then simply: $4\% + (6\% - 4\%)1.3 = 6.6\%$.

73. Portfolio return

Answer: b Diff: E

$$\hat{k}_p = 0.9(12\%) + 0.1(20\%) = 12.8\%.$$
$$b_p = 0.9(1.2) + 0.1(2.0) = 1.28.$$

74. Portfolio risk and return**Answer: a Diff: E N**

The correct answer is statement a. Remember, you can take the weighted average of the beta, and the weighted average of the returns, but you can only take the weighted average of the standard deviations if $r = 1.0$.

The total portfolio value will be $\$900,000 + \$300,000 = \$1,200,000$.

Expected return:

$$\frac{\$900,000}{\$1,200,000} \times 12\% + \frac{\$300,000}{\$1,200,000} \times 10\% = 11.5\%.$$

Beta:

$$\frac{\$900,000}{\$1,200,000} \times 1.2 + \frac{\$300,000}{\$1,200,000} \times 1.2 = 1.2.$$

$$\begin{aligned}\sigma &= [0.75(12\% - 11.5\%)^2 + 0.25(10\% - 11.5\%)^2]^{\frac{1}{2}} \\ &= [0.1875\% + 0.56250\%]^{\frac{1}{2}} \\ &= [0.75\%]^{\frac{1}{2}} \\ &= 0.86603\%.\end{aligned}$$

75. Coefficient of variation**Answer: b Diff: E**

Using your financial calculator you find the mean to be 10.8% and the population standard deviation to be 15.715%. The coefficient of variation is just the standard deviation divided by the mean, or $15.715\%/10.8\% = 1.4551 \approx 1.46$.

76. Expected return**Answer: e Diff: M**

$$\begin{aligned}\hat{k}_x &= 0.10(-3\%) + 0.10(2\%) + 0.25(5\%) + 0.25(8\%) + 0.30(10\%) = 6.15\%. \\ \hat{k}_y &= 0.05(-3\%) + 0.10(2\%) + 0.30(5\%) + 0.30(8\%) + 0.25(10\%) = 6.45\%.\end{aligned}$$

$$\begin{aligned}\sigma_x^2 &= 0.10(-3\% - 6.15\%)^2 + 0.10(2\% - 6.15\%)^2 + 0.25(5\% - 6.15\%)^2 \\ &\quad + 0.25(8\% - 6.15\%)^2 + 0.30(10\% - 6.15\%)^2 \\ \sigma_x^2 &= 15.73\%; \quad \sigma_x = 3.97\%.\end{aligned}$$

$$CV_x = 3.97\%/6.15\% = 0.645.$$

$$\begin{aligned}\sigma_y^2 &= 0.05(-3\% - 6.45\%)^2 + 0.10(2\% - 6.45\%)^2 + 0.30(5\% - 6.45\%)^2 \\ &\quad + 0.30(8\% - 6.45\%)^2 + 0.25(10\% - 6.45\%)^2 \\ \sigma_y^2 &= 10.95\%; \quad \sigma_y = 3.31\%.\end{aligned}$$

$$CV_y = 3.31\%/6.45\% = 0.513.$$

Therefore, Asset Y has a higher expected return and lower coefficient of variation and hence it would be preferred.

77. **Expected return** **Answer: c Diff: M**

$$\hat{k}_J = (0.2)(0.10) + (0.6)(0.15) + (0.2)(0.20) = 0.15 = 15.0\%.$$

Expected return = 15.0%.

$$\sigma_J^2 = (0.2)(0.10 - 0.15)^2 + 0.6(0.15 - 0.15)^2 + (0.2)(0.20 - 0.15)^2 = 0.001.$$

Standard deviation = $\sqrt{0.001} = 0.0316 = 3.16\%$.

78. **Required return** **Answer: c Diff: M**

Step 1: Solve for risk-free rate

$$15\% = k_{RF} + (10\% - k_{RF})2.0$$

$$15\% = k_{RF} + 20\% - 2k_{RF}$$

$$k_{RF} = 5\%.$$

Step 2: Calculate new market return

$$k_M \text{ increases by } 30\%, \text{ so } k_M = 1.3(10\%) = 13\%.$$

Step 3: Calculate new required return on stock

$$k_s = 5\% + (13\% - 5\%)2 = 21\%.$$

Step 4: Calculate percentage change in return on stock

$$\frac{21\% - 15\%}{15\%} = 40\%.$$

79. **Required return** **Answer: c Diff: M**

$$\text{Before: } k_s = 15\% = k_{RF} + (5\%)0.7; k_{RF} = 15\% - 3.5\%; k_{RF} = 11.5\%.$$

$$\text{New } k_{RF} = 11.5\% + 2.0\% = 13.5\%.$$

$$\text{New beta} = 0.7 \times 1.5 = 1.05.$$

After: New required rate of return:

$$k_s = 13.5\% + (5\%)1.05 = 18.75\%.$$

80. **Required return** **Answer: e Diff: M**

Step 1: Calculate the market risk premium ($k_M - k_{RF}$) using the information for Partridge:

$$13\% = 6\% + (k_M - k_{RF})1.4$$

$$k_M - k_{RF} = 5\%.$$

Step 2: Now calculate the required return for Cleaver:

$$k_s = 6\% + (5\%)0.8 = 10\%.$$

81. **Expected and required returns** **Answer: c Diff: M**

Use the calculator's regression function to find β_j . It is -0.6600.

Find k_{RF} . Note that $RP_M = k_M - k_{RF}$, so

$$4\% = 12\% - k_{RF}$$

$$k_{RF} = 8\%.$$

$$\text{Find } k_J = 8\% + 4\%(-0.66) = 5.36\%.$$

$$\Delta = 8.00\% - 5.36\% = 2.64\%.$$

82. Expected and required returns**Answer: b Diff: M**

By calculating the required returns on each of the securities and comparing required and expected returns, we can identify which security is the best investment alternative; that is, the security for which the expected return exceeds the required return by the largest amount. The expected and required returns and the differences between them are shown below:

<u>Security</u>	<u>Expected Return</u>	<u>Required Return</u>	<u>Expected-Required</u>
A	9.01%	$7\% + 2\%(1.7) = 10.40\%$	-1.39%
B	7.06%	$7\% + 2\%(0.0) = 7.00\%$	0.06%
C	5.04%	$7\% + 2\%(-0.67) = 5.66\%$	-0.62%
D	8.74%	$7\% + 2\%(0.87) = 8.74\%$	0.00%
E	11.50%	$7\% + 2\%(2.50) = 12.00\%$	-0.50%

Clearly, security B is the best alternative.

83. CAPM and required return**Answer: e Diff: M**

$b_{HR} = 2.0$; $b_{LR} = 0.5$. No changes occur.

$k_{RF} = 10\%$. Decreases by 3% to 7%.

$k_M = 15\%$. Falls to 11%.

Now SML: $k_i = k_{RF} + (k_M - k_{RF})b_i$.

$k_{HR} = 7\% + (11\% - 7\%)2 = 7\% + 4\%(2) = 15\%$

$k_{LR} = 7\% + (11\% - 7\%)0.5 = 7\% + 4\%(0.5) = \underline{9\%}$
 Difference $\underline{\underline{6\%}}$

84. CAPM and required return**Answer: a Diff: M N**

An index fund will have a beta of 1.0. If k_M is 12 percent (given in the problem) and the risk-free rate is 7 percent, you can calculate the market risk premium (RP_M).

$$k_s = k_{RF} + (RP_M)b$$

$$12\% = 7\% + (RP_M)1.0$$

$$5\% = RP_M.$$

Now, you can use the RP_M , the k_{RF} , and the two stock's betas to calculate their required returns.

Bradley:

$$k_s = k_{RF} + (RP_M)b$$

$$= 7\% + (5\%)1.3$$

$$= 7\% + 6.5\%$$

$$= 13.5\%.$$

Douglas:

$$k_s = k_{RF} + (RP_M)b$$

$$= 7\% + (5\%)0.7$$

$$= 7\% + 3.5\%$$

$$= 10.5\%.$$

The difference in their required returns is:
 $13.5\% - 10.5\% = 3.0\%.$

85. CAPM and required return**Answer: d Diff: M**

$$b_X = 1.6; b_Y = 0.7; k_{RF} = 7\%; k_M = 12\%.$$

Inflation increases by 1%, but k^* remains constant. k_{RF} increases by 1%; k_M rises to 14%.

Before inflation change:

$$k_X = 7\% + 5\%(1.6) = 15\%.$$

$$k_Y = 7\% + 5\%(0.7) = 10.5\%.$$

After inflation change:

$$k_X = 8\% + (14\% - 8\%)1.6 = 17.6\%.$$

$$k_Y = 8\% + (14\% - 8\%)0.7 = 12.2\%.$$

$$k_X - k_Y = 17.6\% - 12.2\% = 5.4\%.$$

86. CAPM and required return**Answer: e Diff: M**

$$k_A = 6\% + (11\% - 6\%)b_A.$$

Calculate b_A as follows using a financial calculator:

6 Input 8 $\Sigma+$

-8 Input 3 $\Sigma+$

-8 Input -2 $\Sigma+$

18 Input 12 $\Sigma+$

0 $\blacksquare \hat{y}, m$

\blacksquare swap $b_A = 0.4534$.

$$k_A = 6\% + 5\%(0.4534) = 8.2669\% \approx 8.27\%$$

87. CAPM and required return**Answer: a Diff: M**

With your financial calculator input the following:

-2 Input 8 $\Sigma+$

12 Input 3 $\Sigma+$

-8 Input 18 $\Sigma+$

21 Input -7 $\Sigma+$

0 $\blacksquare \hat{y}, m$

\blacksquare swap $b_C = -0.76$.

$$k_C = 8\% + (14\% - 8\%)(-0.76) = 8\% - 4.58\% = 3.42\%.$$

88. Portfolio return**Answer: c Diff: M**

Calculate b_X and b_Y for the stocks using the regression function of a calculator.

$$b_X = 0.7358; b_Y = 1.3349.$$

$$k_X = 7\% + 5\%(0.7358) = 10.679\%.$$

$$k_Y = 7\% + 5\%(1.3349) = 13.6745\%.$$

$$k_p = 14/20(10.679\%) + 6/20(13.6745\%) = 11.58\%.$$

89. Portfolio return**Answer: b Diff: M**

Statement b is correct; all the other statements are false. If the market risk premium increases by 2 percent and k_{RF} remains unchanged, then the portfolio's return will increase by $2\%(1.08) = 2.16\%$. Statement a is false, since $k_p = 6\% + (5\%)b_p$. The portfolio's beta is calculated as $0.7(1.2) + 0.3(0.8) = 1.08$. Therefore, $k_p = 6\% + 5\%(1.08) = 11.4\%$. Statement c is false. If k_{RF} increases by 2 percent, but RP_M remains unchanged, the portfolio's return will increase by 2 percent. Statement d is false. Market efficiency states that the expected return should equal the required return; therefore, $\hat{k}_p = k_p = 11.4\%$.

90. Portfolio return**Answer: c Diff: M**

Find the initial portfolio's beta and its required return. Then, find the new beta and new required return. Then subtract the two.

Step 1: The portfolio beta is the weighted average beta of the stocks in the portfolio. The total invested is \$70 million (\$10 + \$20 + \$40).

$$b_{old} = \left(\frac{\$10}{\$70}\right)(1.4) + \left(\frac{\$20}{\$70}\right)(1.0) + \left(\frac{\$40}{\$70}\right)(0.8)$$

$$b_{old} = 0.9429.$$

$$\begin{aligned} k_{old} &= k_{RF} + (k_M - k_{RF})b \\ &= 5\% + (5.5\%)(0.9429) \\ &= 10.1857\%. \end{aligned}$$

Step 2: Now, change the weights. The amount of X owned is now \$25 million (\$10 + \$15), the amount of Y owned is now \$0 million, and the amount of Z owned is \$45 million (\$40 + \$5).

$$b_{New} = \left(\frac{\$25}{\$70}\right)(1.4) + \left(\frac{\$0}{\$70}\right)(1.0) + \left(\frac{\$45}{\$70}\right)(0.8)$$

$$b_{New} = 1.0143.$$

$$\begin{aligned} k_{New} &= k_{RF} + (k_M - k_{RF})b \\ &= 5\% + (5.5\%)(1.0143) \\ &= 10.5786\%. \end{aligned}$$

Step 3: Now subtract the two returns:
 $10.5786\% - 10.1857\% = 0.3929\%$.

91. Portfolio return**Answer: b Diff: M N**

Data given:

$$\begin{array}{ll} k_{RF} = 5.5\% & \text{Current portfolio} = \$10 \text{ million} \\ RP_M = 6\% & k_p = 12\% \end{array}$$

Step 1: Calculate the portfolio's current beta.

$$\begin{aligned} k_s &= k_{RF} + (RP_M)b \\ 12\% &= 5.5\% + (6\%)b \\ 1.0833 &= b. \end{aligned}$$

The portfolio beta is the weighted average of the betas of the individual stocks in the portfolio. If you sell \$3 million of a stock that has a beta of 1.6, what will be the beta of the remaining stocks?

Step 2: Calculate the beta of the remaining stocks in the portfolio.

$$\begin{aligned} 1.0833 &= (\$3/\$10)(1.6) + (\$7/\$10)X \\ 0.6033 &= (\$7/\$10)X \\ 0.8619 &= X. \end{aligned}$$

0.8619 is the beta of the \$7 million of stocks that remain. Now what happens to the portfolio beta when the new stock is added?

Step 3: Calculate the new portfolio's beta.

$$\begin{aligned} b &= (\$7/\$10)(0.8619) + (\$3/\$10)(0.7) \\ &= 0.6033 + 0.21 \\ &= 0.8133. \end{aligned}$$

Step 4: Calculate the new portfolio's required return.

$$\begin{aligned} k_s &= k_{RF} + (RP_M)b \\ &= 5.5\% + (6\%)0.8133 \\ &= 5.5\% + 4.88\% \\ &= 10.38\%. \end{aligned}$$

92. Portfolio return**Answer: a Diff: M N**

The aggressive growth mutual fund has an expected return of:

$$k_{AGMF} = 6\% + (5\%)1.6 = 14\%.$$

The S&P 500 index fund has an expected return of:

$$k_{SP500} = 6\% + 1.0(5\%) = 11\%.$$

So, to get the return she desires, Erika must solve for X, the percentage of her portfolio invested in the S&P 500 index fund:

$$\begin{aligned} 12.5\% &= 0.10(6\%) + (0.90 - X)(14\%) + X(11\%) \\ 11.9\% &= 12.6\% - 14\%X + 11\%X \\ -0.7\% &= -3\%X \\ 0.2333 &= X. \end{aligned}$$

So invest 23.33% in the S&P 500 index fund, invest 66.67% in the aggressive growth fund, and invest 10.00% in the risk-free asset. (Note that the percentage totals must add up so that 100% of the funds are invested.)

93. CAPM and portfolio return**Answer: d Diff: M**

$$b_p = \frac{\$100,000}{\$300,000} (0.8) + \frac{\$150,000}{\$300,000} (1.2) + \frac{\$50,000}{\$300,000} (1.8)$$
$$b_p = 1.1667.$$

Last year: $k = 13\%$
 $13\% = 7\% + RP_M(1.1667)$
 $6\% = RP_M(1.1667)$
 $RP_M = 5.1429\%.$

This year:
 $k = 7\% + (5.1429\% + 2\%)1.1667$
 $k = 15.33\%.$

94. CAPM and portfolio return**Answer: b Diff: M**

Step 1: Determine the returns on each of the 3 assets:

$$k_{RF} = 5\%; k_M - k_{RF} = 6\%.$$

$$k_{RF} = 5\%.$$

$$\begin{aligned} k_{Index} &= k_{RF} + (k_M - k_{RF})b \\ &= 5\% + (6\%)(1.0) \\ &= 11\%. \end{aligned}$$

$$\begin{aligned} k_{Int'l} &= 5\% + (6\%)(1.5) \\ &= 14\%. \end{aligned}$$

Step 2: Let X be the portion of the portfolio invested in the international fund, and let $(0.8 - X)$ be the portion invested in the index fund:

$$\begin{aligned} 11\% &= 0.2(k_{RF}) + (X)(k_{Int'l}) + (0.8 - X)(k_{Index}) \\ 11\% &= 0.2(5\%) + (14\%)X + (0.8)(11\%) - (11\%)X \\ 11\% &= 1\% + 14\%X + 8.8\% - 11\%X \\ 11\% - 1\% - 8.8\% &= (14\% - 11\%)X \\ 1.2\% &= 3\%X \\ X &= 0.4. \end{aligned}$$

Therefore, 40 percent should be invested in the international fund.

95. CAPM and portfolio return**Answer: c Diff: M**

You are given the required return on the portfolio, the RP_M , and enough information to calculate the beta of the original portfolio. With this information you can find k_{RF} . Once you have k_{RF} , you can find the required return on Stock C.

Step 1: Find the portfolio beta:

Take a weighted average of the individual stocks' betas to find the portfolio beta. The total amount invested in the portfolio is:
\$4 million + \$2 million + \$2 million + \$1 million + \$1 million
= \$10 million.

The weighted average portfolio beta is:

$$b_p = \left(\frac{\$4}{\$10}\right)(1.2) + \left(\frac{\$2}{\$10}\right)(1.1) + \left(\frac{\$2}{\$10}\right)(1.0) + \left(\frac{\$1}{\$10}\right)(0.7) + \left(\frac{\$1}{\$10}\right)(0.5)$$
$$b_p = 1.02.$$

Step 2: Use the CAPM and the portfolio's required return to calculate k_{RF} , the risk-free rate:

$$k_p = k_{RF} + RP_M(b_p)$$
$$11\% = k_{RF} + 5\%(1.02)$$
$$5.9\% = k_{RF}.$$

Step 3: Use the CAPM to calculate the required return on Stock C:

$$k_C = k_{RF} + RP_M(b_C)$$
$$k_C = 5.9\% + 5\%(1.0)$$
$$k_C = 10.9\%.$$

96. CAPM and portfolio return**Answer: c Diff: M**

Step 1: Determine the market risk premium from the CAPM:

$$0.14 = 0.06 + (k_M - k_{RF})1.6$$
$$(k_M - k_{RF}) = 0.05.$$

Step 2: Calculate the beta of the new portfolio:

$$\text{The beta of the new portfolio is } (\$200,000/\$1,200,000)(0.6) + (\$1,000,000/\$1,200,000)(1.6) = 1.4333.$$

Step 3: Calculate the required return on the new portfolio:

$$\text{The required return on the new portfolio is:}$$
$$6\% + (5\%)(1.4333) = 13.16667\% \approx 13.17\%.$$

97. CAPM and portfolio return**Answer: c Diff: M**

Step 1: Determine the beta of your portfolio:

$$9\% = 5\% + (11\% - 5\%)b$$
$$b = 0.66667.$$

Step 2: Determine the beta of your sister's portfolio:

$$\text{Sister's beta} = 0.66667 \times 2 = 1.3333.$$

Step 3: Determine the required return of your sister's portfolio:

$$5\% + (11\% - 5\%)(1.3333) = 13\%.$$

98. CAPM and portfolio return**Answer: b Diff: M N**

$k_A = 10\%$; $b_A = 1.0$; $b_B = 2.0$; $k_{RF} = 5\%$; $k_P = 12\%$; $X = \%$ of Stock B in portfolio.

Step 1: Determine market risk premium, RP_M .

$$\begin{aligned}k_A &= 0.05 + RP_M(1.0) \\0.10 &= 0.05 + RP_M(1.0) \\RP_M &= 0.05.\end{aligned}$$

Step 2: Calculate expected return of Stock B.

$$k_B = 0.05 + 0.05(2.0) = 0.15.$$

Let $X\%$ of Portfolio P be in Stock B, so $(1 - X)\%$ is in Stock A. The expected return of Portfolio P is the weighted average of the expected returns of the two stocks.

$$\begin{aligned}0.12 &= 0.15X + (1 - X)(0.10). \\0.12 &= 0.15X + 0.10 - 0.10X \\0.02 &= 0.05X \\X &= 0.40 = 40\%.\end{aligned}$$

99. Portfolio beta**Answer: b Diff: M**

$$\begin{aligned}\text{Before: } 1.15 &= 0.95(b_R) + 0.05(1.0) \\0.95(b_R) &= 1.10 \\b_R &= 1.1579.\end{aligned}$$

$$\text{After: } b_P = 0.95(b_R) + 0.05(2.0) = 1.10 + 0.10 = 1.20.$$

100. Portfolio beta**Answer: c Diff: M**

After additional investments are made, for the entire fund to have an expected return of 13.5%, the portfolio must have a beta of 1.25 as shown by $13.5\% = 6\% + (6\%)b$. Since the fund's beta is a weighted average of the betas of all the individual investments, we can calculate the required beta on the additional investment as follows:

$$\begin{aligned}1.25 &= \frac{(\$200,000,000 \times 1.2)}{\$250,000,000} + \frac{(\$50,000,000 \times X)}{\$250,000,000} \\1.25 &= 0.96 + 0.2X \\0.29 &= 0.2X \\X &= 1.45.\end{aligned}$$

101. Portfolio beta**Answer: e Diff: M**

Find the beta of the original portfolio (b_{old}) as $10.75\% = 4\% + (9\% - 4\%)b_{old}$ or $b_{old} = 1.35$. To achieve an expected return of 11.5%, the new portfolio must have a beta (b_{New}) of $11.5\% = 4\% + (9\% - 4\%)b_{New}$ or $b_{New} = 1.5$. To construct a portfolio with a $b_{New} = 1.5$, the added stocks must have an average beta (b_{Avg}) such that:

$$1.5 = (\$250,000/\$750,000)b_{Avg} + (\$500,000/\$750,000)1.35$$

$$1.5 = 0.333b_{Avg} + 0.90$$

$$0.6 = 0.333b_{Avg}$$

$$b_{Avg} = 1.8.$$

102. Portfolio return and beta**Answer: a Diff: M**

Step 1: Calculate the beta of the original portfolio:

Right now, the total dollars invested in the portfolio is:

$\$300 + \$200 + \$500 = \$1,000$ million. The portfolio's beta is:

$$b = 0.7(\$300/\$1,000) + 1.0(\$200/\$1,000) + 1.6(\$500/\$1,000) \\ = 1.21.$$

Step 2: Calculate the market risk premium using the CAPM, given the original beta calculated in Step 1:

$$k_p = k_{RF} + (k_M - k_{RF})b$$

$$11.655\% = 5\% + (k_M - k_{RF})1.21$$

$$6.655\% = 1.21(k_M - k_{RF})$$

$$5.5\% = k_M - k_{RF}.$$

Step 3: Calculate the new portfolio's beta:

Now, if she changes her portfolio and gets rid of Stock 3 (with a beta of 1.6) and replaces it with Stock 4 (with a beta of 0.9), the new portfolio's beta will be:

$$b = 0.7(\$300/\$1,000) + 1.0(\$200/\$1,000) + 0.9(\$500/\$1,000) \\ = 0.86.$$

Step 4: Calculate the new portfolio's required return:

The required return will be:

$$k_p = 5.0\% + 5.5\%(0.86)$$

$$k_p = 9.73\%.$$

103. Portfolio return and beta**Answer: e Diff: M**

You need to find the beta of the portfolio now and after the change. Then, use the betas in the CAPM to find the two different returns.

Step 1: Determine the betas of the two portfolios:

The total amount invested in the portfolios is: \$300 + \$560 + \$320 + \$230 = \$1,410 million. (Note that the 2nd portfolio changes only in the composition of the stocks, not the amount invested.)

$$\begin{aligned} b_{\text{old}} &= (\$300/\$1,410)1.2 + (\$560/\$1,410)1.4 + (\$320/\$1,410)0.7 + \\ &\quad (\$230/\$1,410)1.8 \\ &= 1.2638. \end{aligned}$$

Now, create the new portfolio by selling \$280 million of Stock 2 and reinvesting it in Stock 4. The new portfolio's beta will be:

$$\begin{aligned} b_{\text{New}} &= (\$300/\$1,410)1.2 + [(\$560 - \$280)/\$1,410]1.4 + \\ &\quad (\$320/\$1,410)0.7 + [(\$230 + \$280)/\$1,410]1.8 \\ &= 1.3433. \end{aligned}$$

Step 2: Determine the returns of the two portfolios:

$$\begin{aligned} k_{\text{pOld}} &= k_{\text{RF}} + (k_{\text{M}} - k_{\text{RF}})b \\ &= 5\% + (5\%)1.2638 \\ &= 11.3190\%. \end{aligned}$$

$$\begin{aligned} k_{\text{pNew}} &= k_{\text{RF}} + (k_{\text{M}} - k_{\text{RF}})b \\ &= 5\% + (5\%)1.3433 \\ &= 11.7165\%. \end{aligned}$$

The difference is: $11.7165\% - 11.3190\% = 0.3975\% \approx 0.40\%$.

104. Portfolio return and beta**Answer: e Diff: M N**

The total portfolio is worth \$10,000,000 so the beta of the portfolio is: $(2/10) \times 0.6 + (3/10) \times 0.8 + (3/10) \times 1.2 + (2/10) \times 1.4 = 1.0$.

$k_p = 10\%$; $b_p = 1$. With this, we can determine the market risk premium (RP_M):

$$\begin{aligned} 10\% &= k_{\text{RF}} + (RP_M)b_p \\ 10\% &= 5\% + (RP_M)1.0 \\ 5\% &= RP_M. \end{aligned}$$

The manager wants an expected return $k_p = 12\%$. So, the manager needs a portfolio with a beta of 1.4. To check this:

$$\begin{aligned} k_p &= k_{\text{RF}} + (RP_M)b_p \\ &= 5\% + (5\%)1.4 = 12\%. \end{aligned}$$

The manager has \$2,000,000 to invest in a stock with a beta of X. With this stock, the new portfolio beta is:

$$\begin{aligned} (2/10)X + (3/10) \times 0.8 + (3/10) \times 1.2 + (2/10) \times 1.4 &= 1.4. \\ 0.2X + 0.24 + 0.36 + 0.28 &= 1.4 \\ 0.2X &= 0.52 \\ X &= 2.60. \end{aligned}$$

$$b_X = 2.60.$$

105. Portfolio standard deviation**Answer: a Diff: M**

Fill in the columns for "XY" and "product," and then use the formula to calculate the standard deviation. We did each $(k - \hat{k})^2 P$ calculation with a calculator, stored the value, did the next calculation and added it to the first one, and so forth. When all three calculations had been done, we recalled the stored memory value, took its square root, and had $\sigma_{XY} = 8.1\%$.

<u>Probability</u>	<u>Portfolio XY</u>	<u>Product</u>
0.1	-5.0%	-0.5%
0.8	17.5	14.0
0.1	30.0	3.0
		$\hat{k} = \underline{16.5\%}$

$$\sigma_{xy} = (\sum (k - \hat{k})^2 P)^{1/2} = 8.07\% \approx 8.1\%.$$

106. Coefficient of variation**Answer: e Diff: M N**

$$\begin{aligned}\hat{k} &= (0.1)(-23\%) + (0.1)(-8\%) + (0.4)(6\%) + (0.2)(17\%) + (0.2)(24\%) \\ &= -2.3\% + -0.8\% + 2.4\% + 3.4\% + 4.8\% \\ &= 7.5\%.\end{aligned}$$

$$\sigma = [0.1(-23\% - 7.5\%)^2 + 0.1(-8\% - 7.5\%)^2 + 0.4(6\% - 7.5\%)^2 + 0.2(17\% - 7.5\%)^2 + 0.2(24\% - 7.5\%)^2]^{1/2}$$

$$\sigma = [93.025\% + 24.025\% + 0.9\% + 18.05\% + 54.45\%]^{1/2}$$

$$\sigma = 13.80036\%.$$

$$\begin{aligned}CV &= \sigma / \hat{k} \\ &= 13.80036\% / 7.5\% \\ &= 1.84.\end{aligned}$$

107. Coefficient of variation**Answer: b Diff: M**

The expected rate of return will equal $0.25(25\%) + 0.5(15\%) + 0.25(5\%) = 15\%$.

The variance of the expected return is:

$$0.25(25\% - 15\%)^2 + 0.5(15\% - 15\%)^2 + 0.25(5\% - 15\%)^2 = 0.0050.$$

The standard deviation is the square root of $0.0050 = 0.0707$.

$$\text{And, } CV = 0.0707 / 0.15 = 0.47.$$

108. Coefficient of variation**Answer: c Diff: M**

$CV = \text{Standard deviation} / \text{Expected return}.$

$$\begin{aligned}\text{Expected return} &= 0.1(-60\%) + 0.2(-10\%) + 0.4(15\%) + 0.2(40\%) + 0.1(90\%) \\ &= 15\%.\end{aligned}$$

$$\begin{aligned}\text{Standard deviation} &= [0.1(-60\% - 15\%)^2 + 0.2(-10\% - 15\%)^2 + 0.4(15\% - 15\%)^2 \\ &\quad + 0.2(40\% - 15\%)^2 + 0.1(90\% - 15\%)^2]^{1/2} \\ &= 37.081\%.\end{aligned}$$

$$CV = 37.081\% / 15\% = 2.4721.$$

109. Coefficient of variation**Answer: c Diff: M**

Expected return for stock A is $0.3(12\%) + 0.4(8\%) + 0.3(6\%) = 8.6\%$.

Expected return for stock B is $0.3(5\%) + 0.4(4\%) + 0.3(3\%) = 4\%$.

Standard deviation for stock A is:

$$[0.3(12\% - 8.6\%)^2 + 0.4(8\% - 8.6\%)^2 + 0.3(6\% - 8.6\%)^2]^{1/2} = 2.3749\%.$$

Similarly, the standard deviation for stock B is 0.7746%.

$$CV_A = 2.3749\% / 8.6\% = 0.28.$$

$$CV_B = 0.7746\% / 4\% = 0.19.$$

110. Coefficient of variation**Answer: d Diff: M**

$$\begin{aligned}\hat{k} &= 0.2(-5\%) + 0.4(10\%) + 0.2(20\%) + 0.1(25\%) + 0.1(50\%) \\ &= -1\% + 4\% + 4\% + 2.5\% + 5\% \\ &= 14.5\%.\end{aligned}$$

$$\sigma = [0.2(-5\% - 14.5\%)^2 + 0.4(10\% - 14.5\%)^2 + 0.2(20\% - 14.5\%)^2 + 0.1(25\% - 14.5\%)^2 + 0.1(50\% - 14.5\%)^2]^{1/2}$$

$$\sigma = (0.0076 + 0.0008 + 0.0006 + 0.0011 + 0.0126)^{1/2}$$

$$\sigma = 0.1507.$$

$$\begin{aligned}CV &= \sigma / \hat{k} \\ &= 0.1507 / 0.145 \\ &= 1.039 \approx 1.04.\end{aligned}$$

111. Coefficient of variation**Answer: b Diff: M**

Step 1: Calculate the mean for the data:

$$\begin{aligned}\hat{k} &= 0.25(5\%) + 0.50(15\%) + 0.25(30\%) \\ &= 16.25\%.\end{aligned}$$

Step 2: Calculate the population standard deviation for the data:

$$\begin{aligned}\sigma &= [0.25(5\% - 16.25\%)^2 + 0.5(15\% - 16.25\%)^2 + 0.25(30\% - 16.25\%)^2]^{1/2} \\ &= (0.003164 + 0.000078 + 0.004727)^{1/2} \\ &= (0.007969)^{1/2} = 0.089268 = 8.9268\%.\end{aligned}$$

The coefficient of variation is $8.9268\% / 16.25\% = 0.54934$.

112. Coefficient of variation**Answer: b Diff: M**

$$E(\text{ROE}) = (0.2 \times -24\%) + (0.3 \times -3\%) + (0.3 \times 15\%) + (0.2 \times 50\%)$$

$$E(\text{ROE}) = -4.8\% - 0.9\% + 4.5\% + 10\%$$

$$E(\text{ROE}) = 8.8\%.$$

$$\sigma_{\text{ROE}} = [0.2(-24\% - 8.8\%)^2 + 0.3(-3\% - 8.8\%)^2 + 0.3(15\% - 8.8\%)^2 + 0.2(50\% - 8.8\%)^2]^{1/2}$$

$$\sigma_{\text{ROE}} = [215.168\% + 41.772\% + 11.532\% + 339.488\%]^{1/2}$$

$$\sigma_{\text{ROE}} = [607.960\%]^{1/2} = 24.6568\%.$$

$$CV = \frac{24.6568\%}{8.8\%} = 2.80.$$

113. Coefficient of variation**Answer: e Diff: M**

CV is equal to the standard deviation divided by the average return.

Step 1: Determine the population standard deviation using your calculator:

10 Σ^+

12 Σ^+

27 Σ^+

15 +/- Σ^+

30 Σ^+

Then select ■ σ_x, σ_y to find 15.9925%.

Step 2: Determine the mean return using your calculator:

■ \bar{x}, \bar{y} to find $\bar{x} = 12.8\%$.

Step 3: Determine the coefficient of variation:

$$CV = 15.9925\% / 12.8\%$$

$$= 1.2494 \approx 1.25.$$

114. Beta coefficient**Answer: a Diff: M**

First find the portfolio's beta:

$$15\% = 6\% + (6\%)b_p$$

$$9\% = 6\%b_p$$

$$b_p = 1.5.$$

Let b_c be the beta of the company for which she works. The portfolio's beta is a weighted average of the individual betas of the stocks in the portfolio.

$$\text{Therefore, } 1.5 = (\$5,000/\$20,000)1.2 + (\$15,000/\$20,000)b_c.$$

$$1.5 = 0.3 + 0.75b_c$$

$$1.2 = 0.75b_c$$

$$b_c = 1.6.$$

115. Beta coefficient**Answer: e Diff: M**

Step 1: Determine the portfolio's beta:

The portfolio's beta is the weighted average of the betas of the individual stocks in the portfolio.

$$b_p = 0.3(b_X) + 0.7(b_Y)$$

$$b_p = 0.3(0.75) + 0.7(b_Y)$$

We have two unknowns. However, we can solve for the portfolio's beta by using the CAPM:

$$k_p = k_{RF} + (k_M - k_{RF})b_p.$$

For the portfolio, we have:

$$12\% = 6\% + (5\%)b_p$$

$$6\% = (5\%)b_p$$

$$1.2 = b_p.$$

Step 2: Solve for Stock Y's beta:

$$b_p = 0.3(0.75) + 0.7(b_Y)$$

$$1.2 = 0.225 + 0.7(b_Y)$$

$$0.975 = 0.7(b_Y)$$

$$b_Y = 1.3929 \approx 1.39.$$

116. CAPM and beta coefficient**Answer: d Diff: M**

Portfolio beta is found from the CAPM:

$$17\% = 7\% + (14\% - 7\%)b_p$$

$$b_p = 1.4286.$$

The portfolio beta is a weighted average of the betas of the stocks within the portfolio.

$$1.4286 = (\$2/\$15)(0.8) + (\$5/\$15)(1.1) + (\$3/\$15)(1.4) + (\$5/\$15)b_D$$

$$1.4286 = 0.1067 + 0.3667 + 0.2800 + (5/15)b_D$$

$$0.6752 = 5/15b_D$$

$$b_D = 2.026.$$

117. Market return**Answer: d Diff: M**

$$b = \frac{\text{Rise}}{\text{Run}} = \frac{\Delta Y}{\Delta X} = \frac{22 - 16}{15 - 11} = \frac{6}{4} = 1.5.$$

$$k_s = 15\% = 9\% + (k_M - 9\%)1.5$$

$$6\% = (k_M - 9\%)1.5$$

$$4\% = k_M - 9\%$$

$$k_M = 13\%.$$

118. Portfolio required return**Answer: a Diff: T**

Step 1: Find the beta of the original portfolio by taking a weighted average of the individual stocks' betas. We calculate a beta of 1.3.

$$\left[\left(\frac{\$300,000}{\$1,600,000} \right) (0.6) + \left(\frac{\$300,000}{\$1,600,000} \right) (1) + \left(\frac{\$500,000}{\$1,600,000} \right) (1.4) + \left(\frac{\$500,000}{\$1,600,000} \right) (1.8) \right]$$

Step 2: Find the market risk premium using the original portfolio. $k_s = 0.125 = 0.06 + (k_M - k_{RF})1.3$. If you substitute for all the values you know, you calculate a market risk premium of 0.05.

Step 3: Calculate the new portfolio's beta.

The question asks for the new portfolio's required rate of return. We have all of the necessary information except the new portfolio's beta. Now, Stock 1 has 0 weight (we sold it) and Stock 4 has a weight of $\$800,000/\$1,600,000 = 0.5$. The portfolio's new beta is:

$$\left(\frac{\$300,000}{\$1,600,000} \right) (1) + \left(\frac{\$500,000}{\$1,600,000} \right) (1.4) + \left(\frac{\$800,000}{\$1,600,000} \right) (1.8) = 1.525.$$

Step 4: Find the portfolio's required return.

$$\text{Thus, } k_s = 0.06 + (0.05)1.525 = 13.625\% \approx 13.63\%.$$

119. CAPM and portfolio return**Answer: d Diff: E N**

This is a straight-forward application of the CAPM. We are given the risk-free rate, the market risk premium, and the portfolio beta.

$$k_p = k_{RF} + (k_M - k_{RF})b_p$$

$$k_p = 5\% + (6\%)1.2$$

$$k_p = 12.2\%.$$

120. CAPM and portfolio return

Answer: c Diff: M N

We must calculate the beta of the new portfolio. From the definition of beta, we can solve for the new portfolio beta:

$$\text{Portfolio beta} = \frac{\sum_{i=1}^{10} b_i}{10}. \quad b_i \text{ is the beta for the 10 individual stocks.}$$

$$1.2 = \frac{\sum_{i=1}^{10} b_i}{10}$$

$$12 = \sum_{i=1}^{10} b_i.$$

So, if the portfolio manager sells a stock that has a beta of 0.9 and replaces it with a stock with a beta of 1.6, that means the sum of the betas for the new portfolio is 0.7 higher than before. Dividing the new sum of betas by 10 gives us the new portfolio beta.

$$\begin{aligned} 12.7/10 &= b_p \\ 1.27 &= b_p. \end{aligned}$$

Alternatively, you can calculate the portfolio's new beta as follows:

$$\begin{aligned} 1.2 &= 0.9b_r + 0.1(0.9) \\ 1.11 &= 0.9b_r \\ 1.2333 &= b_r; \text{ beta of remaining stocks in portfolio.} \end{aligned}$$

$$\begin{aligned} b_p &= 0.9(1.2333) + 0.1(1.6) \\ &= 1.11 + 0.16 \\ &= 1.27. \quad (\text{beta of new portfolio}) \end{aligned}$$

Now, we can calculate the required return of the new portfolio.

$$\begin{aligned} k_p &= k_{RF} + (k_M - k_{RF})b_p \\ k_p &= 5\% + 6\%(1.27) \\ k_p &= 12.62\%. \end{aligned}$$

WEB APPENDIX 5A SOLUTIONS

5A-1. Beta calculation

Answer: b Diff: M

5A-2. Beta calculation

Answer: c Diff: E

$$\begin{aligned}\text{Rise/Run} &= (Y_1 - Y_0) / (X_1 - X_0) = (J_{\text{Year } 2} - J_{\text{Year } 1}) / (M_{\text{Year } 2} - M_{\text{Year } 1}) \\ &= (22.90\% - (-13.85\%)) / (12.37\% - (-8.63\%)) = 36.75\% / 21.0\% \\ \text{beta} &= 1.75.\end{aligned}$$

5A-3. Beta and base year sensitivity

Answer: a Diff: M

Year 1-Year 2 data:

$$\begin{aligned}\text{Rise/Run} &= (Y_1 - Y_0) / (X_1 - X_2) \\ &= (-3.7\% - 6.30\%) / (12.90\% - 6.10\%) = -10.0\% / 6.8\% \\ \text{beta} &= -1.47.\end{aligned}$$

Year 2 - Year 3 data:

$$\text{beta} = (21.71\% - (-3.70\%)) / (16.20\% - 12.90\%) = 25.41\% / 3.3\% = 7.70.$$

Difference:

$$\text{beta}_{Y_2 - Y_3} - \text{beta}_{Y_1 - Y_2} = 7.70 - (-1.47) = 9.17.$$

5A-4. Beta calculation

Answer: b Diff: M

Calculate beta of stock X:

Enter into 10-B market return first!

$$b_x = 0.9484.$$

$$k = k_{RF} + (k_M - k_{RF})b_p$$

$$14\% = 6\% + 6\%b_p$$

$$8\% = 6\%b$$

$$b_p = 1.333.$$

$$b_p = 0.6(b_x) + 0.4(b_Y)$$

$$1.333 = 0.6(0.9484) + 0.4b_Y$$

$$0.7643 = 0.4b_Y$$

$$b_Y = 1.9107 \approx 1.91.$$

5A-5. Beta calculation**Answer: c Diff: E**

Using the linear regression function of the HP 10-B calculator, enter the market return and the corresponding stock return and find the slope of the predicted regression line. Slope = $b = 1.2757$.

5A-6. Beta calculation**Answer: a Diff: E**

Enter the following input data in the calculator:

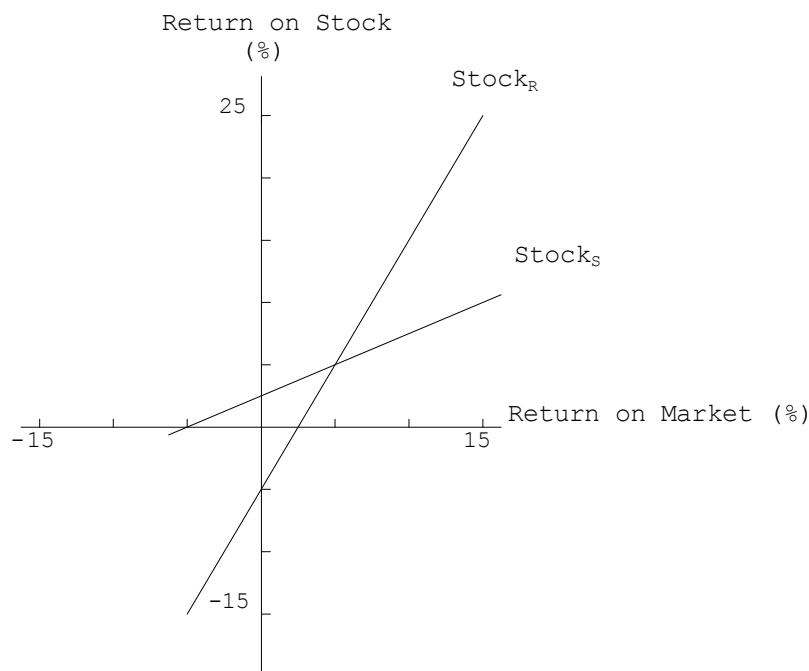
```

8      INPUT  12 Σ+
28     INPUT  34 Σ+
20 +/- INPUT  29 +/- Σ+
4 +/- INPUT  11 +/- Σ+
30     INPUT  45 Σ+
Press 0 ■  $\hat{y}_m$  ■ SWAP to find beta = 1.432  $\approx$  1.43.

```

5A-7. Beta calculation**Answer: c Diff: M**

a. Plot the returns of Stocks R and S and the market.



b. Calculate beta using the rise over run method or calculator regression function.

$$\frac{Y_2 - Y_1}{X_2 - X_1} = \text{beta}$$

Stock_R: $\frac{25 - 5}{15 - 5} = \frac{20}{10} = 2.0 = \text{beta}_R$.

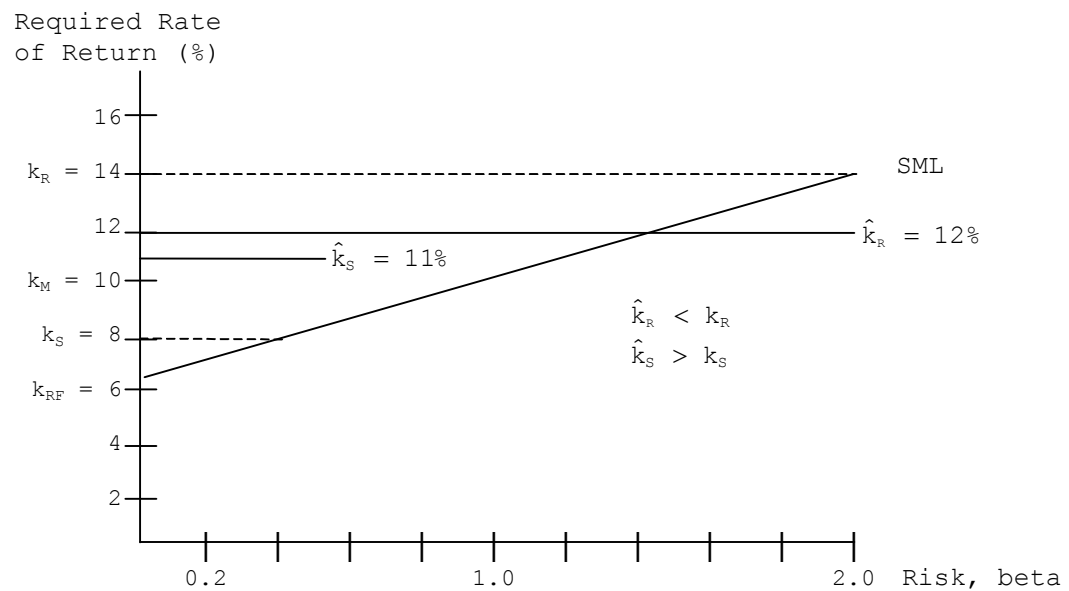
Stock_S: $\frac{10 - 5}{15 - 5} = \frac{5}{10} = 0.5 = \text{beta}_S$.

c. The difference in betas is: $\text{Beta}_R - \text{Beta}_S = 2.0 - 0.5 = 1.5$.

5A-8. Required rate of return

Answer: e Diff: M

a. Draw SML.



b. Calculate required returns for Stocks R and S.

$$k_R = 6\% + (10\% - 6\%)2.0 = 14\%.$$

$$k_S = 6\% + (10\% - 6\%)0.5 = 8\%.$$

c. Calculate the difference between the expected and required returns.

$$\hat{k}_R - k_R = 12\% - 14\% = -2.0\%.$$

$$\hat{k}_S - k_S = 11\% - 8\% = 3.0\%.$$

d. Widest margin = $\hat{k}_S - k_S = 3.0\%$.