

CHAPTER 2 RISK AND RETURN: PART I
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(Difficulty: E = Easy, M = Medium, and T = Tough)

True-False

Easy:

(2.2) Payoff matrix

Answer: a Diff: E

- ¹. If we develop a weighted average of the possible return outcomes, multiplying each outcome or "state" by its respective probability of occurrence for a particular stock, we can construct a payoff matrix of expected returns.

- a. True
- b. False

(2.2) Standard deviation

Answer: a Diff: E

- ². The tighter the probability distribution of expected future returns, the smaller the risk of a given investment as measured by the standard deviation.

- a. True
- b. False

(2.2) Coefficient of variation

Answer: a Diff: E

- ³. The coefficient of variation, calculated as the standard deviation divided by the expected return, is a standardized measure of the risk per unit of expected return.

- a. True
- b. False

(2.2) Risk comparisons

Answer: a Diff: E

- ⁴. The coefficient of variation is a better measure of risk than the standard deviation if the expected returns of the securities being compared differ significantly.

- a. True
- b. False

(2.3) Risk and expected return

Answer: a Diff: E

- ⁵. Companies should deliberately increase their risk relative to the market only if the actions that increase the risk also increase the expected rate of return on the firm's assets by enough to completely compensate for the higher risk.

- a. True
- b. False

(2.2) Risk aversion

Answer: a Diff: E

- ⁶. When investors require higher rates of return for investments that demonstrate higher variability of returns, this is evidence of risk aversion.

a. True
b. False

(2.3) CAPM and risk

Answer: a Diff: E

- ⁷. One key result of applying the Capital Asset Pricing Model is that the risk and return of an individual security should be analyzed by how that security affects the risk and return of the portfolio in which it is held.

a. True
b. False

(2.3) CAPM and risk

Answer: a Diff: E

- ⁸. According to the Capital Asset Pricing Model, investors are primarily concerned with portfolio risk, not the isolated risks of individual stocks. Thus, the relevant risk is an individual stock's contribution to the overall riskiness of the portfolio.

a. True
b. False

(2.3) Portfolio risk

Answer: b Diff: E

- ⁹. When adding new securities to an existing portfolio, the higher or more positive the degree of correlation between the new securities and those already in the portfolio, the greater the benefits of the additional portfolio diversification.

a. True
b. False

(2.3) Portfolio risk

Answer: b Diff: E

- ¹⁰. Portfolio diversification reduces the variability of the returns on each security held in the portfolio.

a. True
b. False

(2.3) Portfolio return

Answer: b Diff: E

- ¹¹. The realized portfolio return is the weighted average of the relative weights of securities in the portfolio multiplied by their respective expected returns.

a. True
b. False

(2.3) Market risk **Answer: a Diff: E**

¹². Market risk refers to the tendency of a stock to move with the general stock market. A stock with above-average market risk will tend to be more volatile than an average stock, and it will definitely have a beta which is greater than 1.0.

- a. True
- b. False

(2.3) Market risk **Answer: b Diff: E**

¹³. Diversifiable risk, which is measured by beta, can be lowered by adding more stocks to a portfolio.

- a. True
- b. False

(2.3) Beta coefficient **Answer: a Diff: E**

¹⁴. A security's beta measures its nondiversifiable (or market) risk relative to that of most other securities.

- a. True
- b. False

(2.3) Beta coefficient **Answer: a Diff: E**

¹⁵. 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 one stock.

- a. True
- b. False

(2.3) Changes in beta **Answer: b Diff: E**

¹⁶. A firm cannot change its beta through any managerial decision because betas are completely market determined.

- a. True
- b. False

(2.5) Required return **Answer: b Diff: E**

¹⁷. The required return on a firm's common stock is determined by the firm's market risk. If its market risk is known, and if it is expected to remain constant, the analyst has sufficient information to specify the firm's required return.

- a. True
- b. False

(2.5) SML **Answer: b Diff: E**

¹⁸. The slope of the SML is determined by the value of beta.

- a. True
- b. False

(2.5) SML and risk aversion

Answer: a Diff: E

¹⁹. If investors become more averse to risk, the slope of the Security Market Line (SML) will increase.

- a. True
- b. False

(Comp: 2.3, 2.5) Physical assets

Answer: a Diff: E

²⁰. Businesses earn returns for security holders by purchasing and operating physical assets. The relevant risk of any physical asset must be measured in terms of its effect on the risk of the firm's securities.

- a. True
- b. False

Medium:

(2.2) Variance

Answer: b Diff: M

²¹. Variance is a measure of the variability of returns and since it involves squaring each deviation of the required return from the expected return, it is always larger than its square root, the standard deviation.

- a. True
- b. False

(2.2) Expected return

Answer: a Diff: M

²². If the expected rate of return for a particular investment, as seen by the marginal investor, exceeds its required rate of return, we should soon observe an increase in demand for the investment, and the price will likely increase until a price is established that equates the expected return with the required return.

- a. True
- b. False

(2.2) Coefficient of variation

Answer: b Diff: M

²³. Because of differences in the expected returns of different securities, the standard deviation is not always an adequate measure of risk. However, the coefficient of variation will always allow an investor to properly compare the relative risks of any two securities.

- a. True
- b. False

(2.2) Risk aversion

Answer: b Diff: M

²⁴. Risk aversion implies that some securities will go unpurchased in the market even if a large risk premium is paid to investors.

- a. True
- b. False

(2.2) Risk premium and risk aversion **Answer: a Diff: M**

²⁵. Risk aversion is a general dislike for risk and a preference for certainty. That is, investors would be willing to give up a risk premium of return in order to obtain a lower return with certainty.

- a. True
- b. False

(2.3) Portfolio risk **Answer: a Diff: M**

²⁶. Portfolio A has but one security, while Portfolio B has 100 securities. Because of diversification effects, we would expect Portfolio B to have the lower relevant risk, but it is possible for Portfolio A to be less risky.

- a. True
- b. False

(2.3) Portfolio risk **Answer: b Diff: M**

²⁷. Portfolio A has but one security, while Portfolio B has 100 securities. Because of diversification, we know that Portfolio B will have the lower market risk; that is, Portfolio B will have the lower beta.

- a. True
- b. False

(2.3) Reducing portfolio risk **Answer: a Diff: M**

²⁸. While the portfolio return is a weighted average of realized security returns, portfolio risk is not necessarily a weighted average of the standard deviations of the securities in the portfolio. It is this aspect of portfolios that allows investors to combine stocks and actually reduce the riskiness of a portfolio.

- a. True
- b. False

(2.3) Portfolio risk and return **Answer: b Diff: M**

²⁹. The distributions of rates of return for Companies AA and BB are given below:

<u>State of Economy</u>	<u>Probability of State Occurring</u>	<u>AA</u>	<u>BB</u>
Boom	0.2	30%	-10%
Normal	0.6	10	5
Recession	0.2	-5	50

We can conclude from the above information that any rational risk-averse investor will add Security AA to a well-diversified portfolio over Security BB.

- a. True
- b. False

(2.3) Correlation coefficient and risk

Answer: b Diff: M

³⁰. Even if the correlation between the returns on two different securities is perfectly positive, if the securities are combined in the correct unequal proportions, the resulting portfolio can have less risk than either security held alone.

- a. True
- b. False

(2.3) Company-specific risk

Answer: b Diff: M

³¹. When a firm makes bad managerial judgements or has unforeseen negative events happen to it that affect its returns, these random events are unpredictable and therefore cannot be diversified away by the investor.

- a. True
- b. False

(2.3) Portfolio risk and beta

Answer: b Diff: M

³². If I know for sure that the market will have a positive return over the next year, to maximize my rate of return, I should increase the beta of my portfolio.

- a. True
- b. False

(2.3) Beta coefficient

Answer: a Diff: M

³³. A portfolio with a beta of minus 2 has the same degree of risk to its holder, relative to the market, as a portfolio with a beta of plus 2. However, the holder of either portfolio could lower his or her risk exposure by buying some "normal" stocks.

- a. True
- b. False

(2.3) Portfolio beta

Answer: a Diff: M

³⁴. We will generally find that the beta of a diversified portfolio is more stable over time than the beta of a single security.

- a. True
- b. False

(2.3) Changes in beta

Answer: a Diff: M

³⁵. Any change in beta is likely to affect the required rate of return on a security, which implies that a change in beta will likely have an impact on the security's price.

- a. True
- b. False

(2.3) Diversification effects

Answer: a Diff: M

³⁶. If an investor buys enough stocks, he or she can, through diversification, eliminate all of the non-market risk inherent in owning stocks, but as a general rule it will not be possible to eliminate all market risk.

- a. True
- b. False

(2.5) CAPM

Answer: a Diff: M

³⁷. The CAPM is built on expected conditions, although we are limited in most cases to using past data in applying it. Betas used in the CAPM, calculated using historical data, are always subject to changes in future volatility and this is a limitation on the use of the CAPM.

- a. True
- b. False

(2.5) CAPM and inflation

Answer: b Diff: M

³⁸. If the price of money increases due to greater anticipated inflation, the risk-free rate will reflect this fact. Although r_{RF} will increase, it is possible that the SML required rate of return for a stock will decrease because the market risk premium ($r_M - r_{RF}$) will decrease. (Assume that beta remains constant.)

- a. True
- b. False

(2.5) Market risk premium

Answer: a Diff: M

³⁹. Since the market return represents the return on an average stock, that return carries risk with it. As a result, there exists a market risk premium which is the amount over and above the risk-free rate that is required to compensate an investor for assuming an average amount of risk.

- a. True
- b. False

(2.5) SML

Answer: a Diff: M

⁴⁰. If you plotted the returns of a given stock against those of the market, and if 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 into the future.

- a. True
- b. False

(2.5) SML

Answer: b Diff: M

⁴¹. The Y-axis intercept of the SML indicates the return on the individual asset when the realized return on an average stock ($\beta = 1.0$) is zero.

- a. True
- b. False

Multiple Choice: Conceptual

Easy:

(2.1) Risk concepts

Answer: e Diff: E

⁴². 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 β 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.

(2.2) Risk measures

Answer: a Diff: E

⁴³. 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 β than Company Y.

Given this information, which of the following statements is most correct?

- a. Company X has a lower coefficient of variation.
- b. Company X has more company-specific risk.
- c. Company X is a better stock to buy.
- d. Statements a and b are correct.
- e. Statements a, b, and c are correct.

(2.3) Portfolio risk and return

Answer: a Diff: E

⁴⁴. 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 which is 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.

(Comp: 2.3, 2.5) Beta coefficient

Answer: d Diff: E

⁴⁵. 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.

(2.5) SML

Answer: a Diff: E

⁴⁶. 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.

(2.5) SML

Answer

⁴⁷. 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, $(r_M - r_{RF})$.
- 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.

(2.5) SML

Answer: c Diff: E

⁴⁸. 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.

(2.5) SML, CAPM, and beta

Answer: e Diff: E

⁴⁹. 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 above statements is correct.

(2.5) Risk analysis and portfolio diversification

Answer: d Diff: E

⁵⁰. 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.

Medium:

(2.2) Market equilibrium

Answer: a Diff: M

- ⁵¹. For markets to be in equilibrium, that is, for there to be no strong pressure for prices to depart from their current levels,
- a. The expected rate of return must be equal to the required rate of return; that is, $\hat{r} = r$.
 - b. The past realized rate of return must be equal to the expected rate of return; that is, $r = \hat{r}$.
 - c. The required rate of return must equal the realized rate of return; that is, $r = \bar{r}$.
 - d. All three of the statements above must hold for equilibrium to exist; that is, $\hat{r} = r = \bar{r}$.
 - e. None of the statements above is correct.

(2.3) Risk aversion

Answer: b Diff: M

- ⁵². You have developed the following data on three stocks:

Stock	Standard Deviation	Beta
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

(2.3) Portfolio risk and return

Answer: c Diff: M

- ⁵³. 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 they 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).

(2.3) Portfolio risk

Answer: e Diff: M

⁵⁴. 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. Answers a and c are correct.
- e. Answers b and c are correct.

(2.3) Portfolio risk and beta

Answer: e Diff: M

⁵⁵. 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 which 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, i.e., 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.

(2.3) Portfolio diversification

Answer: c Diff: M

⁵⁶. 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.

(2.3) Market risk

Answer: b Diff: M

⁵⁷. Inflation, recession, and high interest rates are economic events which 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.

(2.3) Risk analysis and portfolio diversification

Answer: e Diff: M

⁵⁸. 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. Answers a, b, and c are correct.
- e. Answers b and c are correct.

(2.4) Beta coefficient

Answer: a Diff: M

⁵⁹. 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 riskless (default-free) rate of return, r_{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 true.

(2.4) Beta coefficient**Answer: a Diff: M**

⁶⁰. 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 which leads you to believe that the stock market is likely to be very strong in the immediate future, i.e., you are confident that 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, i.e., 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 true.
- e. Statements a and c are true.

(2.4) Beta coefficient**Answer: d Diff: M**

⁶¹. You have developed data which 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. $b_A < -1$; $b_B = 1$

(2.4) Beta coefficient

Answer: c Diff: M

⁶². 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 which 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.

(2.5) Portfolio risk and beta

Answer: c Diff: M

⁶³. 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 answers above are correct.
- e. Answers a and c are correct.

(2.5) SML and risk aversion

Answer: e Diff: M

⁶⁴. 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, r_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. Answers a and b are correct.
- e. None of the statements above is correct.

(2.5) Portfolio return

Answer: b Diff: M

⁶⁵. The risk-free rate, r_{RF} , is 6 percent and the market risk premium, $(r_M - r_{RF})$, 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 above answers is correct.

(2.5) SML

Answer: e Diff: M

⁶⁶. 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 true.

(2.5) SML

Answer: a Diff: M

⁶⁷. 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 steeper slope.
- b. Up and have less steep slope.
- c. Up and keep same slope.
- d. Down and keep same slope.
- e. Down and have less steep slope.

(2.5) SML

Answer: b Diff: M

⁶⁸. Which of the following statements is most correct about a stock which has a beta = 1.2?

- a. If the stock's beta 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. Answers a, b, and c are correct.
- e. Answers b and c are correct.

(2.5) SML, CAPM, and portfolio risk

Answer: a Diff: M

⁶⁹. 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 averse to risk, 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.

(2.5) Portfolio return, CAPM, and beta

Answer: e Diff: M

⁷⁰. Which of the following statements is most correct?

- a. If the returns from two stocks are perfectly positively correlated (i.e., the correlation coefficient is +1) and the two stocks have equal variance, an equally weighted portfolio of the two stocks will have a variance which 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 which has a beta equal to 0.5.
- e. None of the statements above is correct.

(2.5) CAPM and required returns

Answer: d Diff: M

⁷¹. 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. Both statements a and b are correct.
- e. All of the statements above are correct.

(2.5) Portfolio risk and SML

Answer: e Diff: M

⁷². Which of the following statements is most correct?

- a. It is possible to have a situation where 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:

(2.5) CAPM

Answer: c Diff: T

⁷³. 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:

$$r_i = r_{RF} + (r_M - r_{RF})b_i.$$

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 $r_M = 15\%$, and that r_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 r_{RF} .
- d. Statements a and b are true.
- e. Statements a and c are true.

(2.5) SML

Answer: d Diff: T

⁷⁴. Which of the following statements is most correct?

- a. If investors become more risk averse, but r_{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 and thus 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, r_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 r_{RF} .
- e. Statements a, b, c, and d are false.

Multiple Choice: Problems

Easy:

(2.3) Portfolio beta

Answer: b Diff: E

⁷⁵. You hold a diversified portfolio consisting of a \$10,000 investment in each of 20 different common stocks (i.e., your total investment is \$200,000). The portfolio beta is equal to 1.2. You have decided to sell one of your stocks which has a beta equal to 0.7 for \$10,000. You plan to use the proceeds to purchase another stock which 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

(2.3) Portfolio return

Answer: b Diff: E

⁷⁶. You are an investor in common stock, and you currently hold a well-diversified portfolio which 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. $\hat{r}_p = 20.0\%$; $b_p = 2.00$
- b. $\hat{r}_p = 12.8\%$; $b_p = 1.28$
- c. $\hat{r}_p = 12.0\%$; $b_p = 1.20$
- d. $\hat{r}_p = 13.2\%$; $b_p = 1.40$
- e. $\hat{r}_p = 14.0\%$; $b_p = 1.32$

(2.5) Required return

Answer: a Diff: E

⁷⁷. Calculate the required rate of return for Mars Inc.'s stock. The Mars's beta is 1.2, the rate on a T-bill is 4 percent, the rate on a long-term T-bond is 6 percent, the expected return on the market is 11.5 percent, the market has averaged a 14 percent annual return over the last six years, and Mars has averaged a 14.4 return over the last six years.

- a. 12.6%
- b. 13.2%
- c. 14.0%
- d. 15.6%
- e. 16.2%

(2.5) Required return

Answer: d Diff: E

⁷⁸. 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%

(2.5) CAPM and required return

Answer: e Diff: E

⁷⁹. 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 r_{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%

(2.5) Beta coefficient

Answer: b Diff: E

⁸⁰. Given the following information, determine which beta coefficient for Stock A is consistent with equilibrium:

$$r_A = 11.3\%; r_{RF} = 5\%; r_M = 10\%$$

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

(2.5) Beta coefficient

Answer: a Diff: E

⁸¹. 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

(2.5) Market risk premium

Answer: d Diff: E

⁸². 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%

Medium:

(2.2) Expected return

Answer: e Diff: M

- ⁸³. Assume that a new law is passed which 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 (i.e., the probability distributions) are as follows:

Asset X		Asset Y	
P	r	P	r
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.

(2.2) Expected return

Answer: c Diff: M

- ⁸⁴. Given the following probability distribution, what is the expected return and the standard deviation of returns for Security J?

State	P_i	r_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%

(2.2) Coefficient of variation**Answer: b Diff: M**

⁸⁵. 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? (Assume that the standard deviation is calculated using the probability statistic.)

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

(2.2) Coefficient of variation**Answer: c Diff: M**

⁸⁶. 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? (Use the population standard deviation to calculate the coefficient of variation.)

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

(2.2) Coefficient of variation**Answer: c Diff: M**

- ⁸⁷. The following probability distributions of returns for two stocks have been estimated:

<u>Probability</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

(2.3) Portfolio beta**Answer: b Diff: M**

- ⁸⁸. 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

(2.4) Market return**Answer: d Diff: M**

- ⁸⁹. The returns on 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%

(2.5) Required return

Answer: c Diff: M

⁹⁰. You are holding a stock which 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%

(2.5) Required return

Answer: c Diff: M

⁹¹. 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 which 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%

(2.5) CAPM and required return

Answer: d Diff: M

⁹². Your portfolio consists of \$100,000 invested in a stock which has a beta = 0.8, \$150,000 invested in a stock which has a beta = 1.2, and \$50,000 invested in a stock which 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%

(Comp: 2.3, 2.5) **Portfolio beta**

Answer: c Diff: M

- ⁹³. 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

(Comp: 2.3, 2.5) **Portfolio beta**

Answer: e Diff: M

- ⁹⁴. 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

(Comp: 2.3, 2.5) **Portfolio return**

Answer: a Diff: M

- ⁹⁵. An investor is forming a portfolio by investing \$50,000 in stock A which has a beta of 1.50, and \$25,000 in stock B which 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. None of the answers above is correct.

(2.5) Beta coefficient

Answer: a Diff: M

- ⁹⁶. An investor has \$5,000 invested in a stock which 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

(2.5) CAPM and required return

Answer: d Diff: M

- ⁹⁷. 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 r_{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%

(2.5) Expected and required returns

Answer: b Diff: M

- ⁹⁸. You have been scouring *The Wall Street Journal* looking for stocks that are "good values" and have calculated the expected returns for five stocks. Assume the risk-free rate (r_{RF}) is 7 percent and the market risk premium ($r_M - r_{RF}$) 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

(Comp: 2.3, 2.5) CAPM and beta coefficient

Answer: d Diff: M

- ⁹⁹. 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, r_{RF} , is 7 percent and the return on the market, r_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

Tough:

(Comp: 2.3, 2.5) Portfolio required return

Answer: a Diff: T

¹⁰⁰. 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%

Financial Calculator Section

Multiple Choice: Problems

Easy:

(2.2) Coefficient of variation

Answer: b Diff: E

¹⁰¹. Below are the stock returns for the past five years for Agnew Industries:

<u>Year</u>	<u>Stock Return</u>
1	22%
2	33
3	1
4	-12
5	10

What was the stock's coefficient of variation during this five-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:

(2.3) Portfolio standard deviation

Answer: a Diff: M

¹⁰². 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%

(2.5) CAPM and required return

Answer: e Diff: M

¹⁰³. 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%

(2.5) CAPM and required return

Answer: a Diff: M

¹⁰⁴. Some returns data for the market and for Countercyclical Corp. are given below:

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

(Comp: 2.4, 2.5) Expected and required returns

Answer: c Diff: M

- ¹⁰⁵. The realized returns for the market and Stock J for the last 4 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%

(Comp: 2.3, 2.4, 2.5) Portfolio return

Answer: c Diff: M

- ¹⁰⁶. 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>
1	11%	10%	12%
2	7	4	-3
3	17	12	21
4	-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 which 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%

Nonmultiple Choice Problems

Tough:

(Comp: 2.3, 2.4, 2.5) Required return on stock

Diff: T

¹⁰⁷. Assume that the following returns were earned on Stock Y and the market during the last eight years:

Year	r_Y	r_M	Year	r_Y	r_M
2009	14%	20%	2005	6	10
2008	9	10	2004	-1	-5
2007	1	-5	2003	11	20
2006	11	15	2002	9	15
Average return				7.5%	10%
Standard deviation				5.18%	10%

- What is Stock Y's beta coefficient? (Hint: Use a calculator with statistical functions to determine the least squares line.)
- If the expected value of r_M is 10 percent and r_{RF} is 6 percent, what is the required rate of return on Stock Y?
- Suppose that in January, 2010, investors learn that Firm Y will, in the future, face much greater competition, and investors conclude that Stock Y will, in the future, be exposed to much higher nondiversifiable risk. Expected future profits and dividends, however, are unchanged (although the uncertainty about profits and dividends does increase). What effect is this knowledge likely to have on Stock Y's market price, on the realized rate of return on Stock Y during 2009, on the required rate of return on the stock, and on the expected rate of return on the stock in the future?
- Suppose that during 2010 Stock Y had a return of minus 5 percent, while the market return was 20 percent. What would this do to the calculated beta coefficient for Stock Y? (Hint: Add the new data point and recalculate beta.)
- Use the CAPM to calculate the required rate of return for Stock Y. Assume $r_M = 10$ percent and $r_{RF} = 6$ percent.
- How does this new estimate of r_Y compare with the estimate based on data through 2009? Does this seem reasonable?

CHAPTER 2

ANSWERS AND SOLUTIONS

1.		
2.	(2.2) Payoff matrix	Answer: a Diff: E
3.	(2.2) Standard deviation	Answer: a Diff: E
4.	(2.2) Coefficient of variation	Answer: a Diff: E
5.	(2.2) Risk comparisons	Answer: a Diff: E
6.	(2.3) Risk and expected return	Answer: a Diff: E
7.	(2.2) Risk aversion	Answer: a Diff: E
8.	(2.3) CAPM and risk	Answer: a Diff: E
9.	(2.3) CAPM and risk	Answer: a Diff: E
10.	(2.3) Portfolio risk	Answer: b Diff: E
11.	(2.3) Portfolio risk	Answer: b Diff: E
12.	(2.3) Portfolio return	Answer: b Diff: E
13.	(2.3) Market risk	Answer: a Diff: E
14.	(2.3) Market risk	Answer: b Diff: E
15.	(2.3) Beta coefficient	Answer: a Diff: E
16.	(2.3) Beta coefficient	Answer: a Diff: E
17.	(2.3) Changes in beta	Answer: b Diff: E
18.	(2.5) Required return	Answer: b Diff: E
19.	(2.5) SML	Answer: b Diff: E
20.	(2.5) SML and risk aversion	Answer: a Diff: E
21.	(Comp: 2.3, 2.5) Physical assets	Answer: a Diff: E
22.	(2.2) Variance	Answer: b Diff: M
23.	(2.2) Expected return	Answer: a Diff: M
24.	(2.2) Coefficient of variation	Answer: b Diff: M
25.	(2.2) Risk aversion	Answer: b Diff: M

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25. (2.2) Risk premium and risk aversion Answer: a Diff: M
26. (2.3) Portfolio risk Answer: a Diff: M
27. (2.3) Portfolio risk Answer: b Diff: M
28. (2.3) Reducing portfolio risk Answer: a Diff: M
29. (2.3) Portfolio risk and return Answer: b Diff: M
30. (2.3) Correlation coefficient and risk Answer: b Diff: M
31. (2.3) Company-specific risk Answer: b Diff: M
32. (2.3) Portfolio risk and beta Answer: b Diff: M
33. (2.3) Beta coefficient Answer: a Diff: M
34. (2.3) Portfolio beta Answer: a Diff: M
35. (2.3) Changes in beta Answer: a Diff: M
36. (2.3) Diversification effects Answer: a Diff: M
37. (2.5) CAPM Answer: a Diff: M
38. (2.5) CAPM and inflation Answer: b Diff: M
39. (2.5) Market risk premium Answer: a Diff: M
40. (2.5) SML Answer: a Diff: M
41. (2.5) SML Answer: b Diff: M
42. (2.1) Risk concepts Answer: e Diff: E
43. (2.2) Risk measures Answer: a Diff: E
Statement a is true, since the coefficient of variation is equal to the standard deviation divided by the mean. The remaining statements are false.
44. (2.3) 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 beta of the portfolio will equal 1.2. Because the stocks' correlation coefficient is less than one, the portfolio's standard deviation will be lower than 20 percent.
45. (Comp: 2.3, 2.5) Beta coefficient Answer: d Diff: E
46. (2.5) SML Answer: a Diff: E
The slope of the SML is determined by the size of the market risk premium, $r_M - r_{RF}$, which depends on investor risk aversion.

-
59. (2.4) Beta coefficient Answer: a Diff: M
60. (2.4) Beta coefficient Answer: a Diff: M
61. (2.4) Beta coefficient Answer: d Diff: M
62. (2.4) Beta coefficient Answer: c Diff: M
63. (2.5) Portfolio risk and beta Answer: c Diff: M
64. (2.5) SML and risk aversion Answer: e Diff: M
65. (2.5) 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 r_{RF} remains unchanged, then the portfolio's return will increase by $2\%(1.08) = 2.16\%$. Statement a is false, since $r_p = 6\% + (5\%)b_p$. The portfolio's beta is calculated as $0.7(1.2) + 0.3(0.8) = 1.08$. Therefore, $r_p = 6\% + 5\%(1.08) = 11.4\%$. Statement c is false. If r_{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, $\hat{r}_p = r_p = 11.4\%$.
66. (2.5) SML Answer: e Diff: M
67. (2.5) SML Answer: a Diff: M
68. (2.5) SML Answer: b Diff: M
69. (2.5) SML, CAPM, and portfolio risk Answer: a Diff: M
An increase in expected inflation would lead to an increase in r_{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 r_M that is equal to the expected increase in inflation.
70. (2.5) 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 $r_s = r_{RF} + (r_M - r_{RF})b$. 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.

71. (2.5) CAPM and required returns Answer: d Diff: M
72. (2.5) Portfolio risk and SML Answer: e Diff: M
73. (2.5) CAPM Answer: c Diff: T
74. (2.5) SML Answer: d Diff: T
75. (2.3) Portfolio beta Answer: b Diff: E
 $1.2 = 1/20(0.7) + (9/20)b$
 b is average beta for other 19 stocks.
 $1.165 = (19/20)b$
 $\text{New Beta} = 1.165 + 1/20(1.4) = 1.235$.
- 76
- ?. (2.3) Portfolio return Answer: b Diff: E
 $\hat{r}_p = 0.9(12\%) + 0.1(20\%) = 12.8\%$
 $b_p = 0.9(1.2) + 0.1(2.0) = 1.28$.
77. (2.5) Required return Answer: a Diff: E
 $r_s = 6\% + (11.5\% - 6\%)1.2 = 12.6\%$.
78. (2.5) Required return Answer: d Diff: E
 $r_{RF} = r^* + IP = 3\% + 5\% = 8\%$
 $r_s = 8\% + (5\%)2.0 = 18\%$.
79. (2.5) CAPM and required return Answer: e Diff: E
 $b_{HR} = 2.0$; $b_{LR} = 0.5$. No changes occur.
 $r_{RF} = 10\%$. Decreases by 3% to 7%.
 $r_M = 15\%$. Falls to 11%.
 Now SML: $r_i = r_{RF} + (r_M - r_{RF})b_i$.
 $r_{HR} = 7\% + (11\% - 7\%)2 = 7\% + 4\%(2) = 15\%$
 $r_{LR} = 7\% + (11\% - 7\%)0.5 = 7\% + 4\%(0.5) = \underline{\underline{9\%}}$
 Difference 6%
- 80
- ?. (2.5) Beta coefficient Answer: b Diff: E
 In equilibrium
 $r_A = \hat{r} = 11.3\%$
 $r_A = r_{RF} + (r_M - r_{RF})b$
 $11.3\% = 5\% + (10\% - 5\%)b$
 $b = 1.26$.
- 81
- ?. (2.5) Beta coefficient Answer: a Diff: E
 $13.75\% = 5\% + (7\%)b$
 $8.75\% = 7\%b$
 $b = 1.25$.
- 82
- ?. (2.5) Market risk premium Answer: d Diff: E
 $12.25\% = 5\% + (RP_M)1.15$

$$7.25\% = (RP_M)1.15$$

$$RP_M = 6.30\%.$$

83

?. **(2.2) Expected return** **Answer: e Diff: M**

$$\hat{r} = 0.10(-3\%) + 0.10(2\%) + 0.25(5\%) + 0.25(8\%) + 0.30(10\%) = 6.15\%.$$

$$\hat{r}_Y = 0.05(-3\%) + 0.10(2\%) + 0.30(5\%) + 0.30(8\%) + 0.25(10\%) = 6.45\%.$$

$$\sigma_x^2 = 0.10(-3\% - 6.15\%)^2 + 0.10(2\% - 6.15\%)^2 + 0.25(5\% - 6.15\%)^2$$

$$+ 0.25(8\% - 6.15\%)^2 + 0.30(10\% - 6.15\%)^2$$

$$= 15.73; \quad \sigma_x = 3.97.$$

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

$$\sigma_y^2 = 0.05(-3\% - 6.45\%)^2 + 0.10(2\% - 6.45\%)^2 + 0.30(5\% - 6.45\%)^2$$

$$+ 0.30(8\% - 6.45\%)^2 + 0.25(10\% - 6.45\%)^2$$

$$= 10.95; \quad \sigma_y = 3.31.$$

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

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

84. **(2.2) Expected return** **Answer: c Diff: M**

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

Expected return = 15.0%.

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

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

85

?. **(2.2) 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 $0.0050 = 0.0707$. And, $CV = 0.0707/0.15 = 0.47$.

86. **(2.2) Coefficient of variation** **Answer: c Diff: M**

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

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

$$= 15\%.$$

$$\text{Standard deviation} = [0.1(-60\% - 15\%)^2 + 0.2(-10\% - 15\%)^2 + 0.4(15\% - 15\%)^2$$

$$+ 0.2(40\% - 15\%)^2 + 0.1(90\% - 15\%)^2]^{1/2}$$

$$= 1,375^{1/2}$$

$$= 37.081\%.$$

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

87

?. **(2.2) 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%.
 $CV_A = 2.3749\%/8.6\% = 0.28$.
 $CV_B = 0.7746\%/4\% = 0.19$.

88

?. **(2.3) Portfolio beta** **Answer: b Diff: M**

Before: $1.15 = 0.95(b_R) + 0.05(1.0)$
 $0.95(b_R) = 1.10$
 $b_R = 1.158$.

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

89

?. **(2.4) Market return** **Answer: d Diff: M**

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

$$\begin{aligned}
 r_s &= 15\% = 9\% + (r_M - 9\%)1.5 \\
 6\% &= (r_M - 9\%)1.5 \\
 4\% &= r_M - 9\% \\
 r_M &= 13\%.
 \end{aligned}$$

90

?. **(2.5) Required return** **Answer: c Diff: M**

Step 1 Solve for risk-free rate
 $r_s = 15\% = r_{RF} + (10\% - r_{RF})2.0 = r_{RF} + 20\% - 2r_{RF}$
 $r_{RF} = 5\%$.

Step 2 Calculate new market return
 r_M increases by 30%, so $r_M = 1.3(10\%) = 13\%$.

Step 3 Calculate new required return on stock
 $r_s = 5\% + (13\% - 5\%)2 = 21\%$.

Step 4 Calculate percentage change in return on stock
 $\frac{21\% - 15\%}{15\%} = 40\%$.

91. **(2.5) Required return** **Answer: c Diff: M**

Before: $r_s = 15\% = r_{RF} + (5\%)0.7$; $r_{RF} = 15\% - 3.5\%$; $r_{RF} = 11.5\%$.
 New $r_{RF} = 11.5\% + 2.0\% = 13.5\%$.
 New beta = $0.7 \times 1.5 = 1.05$.

After: New required rate of return:
 $r_s = 13.5\% + (5\%)1.05 = 18.75\%$.

92

?. **(2.5) CAPM and required return** **Answer: d Diff: M**

$$\begin{aligned}
 b_P &= \frac{\$100,000}{\$300,000}(0.8) + \frac{\$150,000}{\$300,000}(1.2) + \frac{\$50,000}{\$300,000}(1.8) \\
 b_P &= 1.167.
 \end{aligned}$$

Last year: $r = 13\%$
 $13\% = 7\% + R_{PM}(1.167)$

$$6\% = RP_M(1.167)$$

$$RP_M = 5.1429\%.$$

This year:
 $r = 7\% + (5.1429\% + 2\%)1.167$
 $r = 15.33\%.$

93

?. **(Comp: 2.3, 2.5) 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:

$$1.25 = \frac{(\$200,000,000 \times 1.2)}{\$250,000,000} + \frac{(\$50,000,000 \times X)}{\$250,000,000}$$

$$1.25 = 0.96 + 0.2X$$

$$0.29 = 0.2X$$

$$X = 1.45.$$

94. **(Comp: 2.3, 2.5) 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:

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

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

$$0.6 = 0.333b_{Avg}$$

$$b_{Avg} = 1.8.$$

95

?. **(Comp: 2.3, 2.5) Portfolio return** **Answer: a Diff: M**

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

$$(\$50,000/\$75,000)1.5 + (\$25,000/\$75,000)0.9 = 1.3. \quad \text{The required rate of return is then simply: } 4\% + (6\% - 4\%)1.3 = 6.6\%.$$

96

?. **(2.5) 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.

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

$$1.5 = 0.3 + 0.75b_c$$

$$1.2 = 0.75b_c$$

$$b_c = 1.6.$$

97. **(2.5) CAPM and required return** **Answer: d Diff: M**

$$b_x = 1.6; b_y = 0.7; r_{RF} = 7\%; r_M = 12\%.$$

Inflation increases by 1%, but r^* remains constant. r_{RF} increases by 1%; r_M rises to 14%.

Before inflation change:

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

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

After inflation change:

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

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

$$r_x - r_y = 17.6\% - 12.2\% = 5.4\%.$$

98

- ?. **(2.5) 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, i.e., 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.

99. **(Comp: 2.3, 2.5) 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.

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

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

$$0.6752 = 5/15b_D$$

$$b_D = 2.026.$$

100. **(Comp: 2.3, 2.5) 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.

Step 2 Find the market risk premium using the original portfolio.

$$\left[\left(\frac{\$300,000}{\$1,600,000} \right) (0.6) + \left(\frac{\$300,000}{\$1,600,000} \right) (1) + \left(\frac{\$500,000}{\$1,600,000} \right) (1.4) + \left(\frac{\$500,000}{\$1,600,000} \right) (1.8) \right]$$
 $r_s = 0.125 = 0.06 + (r_M - r_{RF})1.3$. 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 $\left(\frac{\$800,000}{\$1,600,000} \right) = 0.5$. 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.
 Thus, $r_s = 0.06 + (0.05)1.525 = 13.625\% \approx 13.63\%$.

101. **(2.2) 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 $15.715/10.8 = 1.4551 \approx 1.46$.

102 **(2.3) 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 $(r - \hat{r})^2 P$ 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 $\sigma_{XY} = 8.1\%$.

Probability	Portfolio XY	Product
0.1	-5.0%	-0.5%
0.8	17.5	14.0
0.1	30.0	3.0
		$\hat{r}$
		$= \underline{\underline{16.5\%}}$

$$\sigma_{XY} = (\Sigma(r - \hat{r})^2 P)^{1/2} = 8.07\% \approx 8.1\%.$$

103. **(2.5) CAPM and required return** **Answer: e Diff: M**

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

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 $\vee \hat{Y}, m$

$\vee$ swap $b_A = 0.4534$.

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

104. **(2.5) 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 $\vee \hat{Y}, m$

$\vee$ swap $b_C = -0.76$.

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

105. **(Comp: 2.4, 2.5) Expected and required returns**

Answer: c Diff: M

Use the calculator's regression function to find β_{A_j} . It is -0.6600.

Find r_{RF} . Note that $RP_M = r_M - r_{RF}$, so

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

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

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

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

106

?. **(Comp: 2.3, 2.4, 2.5) Portfolio return**

Answer: c Diff: M

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

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

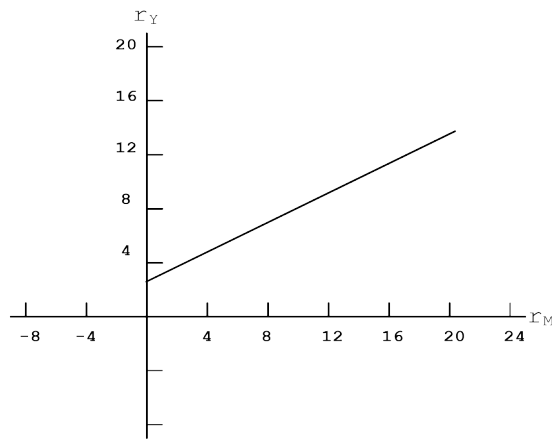
$$r_X = 7\% + 5\%(0.7358) = 10.679\%.$$

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

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

107. **(Comp: 2.3, 2.4, 2.5) Required return on stock**

Diff: T



- a. The least squares procedure yields the following equation for predicting the rate of return on Stock Y: $r_Y = a + br_M = 2.5 + 0.5r_M$. Therefore, the beta for Stock Y is 0.50. The regression line is plotted in the graph.
- b. $r_Y = r_{RF} + (r_M - r_{RF})b_Y = 6\% + (4\%)0.5 = 8\%$.
- c. The stock is now riskier. With greater risk and the same expected earnings and dividends, the price of the stock would fall. Thus, capital losses would be incurred, and they would offset if not overwhelm the dividend return, with the net result being a low or even negative realized rate of return during 2010. The required rate of return would rise. With the same expected dividends and dividend growth rate, but a lower market price, the expected rate of return on the now lower priced stock would rise to equal the now higher required rate of return.
- d. Adding the point -5, 20 for 2010 to the data set produces this regression equation:
- $$r_Y = 2.75 + 0.3r_M \quad \text{beta} = 0.3.$$
- Thus, the historical beta declines when the 2009 data is added.
- e. $r_Y = 6\% + (4\%)0.3 = 7.2\%$.
- f. This is down from 8% in 2009. Since we know that investors regard Stock Y as being riskier, the true required rate of return must be higher than 8%, not lower. This demonstrates one of the problems with using the CAPM. In this case, rising risk caused a decline in the price of the stock, which caused a low rate of return, which in turn caused the calculated beta to decline. In this example, historical betas do not reflect risk well at all.