

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 1.1, 2.1

1. **C** According to Standard I(A), informing her supervisor or firm's compliance department is appropriate. Dissociating herself would be premature. She should report her suspicions to a supervisory person and attempt to remedy the situation. (Module 2.1, LOS 2: I(A))
2. **B** According to Standard I(A), since she has taken steps to stop the illegal activities and the board has ignored her, Jones must dissociate from the board and seek legal advice as to what other actions would be appropriate in this instance. She may need to inform legal or regulatory authorities of the illegal activities. (Module 2.1, LOS 2: I(A))
3. **C** According to Standard I(A), in some instances, reporting a legal violation to governmental or regulatory officials may be appropriate, but this isn't always necessary, and it isn't required under Standard I(A). (Module 2.1, LOS 2: I(A))
4. **A** Standard I(B), Independence and Objectivity, requires that members and candidates reject offers of gifts or compensation that could compromise their independence or objectivity. Schleifer has appropriately rejected the offer of the hotel accommodations and the use of ChemCo's jet. He may accept the desk clock since this gift is of nominal value and is unlikely to compromise his independence and objectivity. Schleifer cannot accept the tickets to the dinner, however. Since it is a formal high-society dinner, the tickets are most likely expensive or difficult to come by. Even though he has disclosed the gift to his employer and he plans to use the dinner as a marketing opportunity for his firm, the gift itself may influence Schleifer's future research in favor of ChemCo. Allowing such potential influence is a violation of Standard I(B). (Module 2.1, LOS 2: I(B))
5. **C** Standard I(B) recommends, but does not require, that an analyst have his firm pay for ordinary travel expenses to visit companies that are the subject of research. The other choices are required by the Standards. (Module 2.1, LOS 2: I(B))

### Module Quiz 2.2

1. **A** Hutchins's personal bankruptcy may reflect poorly on her professional reputation if it resulted from fraudulent or deceitful business activities. There is no indication of this, however, and the bankruptcy is thus not a violation. Smith has not violated the Code and Standards by refusing to invest with Hutchins in what turned out to be bad investment opportunities. By reporting Smith to CFA Institute for a violation, Hutchins has misused the Professional Conduct Program to settle a dispute unrelated to professional ethics and has thus violated Standard I(D), Misconduct. (LOS 2: I(D))

2. **B** According to Standard I(C), Misrepresentation, factual data from a recognized statistical reporting service need not be cited. (LOS 2: I(C))
3. **B** In the other choices, Olson violates Standard I(C) by misrepresenting the services that she or her firm are capable of performing, her qualifications, her academic or professional credentials, or the firm's credentials. The firm is small and most likely cannot perform all investment services the client may require. The firm cannot guarantee future outperformance of the market indexes. The firm doesn't have a long history (only six months). (LOS 2: I(C))
4. **C** There can be no assurance that a premium of 2% to 4% will consistently be obtained. Bixby is in violation of Standard I(C), Misrepresentation, since she has made an implicit guarantee of the fund's expected performance. (LOS 2: I(C))
5. **C** Since the statements are vague, we have no direct evidence that a violation of securities law has occurred. However, under Standard I(D), Misconduct, members and candidates are prohibited from engaging in activities involving deceit. Karloff's action is a clear attempt to mislead the investing public regarding the value of Summit IPOs. (LOS 2: I(D))

### Module Quiz 2.3

1. **C** According to Standard II(A), members and candidates are under no circumstances allowed to use material nonpublic information to trade securities. Carlson must abide by the Code and Standards, which is the most strict regulation in the scenario. (LOS 2: II(A))
2. **B** The intent of Green Brothers' actions is to manipulate market liquidity in order to attract investment to its own funds. The increased trading activity was not based on market fundamentals or an actual trading strategy to benefit investors. It was merely an attempt to mislead market participants in order to increase assets under Green Brothers' management. The action violates Standard II(B), Market Manipulation. (LOS 2: II(B))
3. **A** Quigley's trades are most likely an attempt to take advantage of an arbitrage opportunity that exists between Craeger's common stock and its put options. She is not manipulating the prices of securities in an attempt to mislead market participants, which would violate Standard II(B), Market Manipulation. She is pursuing a legitimate investment strategy. Participants in her hedge fund are aware of the fund's investment strategy, and thus Quigley did not violate the Code and Standards by not disclosing this specific set of trades in advance of trading. (LOS 2: II(B))
4. **A** There is no indication that Servais has inside information pertaining to the situation at the five firms in question—only the two firms that have already gone public with the information. It is common knowledge that the other five firms follow the same boron handing procedures. She is, therefore, in compliance with Standard II(A) concerning the use of material nonpublic information in the issuance of the investment recommendation. (LOS 2: II(A))

5. **B** Even though the laws of Zanuatu would not preclude trading on the information, as a CFA Charterholder the friend is bound by the CFA Institute Code and Standards. Standard II(A) prohibits the use of material nonpublic information, and the friend may not trade the stocks about which she has such information under any circumstances. (LOS 2: II(A))
6. **B** The release of such information to a limited circle via an Internet chat room does not cause the information to be public. The information is also clearly material. Therefore, Green is not allowed to trade on the information under Standard II(A). (LOS 2: II(A))
7. **B** NV management is asking Hunter to violate Standard II(B), Market Manipulation, which prohibits taking actions that are designed to distort prices or artificially increase trading volume. The intent of Hunter's actions is to mislead market participants and allow corporate insiders to take advantage of the artificially high prices. (LOS 2: II(B))

## Module Quiz 2.4

1. **B** Standard III(A), Loyalty, Prudence, and Care. Herbst is acting as a fiduciary for the pension plan beneficiaries. Choosing brokers based on quality of services provided is reasonable. She may pay higher-than-average brokerage fees so long as doing so benefits the pension beneficiaries, not other clients. Trading with selected brokers solely to gain referrals is not likely to be in the pension beneficiaries' best interest since it does not take into account other important factors for selecting brokerage firms. (LOS 2: III(A))

## Module Quiz 2.5

1. **B** Standard III(C), Suitability, requires that before taking investment action, members and candidates must make a reasonable inquiry into a client's or prospect's investment objectives and constraints as well as their prior investment experience. Byrne cannot assume that because the brothers have similar lifestyles and are close in age that they should have similarly managed portfolios. Byrne should have interviewed Cliff directly before investing his portfolio. (LOS 2: III(C))
2. **B** According to Standard III(C), Ellis must consider the suitability of each new investment (as well as the current holdings) in light of the portfolio mandate. In this given case, the client is the fund. Ellis must only make investments that are in accordance with the fund's investment policy statement. Therefore, Ellis should not purchase the unsuitable bonds as requested by her clients. (LOS 2: III(C))
3. **C** Standard III(B), Fair Dealing, requires that members not selectively disadvantage clients, specifically in the case of IPOs. Disclosure of an inequitable allocation method does not relieve the member of his obligation to fair dealing. (LOS 2: III(B))

## Module Quiz 2.6

1. **B** By failing to include terminated portfolios in the performance presentation, the performance will have an inherent upward bias, making results appear better than they truly are. By excluding the terminated portfolios, DNR misleads its potential investors and thus violates Standard III(D), Performance Presentation, which prohibits any “practice that would lead to misrepresentation of a member or candidate’s performance record.” (LOS 2: III(D))
2. **A** Anderson must maintain the confidentiality of client information according to Standard III(E). Confidentiality may be broken in instances involving illegal activities on the part of the client, but the client’s information may only be relayed to proper authorities. Anderson did not have the right to inform the investment bank of her client’s investigation. (LOS 2: III(E))
3. **B** The recommended procedure in Standard III(D), Performance Presentation, is to present the performance of a composite as a weighted average of the performance of similar portfolios rather than using a single representative account. (LOS 2: III(D))

## Module Quiz 2.7

1. **C** According to Standard IV(A), Loyalty, members and candidates are expected to act for the benefit of the employer and not deprive the employer of their skills. Fletcher is performing work similar to the services that her employer provides for a fee. Although the position is a volunteer position, Fletcher will receive compensation in the form of a free parking space. In light of the circumstances, Fletcher must disclose the details of the position and get written permission before accepting the volunteer position. (LOS 2: IV(A))
2. **C** According to Standard IV(C), Responsibilities of Supervisors, reporting the violation and warning the employee to cease activities that violate the law or the Code and Standards are not enough. The supervisor must take steps (such as limiting employee activity or increasing the level of employee monitoring) to prevent further violations while he conducts an investigation. (LOS 2: IV(C))
3. **C** According to Standard IV(C), because he is aware that the firm’s compliance procedures are not being monitored and followed and because he has repeatedly tried to get company management to correct the situation, Blair should decline supervisory responsibility until adequate procedures to detect and prevent violations of laws, regulations, and the Code and Standards are adopted and followed. If he does not do so, he will be in violation of the Code and Standards. (LOS 2: IV(C))
4. **B** Jamal failed to properly supervise employees and provide adequate procedures and policies to prevent employee violations. Smith should not have traded her own account ahead of client accounts. Temple should not have disclosed the recommendation change selectively but should have informed his clients fairly and objectively. No inside information was used in the question. (LOS 2: IV(C))

5. **A** Albright may accept work for which she receives outside compensation and which may compete with her employer only if she obtains her employer's consent. Under Standard IV(A), Loyalty, such consent must be obtained from her employer prior to beginning the work. (LOS 2: IV(A))

## Module Quiz 2.8

1. **A** Historical growth can be cited as a fact since it actually happened. Stefano states that her firm expects further growth and profitability, which is an opinion. She does not claim that these are facts. In addition, Stefano identifies relevant factors and highlights in particular the most significant risks of investing in South American utilities. She has fully complied with Standard V(B), Communication with Clients and Prospective Clients. Under the Standard, it is not necessary to include every detail about a potential investment in a report. Members and candidates are expected to use their judgment and identify the most important factors to include. (LOS 2: V(B))
2. **A** Choice B is not necessarily a violation. Firms can offer different levels of service to clients as long as this is disclosed to all clients. The largest institutional clients would likely be paying higher fees for a greater level of service. Also note that the analyst's brother's account in choice C should be treated the same as any other client account. (LOS 2: V(B))
3. **A** Nieder must not take models or documents from his previous employer without explicit permission to do so, or he would violate Standard IV(A), Loyalty. He is allowed, however, to reproduce the model from memory but must recreate the supporting documentation to maintain compliance with Standard V(C), Record Retention. (LOS 2: V(A))
4. **B** Johnson has apparently let his recreational passion cloud his judgment. This is not to say that Swordfish Enterprises is not or will not be an excellent investment. However, if he had never heard of the firm previously, issuing an investment recommendation without conducting a thorough financial investigation indicates a failure to exercise diligence and also indicates that he lacks a reasonable and adequate basis for his recommendation. He is in violation of Standard V(A). (LOS 2: V(A))
5. **C** It is required under Standard V(A), Diligence and Reasonable Basis, that third-party research assumptions be reviewed and both the independence and objectivity of the research and recommendations be evaluated. The other choices are recommended policies and procedures under the Standard. (LOS 2: V(A))

## Module Quiz 2.9

1. **C** Members and candidates must give clients adequate opportunity to act on new or changed recommendations before taking investment action in their own non-firm accounts or other non-client accounts in which they have a beneficial interest. One week is likely an acceptable waiting period. (LOS 2: VI(B))

2. **C** According to Standard VI(C), Referral Fees, Hern must disclose the referral arrangement between itself and Baker so that potential clients can judge the true cost of Hern's services and assess whether there is any partiality inherent in the recommendation of services. (LOS 2: VI(C))
3. **A** There is no violation of the CFA Institute Standards regarding this matter. The referral arrangement is fully disclosed to clients before they agree to do business with Pick. Therefore, clients can fully assess the effect of the agreement on the referral and how the agreement may affect their accounts before hiring Pick as their asset manager. (LOS 2: VI(C))
4. **C** Even though the shares are held in trust, this could still be construed as a conflict of interest. Lyons is obligated under Standard VI(A), Disclosure of Conflicts, to inform his employer of the potential conflict. If he is then authorized to issue investment recommendations on the security in question, the existence of a potential conflict must be disclosed in the report. (LOS 2: VI(A))

## Module Quiz 2.10

1. **B** According to Standard VII(B), any explanation of the designation in print form should be a concise description of the requirements or of CFA Institute. The other statements contain violations of Standard VII(B), in particular the presentation of the letters CFA. Also, she may not imply superior performance as a result of being a CFA charterholder. (LOS 2: VII(B))
2. **C** Standard VII(B) governs acceptable methods of referencing the CFA Institute, CFA designation, and CFA Program. Candidates may reference their candidacy if they are enrolled for or waiting for the results of, a CFA Program exam. Pulin may also reference his membership status with the CFA Institute as well as his remaining eligibility requirements to become a CFA charterholder. (LOS 2: VII(B))
3. **C** In this situation, Donovan, Smythe, and Yeats all violated Standard VII(A), Conduct as Members and Candidates in the CFA Program. The Standard prohibits conduct that compromises the integrity, validity, or security of the CFA Program exams. Donovan clearly breached the exam security. Smythe and Yeats both compromised the integrity of the exams by planning to use the actual exam question to gain an advantage over other candidates. Even though Yeats did not ultimately use the information to study for the exam, she participated in a scheme to cheat on the CFA Program exam. (LOS 2: II(A))
4. **B** Standard VII(A) Conduct as Members and Candidates in the CFA Program prohibits candidates from revealing which portions of the Candidate Body of Knowledge were or were not covered on an exam. Members and candidates are free to disagree with the policies, procedures, or positions taken by the CFA Institute. The Standard does not prohibit participating in CFA Program-related Internet blogs, forums, or social networks. (LOS 2: VII(A))

5. **C** Standard VII(B) Reference to CFA Institute, the CFA Designation, and the CFA Program prohibits members and candidates from implying superior performance as a result of being a CFA charterholder. Concise factual descriptions of the requirements to obtain the CFA Charter are acceptable. Osgood's statement that she passed the exams on her first attempts is acceptable because it states a fact. (LOS 2: VII(B))

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## ANSWER KEY FOR MODULE QUIZ

### Module Quiz 6.1

1. **A** Fintech refers to the application of technology to the financial services industry, and to companies that are involved in developing and applying technology for financial services. Cryptocurrencies and distributed ledger technology are examples of fintech-related developments. (LOS 6.a)
2. **A** ML is a computer programming technique useful for identifying and modeling patterns in large volumes of data. The Internet of Things refers to the network of devices that is one of the sources of Big Data. Capture is one aspect of processing data. Latency refers to the lag between when data is generated and when it is needed. (LOS 6.b)
3. **B** One criticism of robo-advisory services is that the reasoning behind their recommendations might not be readily apparent to customers. Recommendations from robo-advisors tend to be conservative rather than aggressive. Low cost is a primary advantage of robo-advisors. (LOS 6.c)
4. **B** By enabling electronic proof of ownership, tokenization has the potential to streamline transfers of physical assets, such as real estate. The high cost and difficulty of manipulating past records is a strength of blockchain technology. Permissionless networks do not require trust between the parties to a transaction because the record of a transaction is unchangeable and visible to all network participants. (LOS 6.d)

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 7.1

1. **A** In this regression,  $a_1$  is the intercept term. To test the statistical significance means to test the null hypothesis that  $a_1$  is equal to zero versus the alternative that it is not equal to zero. (LOS 7.c)
2. **B** The appearance of a relationship between two variables when there is none is spurious correlation. Outliers may influence the results of regression and the estimate of the correlation coefficient. Correlation only measures linear relationships properly. (LOS 7.b)
3. **A** There is little to no chance that the relationship between total assets under management and lizards in a park is other than a coincidence. The correlation is spurious. The non-linear relationship in the total assets function makes correlation a poor choice of measure. (LOS 7.b)

### Module Quiz 7.2

1. **C** The model does not assume that the dependent variable is uncorrelated with the residuals. It does assume that the independent variable is uncorrelated with the residuals. (LOS 7.e)
2. **A** If the independent variable is in pounds, the interpretation of the slope coefficient is the change in the dependent variable for a one pound change in the independent variable. If the independent variable is measured in tons (2,000 pounds) the slope coefficient is interpreted as the change in the dependent variable for a 2,000 pound change in the independent variable, which will be 2,000 times larger. The slope of the regression line is not a function of the correlation between the two variables. The researcher would need to know either the regression sum of squares or the total sum of squares, along with the sum of squared errors, in order to calculate the coefficient of determination. (LOS 7.e)
3. **B** The slope coefficient is best interpreted as the predicted change in the dependent variable for a 1-unit change in the independent variable. If the slope coefficient estimate is 10.0 and the independent variable changes by one unit, the dependent variable will change by 10 units. The intercept term is best interpreted as the value of the dependent variable when the independent variable is equal to zero. (LOS 7.e)

## Module Quiz 7.3

1. **B** The  $R^2$  is computed as the correlation squared:  $(0.9757)^2 = 0.952$ .

The interpretation of this  $R^2$  is that 95.2% of the variation in Company XYZ's sales is explained by the variation in industry sales. Answer C is incorrect because it is the independent variable (industry sales) that explains the variation in the dependent variable (company sales). This interpretation is based on the economic reasoning used in constructing the regression model. (Module 7.3, LOS 7.f)

2. **B** The slope coefficient of 0.2796 indicates that a \$1 million increase in industry sales will result in an increase in firm sales of approximately 28% (\$279,600) of that amount. (Module 7.1, LOS 7.a)
3. **C** The test of significance for the correlation coefficient is evaluated using the following  $t$ -statistic:

$$t = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}} = \frac{0.9757\sqrt{3}}{\sqrt{1-0.952}} = \frac{1.69}{0.219} = 7.72$$

From the  $t$ -table, we find that with  $df = 3$  and 95% significance, the two-tailed critical  $t$ -values are  $\pm 3.182$  (recall that for the  $t$ -test the degrees of freedom =  $n - 2$ ). Because the computed  $t$  is greater than  $+3.182$ , the correlation coefficient is significantly different from zero. (Module 7.1, LOS 7.a)

4. **B** The slope coefficient is 1.93, indicating that each additional kilometer increases travel time by 1.93 minutes:

$$1.93 \times 8 = 15.44$$

(Module 7.1, LOS 7.a)

5. **C** The higher  $R^2$  for the passenger car model indicates that regression results are more reliable. Distance is a better predictor of travel time for cars. Perhaps the aggressiveness of the driver is a bigger factor in travel time for motorcycles than it is for autos. (Module 7.3, LOS 7.f)
6. **A** In simple linear regression, the appropriate degrees of freedom for both confidence intervals is the number of observations in the sample ( $n$ ) minus two. (Module 7.3, LOS 7.g)

## Module Quiz 7.4, 7.5

1. **C** The regression sum of squares measures the variation in the dependent variable explained by the independent variable (i.e., the explained variation). The sum of squared errors measures the variation in the dependent variable NOT explained by the independent variable. The mean squared error is equal to the sum of squared errors divided by its degrees of freedom. (Module 7.5, LOS 7.j)

2. **A** Note that there are 36 monthly observations from June 2014 to May 2017, so  $n = 36$ . The critical two-tailed 10%  $t$ -value with  $34$  ( $n - 2 = 36 - 2 = 34$ ) degrees of freedom is approximately 1.69. Therefore, the 90% confidence interval for  $b_0$  (the intercept term) is  $0.0023 +-(0.0022)(1.69)$ , or  $-0.0014$  to  $+0.0060$ . (Module 7.3, LOS 7.f)
3. **C** The critical two-tailed 5%  $t$ -value with 34 degrees of freedom is approximately 2.03. The calculated  $t$ -statistics for the intercept term and slope coefficient are, respectively,  $0.0023 / 0.0022 = 1.05$  and  $1.1163 / 0.0624 = 17.9$ . Therefore, the intercept term is not statistically different from zero at the 5% significance level, while the slope coefficient is. (Module 7.3, LOS 7.g)
4. **B** Notice that this is a one-tailed test. The critical one-tailed 1%  $t$ -value with 34 degrees of freedom is approximately 2.44. The calculated  $t$ -statistic for the slope coefficient is  $(1.1163 - 1) / 0.0624 = 1.86$ . Therefore, the slope coefficient is not statistically different from one at the 1% significance level and Coldplay should fail to reject the null hypothesis. (Module 7.3, LOS 7.g)
5. **B** This is a tricky question because you are given the confidence interval and its midpoint and asked to solve for the standard error of the forecast ( $s_f$ ). Remember to also convert the percentages to decimals. The critical two-tailed 5%  $t$ -value with 34 degrees of freedom is approximately 2.03. The midpoint, or predicted value is  $0.0023 + 1.1163 \times 0.05 = 0.058$ . Therefore,  $0.058 +-(2.03)(s_f)$  is equivalent to 0.039 to 0.077 and solving for  $s_f$  yields  $s_f = 0.0093$ . (Module 7.5, LOS 7.j)
6. **C** SST is equal to the sum of RSS and SSE:  $0.0228 + 0.0024 = 0.0252$ .  $R^2 = RSS / SST = 0.0228 / 0.0252 = 0.905$ . (Module 7.5, LOS 7.j)
7. **A** Because  $n = 36$ , and the degrees of freedom for the sum of squared errors (SSE) is  $n - 2$  in simple linear regression, the degrees of freedom for SSE is 34, and the mean squared error is  $SSE / 34$ . The standard error of estimate (SEE) is equal to the square root of the mean squared error:

$$SEE = \sqrt{\frac{0.0024}{34}} = 0.008$$

(Module 7.5, LOS 7.j)

8. **B** The insufficient availability of data is not likely to be much of a limitation for most financial and economic models; usually an abundance of data is available. The other choices are limitations of regression analysis. (Module 7.5, LOS 7.k)

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 8.1, 8.2, 8.3

1. **C** RSS = 9,105 – 4,320 = 4,785

$$F = \frac{\frac{4,785}{4}}{\frac{4,320}{65-4-1}} = \frac{1,196.25}{72} = 16.61$$

(Module 8.3, LOS 8.g)

2. **B** This is a one-tailed test, so the critical *F*-value at the 5% significance level with 4 and 60 degrees of freedom is approximately 2.53. (Module 8.3, LOS 8.g)

### Module Quiz 8.4

1. **C**  $k = 5$  and  $n - k - 1 = 25$ , so  $n = 31$  (Module 8.3, LOS 8.g)

2. **A**  $MSE = \frac{SSE}{df_{error}} = \frac{925}{25} = 37$  (Module 8.3, LOS 8.g)

3. **A**  $R^2 = \frac{RSS}{SST} = \frac{1,025}{1,950} = 53\%$  (Module 8.4, LOS 8.h)

4. **C**  $F = \frac{\frac{RSS}{df_{regression}}}{\frac{SSE}{df_{error}}} = \frac{\frac{1,025}{5}}{\frac{925}{25}} = \frac{205}{37} = 5.5$  (Module 8.3, LOS 8.g)

5. **B** Adjusted R<sup>2</sup> must be less than or equal to R<sup>2</sup>. However, if R<sup>2</sup> is low enough and the number of independent variables is large, adjusted R<sup>2</sup> may be negative. (Module 8.4, LOS 8.h)

### Module Quiz 8.5

1. **C** The *t*-statistic tests the null that industry PEs are equal. The dummy variable is significant and positive, and the dummy variable is defined as being equal to one for biotechnology stocks, which means that biotechnology PEs are statistically significantly larger than electric utility PEs. Remember, however, this is only accurate if we hold the other independent variables in the model constant. (LOS 8.j)
2. **B** Note that IND = 1 because the stock is in the biotech industry. Predicted P/E =  $6.75 + (8.00 \times 1) + (4.00 \times 0.00) + (12.35 \times 0.14) - (0.50 \times 1.5) = 15.7$ . (LOS 8.j)

### Module Quiz 8.6

1. **C** Assumptions underlying a multiple regression include: the error for one observation is not correlated with that of another observation; the expected value

of the error term is zero; a linear relationship exists between the dependent and independent variables; the variance of the error terms is constant. (LOS 8.f)

## Module Quiz 8.7

1. **A** The Durbin-Watson statistic tests for serial correlation of the residuals. The appropriate remedy if serial correlation is detected is to use the Hansen method. (LOS 8.k)

## Module Quiz 8.8, 8.9

1. **C** The coefficients column contains the regression parameters. The regression equation is thus  $RET = 0.522 + 0.0460(MKT) + 0.7102(IND) + 0.9(FORT)$ . (Module 8.9, LOS 8.o)
2. **C** The coefficient on FORT is the amount of the return attributable to the stock of a Fortune 500 firm. Other things equal, the return on a Fortune 500 company is expected to exceed the return on a non-Fortune 500 company by 0.9% annually. (Module 8.2, LOS 8.d)
3. **A** The regression equation is  $0.522 + 0.0460(MKT) + 0.7102(IND) + 0.9(FORT)$ , so  $RET = 0.522 + 0.0460(5) + 0.7102(3) + 0.900(0) = 2.88\%$ . (Module 8.1, LOS 8.b)
4. **C** The  $p$ -value = 0.139, or 13.9%, which is not a reasonable level of significance. (Module 8.2, LOS 8.d)
5. **C** The Breusch-Pagan test is statistically significant at any reasonable level of significance, which indicates heteroskedasticity. The Durbin-Watson statistic is greater than the lower limit, but less than the upper limit, which places it in the “inconclusive” area. Thus, we are unable to reject the null hypothesis that there is no serial correlation present. (Module 8.7, LOS 8.k)
6. **B** Using leading P/E from a prior period as an independent variable in the regression is unlikely to result in misspecification because it is not related to any of the six types of misspecifications previously discussed. We’re not forecasting the past because leading P/E is calculated using beginning-of-period stock price and a forecast of earnings for the next period. Also, because the dependent variable is monthly returns and not leading P/E, there is no concern about inclusion of a lagged dependent variable in the model. Omitting a relevant independent variable from the regression and using actual instead of expected inflation (measuring the independent variable in error) are likely to result in model misspecification. (Module 8.9, LOS 8.m)
7. **C** The effects of the model misspecification on the regression results are basically the same for all of the misspecifications: regression coefficients are biased and inconsistent, which means we can’t have any confidence in our hypothesis tests of the coefficients or in the predictions of the model. Notice that choice C states that model misspecification will result in “unbiased” regression coefficients, while in

fact model misspecification is most likely to result in “biased” regression coefficients. (Module 8.9, LOS 8.m)

8. **C** Including a lagged dependent variable (previous period hedge fund composite index returns) in the list of independent variables is likely to lead to model misspecification and biased and inconsistent regression coefficients.

The fact that an independent variable (small-cap returns) and the dependent variable (hedge fund index returns) are correlated is not a problem for the regression model; we would expect that if the model has predictive power, the dependent variable would be correlated with the independent variables. The fact that two independent variables (small-cap returns and emerging market index returns) are correlated is not a problem of model misspecification, but potentially one of multicollinearity. Without additional information, we can't draw any conclusions concerning whether multicollinearity is a problem (remember “most likely”). (Module 8.9, LOS 8.m)

9. **C** All qualitative dependent variable models must be tested for heteroskedasticity, serial correlation, and multicollinearity. Each of the alternatives are potential examples of a qualitative dependent variable model, but none are universal elements of all qualitative dependent variable models. (Module 8.9, LOS 8.n)

## Module Quiz 8.10

1. **A** A tag variable (or dependent variable) can be continuous, ordinal, or categorical. Tag variables are not specified for unsupervised learning. (LOS 8.p)
2. **A** Supervised learning uses labeled training data, does not need human intervention, and can be used for nonstructured data. (LOS 8.p)

## Module Quiz 8.11

1. **A** When a target variable is specified, the problem is structured. When the target is continuous, structured regression models are appropriate. (LOS 8.q)
2. **C** Clustering does not seek to reduce the number of features. While dimension reduction models seek to reduce the number of relatively unimportant features, it is not a linear model. Penalized regressions are a category of generalized linear models (GLMs) that focus on reduction in the number of features. (LOS 8.q)
3. **B** Unstructured dimension reduction is not a decision tree algorithm. Deep learning nets (DLMs) are neural networks and are not decision trees. Classification and Regression Trees (CART) (or more specifically classification trees) are used for classifying data into categories. (LOS 8.q)
4. **A** Neural networks are suitable when the underlying relationship between the features is nonlinear. It does not mimic human neurons. Also, the features need not have a common unit of measurement, although the input values are usually standardized before being used as a node input value. (LOS 8.q)

5. **A** In the case of **cross validation**, the training and validation samples are randomly generated every learning cycle. (LOS 8.r)
  6. **C** The first step in model training is specification of the algorithm. (LOS 8.r)
- 
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## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 9.1

1. **A** With a trend model, the independent variable is time,  $t$ . (LOS 9.b)
2. **A** The slope coefficient ( $b_1$ ) is positive and significantly different from zero indicating an upward trend. (LOS 9.a)
3. **A** The  $t$ -statistic to test the statistical significance of the intercept and slope coefficient is the parameter estimate divided by its standard error. We reject the null hypothesis and conclude the coefficients are statistically significant if the absolute value of the  $t$ -statistic is greater than the two-tail 5% critical  $t$ -value with 43 degrees of freedom, which is 2.02.

$$t_{b_0} = \frac{1,195.6241}{8.9704362} = 133.3$$

$$t_{b_1} = \frac{12.230448}{0.3396171} = 36.0$$

Both the intercept term and the slope coefficient are significantly different from zero at the 5% level because both  $t$ -statistics are greater than the critical  $t$ -value of 2.02. (LOS 9.a)

4. **C**  $\hat{Y}_{46} = \$1,195.6241 + \$12.230448(46) = \$1,758.225$  billion. (LOS 9.a)
5. **A** The Durbin-Watson statistic is used to detect serial correlation in the residuals. The lower critical value for a DW test with one independent variable and 45 observations is 1.48 and the upper critical value is 1.57. The actual DW-statistic is 0.601, which is less than the lower critical value. This indicates the residuals are positively serially correlated. See the previous topic review for details on implementing the Durbin-Watson test. (LOS 9.b)
6. **B** A log-linear model (choice B) is most appropriate for a time series that grows at a relatively constant growth rate. Neither a linear trend model (choice A), nor an AR(1) model (choice C) are appropriate in this case. (LOS 9.b)

### Module Quiz 9.2

1. **B** Time series Z has a definite upward trend, which once again suggests the expected value of the time series Z is not constant, and therefore it is not covariance stationary. (LOS 9.c)
2. **B** Given  $x_{t-1} = 16.5$ ,  $\hat{x}_t = 5 + 1.75(16.5) = 33.875$ . So,  $\hat{x}_{t+1} = 5 + 1.75 \hat{x}_t = 5 + 1.75(33.875) = 64.28$ . So,  $\hat{x}_{t+2} = 5 + 1.75 \hat{x}_{t+1} = 5 + 1.75(64.28) = 117.49$ . (LOS

9.d)

3. **B** The seasonal (annual) lag occurs on a quarterly basis, so the appropriate model is  $b_0 + b_1x_{t-1} + b_2x_{t-4} + \varepsilon_t$ . The intercept  $b_0$  should be included in the model. (LOS 9.d)
4. **B** Out-of-sample performance is the most important indicator of a model's real-world forecasting ability. In-sample forecast performance is less persuasive, because forecasting the past is not difficult. The residuals from the fitted time-series model are another name for the model's in-sample forecast errors. (LOS 9.g)

### Module Quiz 9.3

1. **A** The independent variable is the dependent variable lagged one period, so the model is an AR(1) model. (Module 9.2, LOS 9.d)
2. **C** The first-differenced series usually does not have a unit root and is, therefore, covariance stationary. (Module 9.3, LOS 9.j)
3. **A** All random-walk time series have a unit root. Time series with unit root do not have a finite mean-reverting level. (Module 9.3, LOS 9.i)
4. **A** A random walk process does not have a finite mean-reverting level and hence covariance nonstationary. An AR(1) model cannot be used to fit a covariance nonstationary time series. (Module 9.3, LOS 9.j)
5. **C** For a unit root test, the null hypothesis is that the time series has a unit root. For testing for unit roots, the Dickey-Fuller (DF) test computes the conventional t-statistic, which is then compared against the revised set of critical values computed by DF. If the test statistic is significant, we reject the null hypothesis (that the time series has a unit root), implying that a unit root is not present. (Module 9.3, LOS 9.k)

### Module Quiz 9.4

1. **C** The standard error of the estimated autocorrelations is  $1/\sqrt{T}$ , where  $T$  is the number of observations (periods). So, if the standard error is given as 0.0632, the number of observations,  $T$ , in the time series must be  $(1 / 0.0632)^2 \approx 250$ . (Module 9.2, LOS 9.e)
2. **A** The results in the table indicate that the prediction equation is  $x_t = 26.8625 + 0.7196x_{t-1}$ , which is estimated from an AR(1) model. (Module 9.1, LOS 9.a)
3. **A** The autocorrelation in the twelfth month is not statistically different from zero. (p-value:  $0.5612 > 0.05$ ) Thus, there appears to be no seasonality. (Module 9.4, LOS 9.l)
4. **A** If the fourth autocorrelation of the error term differs significantly from 0, this is an indication of seasonality. (Module 9.4, LOS 9.l)

5. **C** Adding an appropriate lag is an appropriate solution to seasonality. Excluding variables can sometimes be used to solve multicollinearity. Transforming using first-differencing can be a cure for nonstationarity. (Module 9.4, LOS 9.l)

## Module Quiz 9.5

1. **C** To accurately model a time series that contains shifts, it may be necessary to strategically choose a longer or shorter sample period, or to use a first- or second-order autoregressive model. There is no accepted formula for estimating the optimal sample period (though a graphical inspection of the data may be helpful). (LOS 9.o)
2. **B** ARCH is present when the variance of the error depends on the variance of previous errors. A zero autocorrelation of the error term at all lags suggests that an autoregressive model is a good fit to the data. (LOS 9.m)
3. **B** If only one time series has a unit root, we should not use linear regression. If neither time series have unit root, or if both time series have unit root and the time series are cointegrated, linear regression is appropriate to use. (LOS 9.n)

## ANSWER KEY FOR MODULE QUIZ

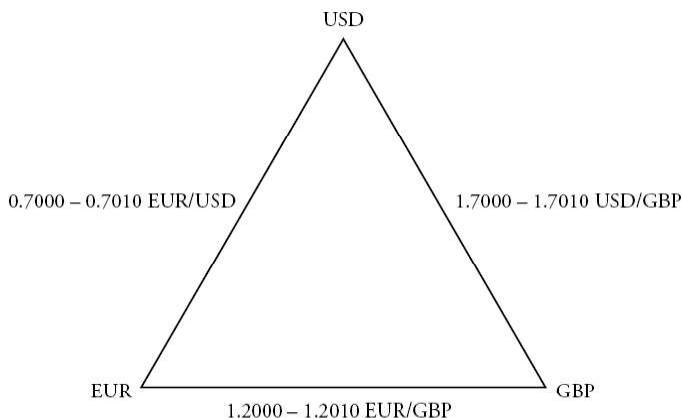
### Module Quiz 10.1

1. **A** The first step in running a simulation is to determine the probabilistic variables that influence the output (for example, interest rates determine the value of a bond). (LOS 10.a)
2. **B** Examining past values of a variable (i.e., using historical data) and examining the values of numerous peers (i.e., using cross-sectional data) are two valid approaches to specifying distributions for probabilistic variables. Proxying with the distribution of a correlated variable is not a valid approach. (LOS 10.a)
3. **A** When two input variables are correlated, we can specify the distribution of the more important variable and derive the other variable algorithmically. Alternatively, we can build the rules of correlation within the simulation. (LOS 10.b)
4. **B** Better input quality and providing a distribution of expected values (rather than a single point estimate) are two advantages of simulations. However, simulations by themselves do not necessarily lead to better decisions. (LOS 10.d)
5. **A** Earnings and cash flow constraints are imposed internally to maximize the likelihood of beating analyst estimates. (LOS 10.e)
6. **A** Specification of a distribution for input variables (as opposed to a single point estimate) is generally seen as an *advantage* of using simulations rather than a disadvantage. (LOS 10.d)
7. **B** Simulations are appropriate when risk is continuous. Decision trees and scenario analysis are appropriate when risk is discrete. Decision trees are suitable when the risk is discrete as well as sequential. (LOS 10.g)

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 11.1

1. **C** Dealer spreads are lower for smaller orders as compared to larger orders. Dealer spreads are larger when spreads in the interbank market are higher. An increase in spot rate volatility will increase spreads in the interbank market. (LOS 11.a)
2. **C** Here is what the triangle looks like with the bid-ask quotes filled in:



If we start with 1 million USD and move clockwise around the triangle (USD to GBP to EUR to USD), we first convert 1 million USD into GBP at the ask:

$$\frac{1 \text{ million USD}}{1.7010 \text{ USD/GBP}} = 587,889 \text{ GBP}$$

Then we sell the GBP for EUR at the bid:

$$587,889 \text{ GBP} \times \left( \frac{1.2000 \text{ EUR}}{\text{GBP}} \right) = 705,467 \text{ EUR}$$

Finally, we purchase USD at the ask in euros:

$$\frac{705,467 \text{ EUR}}{0.7010} = 1,006,372 \text{ USD}$$

Arbitrage profits are 1,006,372 USD – 1,000,000 USD = 6,372 USD. (LOS 11.b)

## Module Quiz 11.2

1. **A** Because of a lower interest rate, the USD (base currency) will appreciate by 2% to  $\$1.012 \times 1.02 = \$1.0322$ . (LOS 11.e)
2. **C** Combining all parity relationships indicates that the expected return on risk-free securities should be the same in all countries and exchange rate risk is really just inflation risk. There are four practical implications from this framework:
  1. The real, risk-free return will be the same in all countries.
  2. Investing in countries with high nominal interest rates will not generate excess returns because the high nominal interest rates will be accompanied by local currency depreciation.
  3. All investors will earn the same expected return in their own currency on any investment denominated in a foreign currency.
  4. Exchange rate risk is simply inflation risk, so investors interested in real returns will not face exchange rate risk.

(LOS 11.f)

3. **A** Covered interest parity is forced by arbitrage, which is not the case for uncovered interest rate parity. If the forward rate is equal to the expected future spot rate, we say that the forward rate is an unbiased predictor of the future spot rate:  $F = E(S_1)$ . In this special case, given that covered interest parity holds, uncovered interest parity would also hold (and vice versa). In other words, if uncovered interest rate parity (and covered interest parity) holds, the forward rate is unbiased predictor of future spot rate (i.e., forward rate parity holds). (LOS 11.e)
4. **A** According to the international Fisher relation:

$$r = \text{real } r + E(I)$$

From European data:

$$4\% = \text{real } r + 2\%$$

$$\text{real } r = 2\%$$

For United States:

$$r = 2\% + 1\%$$

$$r = 3\%$$

(LOS 11.e)

5. **A** Since inflation in Europe is higher than the inflation in the U.S. by 1%, the Euro is expected to depreciate by 1% annually against the dollar.

The current spot rate is  $\$(1/0.74)$  per Euro or  $\$1.3513/\text{€}$

Expected exchange rate in 1 year =  $1.3513(0.99) = \$1.3378/\text{€}$  (LOS 11.e)

6. **C** Using covered interest parity, the forward rate in one year (in \$ per €) can be calculated as follows:

$$\text{Spot rate} = \text{€}0.74 \text{ per \$} = \$\left(\frac{1}{0.74}\right) \text{per €}$$

$$F = S_0 \times \left( \frac{1+r_{\$}}{1+r_{\text{€}}} \right) = \left( \frac{1}{0.74} \right) \times \left( \frac{1.035}{1.04} \right) = \$1.3449 \text{ per €}$$

(LOS 11.e)

7. **B** Franklin is correct with respect to both of his statements: the rand should depreciate relative to the franc and the euro should depreciate relative to the dollar.

The relative form of purchasing power parity predicts that countries with higher expected inflation will experience a depreciation of their currencies. South Africa's expected inflation rate (5%) is higher than the expected inflation rate in Switzerland (3%). The expected inflation rate in Europe (2%) is higher than the expected inflation rate in the United States (1%). According to purchasing power parity, the rand should depreciate relative to the franc, and the euro should depreciate relative to the U.S. dollar.

Uncovered interest parity makes the same predictions with regard to relative interest rates: countries with higher nominal interest rates can be expected to experience currency depreciation. The South African interest rate (7%) is higher than the Swiss rate (5%), so uncovered interest rate parity predicts that the rand will depreciate with respect to the franc. The interest rate in Europe (4%) is higher than the interest rate in the United States (3%), so the euro should depreciate relative to the U.S. dollar. (LOS 11.e)

8. **C** According to the international Fisher relation, the real interest rate is equal to the nominal interest rate minus the expected inflation rate. The real interest rate in each of the four countries is 2%. (LOS 11.e)
9. **B** The 1-year expected spot rate should be equal to the current 1-year forward rate if uncovered interest rate parity holds. One of the assumptions of uncovered interest rate parity is that investors are risk neutral. Real interest rate parity states that real interest rates are equal across countries. Uncovered interest rate parity also would hold if both (1) relative (not absolute) PPP holds and (2) the international Fisher relationship holds. (LOS 11.e)

### Module Quiz 11.3

1. **A** The flow mechanism of current account influences supports the view that current account deficits lead to depreciation of currency. In this example, the reduction in the JPY/USD rate implies depreciation of the USD. Under capital account influences, current account deficits imply capital account inflows and,

hence, would lead to an appreciation of USD. The portfolio composition mechanism of current account influences supports the flow mechanism if investors rebalance a portion of their portfolio out of USD assets due to gradual buildup of USD assets over time in their portfolios. The question does not provide information to support this reallocation. (Module 11.3, LOS 11.j)

2. **B** Under the pure monetary approach, growth in the money supply leads to depreciation in currency. However, the future growth rate in money supply affects the trajectory of FX rates but not the current exchange rate. (Module 11.3, LOS 11.k)
3. **A** Under the Mundell-Fleming framework, low capital mobility and restrictive monetary and fiscal policy leads to better trade balance and appreciation of the country's currency. (Module 11.3, LOS 11.k)
4. **A**  $(0.9821 - 0.00069) - (0.9817 - 0.00076) = 0.00047$  (Module 11.1, LOS 11.c)
5. **B** The contract calls for purchase of 200 million CHF in 30 days. To compute the mark-to-market value, we would have to use the quote on 30-day forward contract to sell CHF. Given USD/CHF quote structure, we should use the bid price (going up the quote).

all-in bid price for 30-day USD/CHF forward contract =  $0.9817 - 7.6 / 10,000 = 0.98094$

$$V_t = \frac{(FP_t - FP)(\text{contract size})}{\left[1 + R\left(\frac{\text{days}}{360}\right)\right]}$$

$FP_t = 0.98094$  (computed above)

$FP = 0.9832$  (given)

$R = 30\text{-day USD interest rate}$  (USD is the price currency)

= 0.20%

$$V_t = \frac{(0.98094 - 0.9832)(200,000,000)}{\left[1 + 0.002\left(\frac{30}{360}\right)\right]} = \frac{-452,000}{1.000166} = -451,924 \text{ USD}$$

(Module 11.2, LOS 11.d)

1. **A** The contract calls for purchase of 100 million EUR in 60 days. To compute the mark-to-market value, we would have to use the quote on 60-day forward contract to sell EUR. Given USD/EUR quote structure, we should use the bid price (going up the quote).

$$\text{all-in bid price for 60-day USD/EUR forward contract} = 1.2235 - 14.56 / 10,000 \\ = 1.22204$$

$$V_t = \frac{(FP_t - FP)(\text{contract size})}{\left[1 + R\left(\frac{\text{days}}{360}\right)\right]}$$

$$FP_t = 1.22204 \text{ (computed above)}$$

$$FP = 1.2242 \text{ (given)}$$

$$R = 60\text{-day USD interest rate (USD is the price currency)}$$

$$= 0.21\%$$

$$V_t = \frac{(0.98094 - 0.9832)(200,000,000)}{\left[1 + 0.002\left(\frac{30}{360}\right)\right]} = \frac{-452,000}{1.000166} = -451,924 \text{ USD}$$

(Module 11.2, LOS 11.d)

2. **C** Poulsen incorrectly described both the skewness as well as the kurtosis of carry trade returns. Carry trade return distributions generally have negative skewness and excess kurtosis. (Module 11.3, LOS 11.i)
3. **A** Deterioration (and not improvement) in terms of trade is an indicator of currency crisis. (Module 11.3, LOS 11.m)
4. **A** The Zu is overvalued per PPP, and Zambola is running a current account deficit. A depreciation of Zu would bring it closer to its long-run fair value. An increase in interest rates would lead to appreciation of Zu. Expansionary monetary policy would reduce interest rates and make Zambolan yields less attractive to foreign investors. (Module 11.3, LOS 11.j)

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 12.1, 12.2

1. **B** Financial intermediary development helps foster economic growth by allowing more efficient allocation of capital and risk. (Module 12.1, LOS 12.a)
2. **A** Long-term growth in the stock market is a function of GDP growth. The other factors—profits as a percentage of GDP and P/E ratios—will have a long-term growth rate of approximately zero and will not impact a forecast of long-term growth in the stock market. (Module 12.1, LOS 12.a)
3. **C** Potential GDP can be interpreted as the highest growth that can be obtained without pressure on prices. Since actual GDP is lower than potential, there is little risk of inflation. (Module 12.1, LOS 12.b)
4. **C** Since Minikaz is a developing country, it is likely to have a low capital base. With a low capital base, increased capital expenditures will still have an impact on output per worker. Technological progress always has a positive impact on output per worker. (Module 12.1, LOS 12.d)
5. **B** Use the growth accounting relations and solving for growth in TFP.  
$$3.7\% = \Delta \text{TFP} + 0.4(3\%) + 0.6(2\%)$$

$$\Delta \text{TFP} = 1.3\% \text{ (Module 12.2, LOS 12.e)}$$

6. **C** Empirical evidence has shown that for economic growth, access to natural resources is more important than ownership. Natural resources may inhibit growth if countries that own them do not develop other industries. However, that is not the conclusion Smith reaches. (Module 12.2, LOS 12.f)
7. **A** Country X will have the greater opportunity due to the younger workforce, potential labor input from unemployed workers, and immigration. (Module 12.2, LOS 12.g)
8. **C** Both human capital and ICT investment tend to have societal benefits. This spillover effect enhances overall growth rate. (Module 12.2, LOS 12.h)

### Module Quiz 12.3

1. **C** Using the equation from neoclassical theory,  $1\% / (1 - 0.6) + 2\% = 4.5\%$ . (LOS 12.i)
2. **C** The notion of the club is that some nations are not in the club and will not converge. (LOS 12.j)
3. **A** Endogenous growth theory includes the concept that R&D may have external benefits, and, therefore, should be subsidized by the government. (LOS 12.i)

4. **B** Under the neoclassical growth theory, the benefit of open markets is temporary. (LOS 12.i)
5. **C** Under the endogenous growth theory, open markets lead to higher rate of growth permanently for all markets. (LOS 12.i)
6. **B** Knowledge capital is a special type of public good that is not subject to the law of diminishing returns. Investment in labor and physical capital do exhibit diminishing returns, which are reflected in the shape of the productivity curve. (LOS 12.k)

## ANSWER KEY FOR MODULE QUIZ

### Module Quiz 13.1

1. **A** Judicial law is findings of the court and is applicable in this case. Statutes are laws made by legislative bodies while administrative regulations are rules issued by government agencies or other bodies authorized by the government. (LOS 13.a)
2. **C** JBL Services is neither a regulator nor an SRO and is best described as an outside body. The work of such outside bodies is sometimes referenced by regulatory authorities in their regulations. (LOS 13.a)
3. **B** The Exchange Association is an SRO and hence increases overall regulatory resources. Its members also bring knowledge and expertise of industry professionals. However, due to inherent conflict of interest in an association regulating its own members, adequate regulatory oversight would be necessary. (LOS 13.d)
4. **B** The Exchange Association is exposed to conflict of interest in regulating its members. Hence regulatory capture (where a regulatory body is influenced or controlled by the industry that is being regulated) is a concern. Regulatory differences between jurisdictions can lead to regulatory competition; regulators compete to provide a business-friendly regulatory environment. Firms may also resort to regulatory arbitrage to exploit the difference between the substance and interpretation of a regulation. Neither regulatory competition nor regulatory arbitrage is applicable in this case. (LOS 13.d)
5. **A** Taxes and subsidies as regulatory tools are examples of price mechanisms. (LOS 13.e)
6. **B** Net regulatory burden is the cost of compliance for the regulated entity minus the private benefits of regulation.  
net regulatory burden =  $300 - 30 = 270$  million Zu  
(LOS 13.h)
7. **B** Everything else held constant, sectors being taxed (i.e., commercial banks, alcohol and tobacco) would be expected to shrink while sectors that are subsidized (i.e., health care) would be expected to grow. (LOS 13.i)
8. **C** Prudential supervision deals with regulating financial markets rather than regulating commerce. Antitrust regulations and dispute resolution regulations are elements of regulation of commerce. (LOS 13.f)

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 14.1

1. **A** Usually an ownership interest between 20% and 50% would indicate the ability to significantly influence. However, in this case, Tall is unable to influence Short as evidenced by its failure to obtain board representation; thus, Tall's ownership interest should be considered an investment in financial assets. (LOS 14.a)

### Module Quiz 14.2

1. **B** Initially, the carrying value of all security investments is cost.  
initial cost = \$950 + 250 = \$1,200 (LOS 14.a)
2. **B** Both available-for-sale and fair value through profit or loss securities are carried at market value on the balance sheet. Also, both classifications call for recognition of unrealized losses and gains. Market value at  $t = 1$  is  $\$850 + \$180 = \$1,030$ . Unrealized loss is  $(\$850 - \$950) + (\$180 - \$250) = -\$170$ . Note that the recognition differs. With available-for-sale securities, the recognition is only on the balance sheet. With fair value through profit or loss securities, the recognition impacts the income statement. (LOS 14.a)
3. **C** The increase in value requires that investment securities be written up to  $\$900 + \$350 = \$1,250$ . Because these are equity securities, the held-to-maturity classification is not available. (LOS 14.a)
4. **A** Classifying the shares as trading requires both realized and unrealized gains and losses to be recognized on the income statement. As a result, this would have the effect of greater reported earnings volatility. There is actually a \$220 *unrealized* gain between  $t = 1$  and  $t = 2$ ; the gain is unrealized because the shares were not actually sold. The net gain of \$50 between the acquisition date and  $t = 2$  is unrealized; therefore, by classifying as available-for-sale, the gain is not recognized on the income statement (it goes directly to equity). Classification as either trading or available-for-sale securities results in the same fair market value of \$1,250 reported on the balance sheet at  $t = 2$ . (LOS 14.a)
5. **B** Debt securities held-to-maturity are securities that a company has the positive intent and ability to hold to maturity. They are carried at amortized cost (\$1,200), and no unrealized or realized gains or losses are recognized until disposition. Because these securities were purchased at par, there is no amortization of premium/discount. (LOS 14.a)

### Module Quiz 14.3, 14.4

1. **A** With the equity method, the proportional share of the affiliate's income (% ownership  $\times$  affiliate earnings) is reported on the investor's income statement. (Module 14.4, LOS 14.a)

2. **B**  $\$1,500,000 + 0.4(\$500,000 - \$125,000) = \$1,650,000$ . (Module 14.4, LOS 14.a)
3. **C**  $\$500,000 \times 0.4 = \$200,000$ ; dividends are not included in income under the equity method. (Module 14.4, LOS 14.a)
4. **A**  $\$125,000 \times 0.4 = \$50,000$ ; the dividend is cash flow = \$50,000. (Module 14.4, LOS 14.a)

### Module Quiz 14.5, 14.6

1. **B** Total assets =  $\$1,200,000 + \$360,000 - \$120,000 = \$1,440,000$ . (Module 14.6, LOS 14.a)
2. **B** Minority interest income =  $\$60,000(0.2) = \$12,000$ .  
Consolidated net income (after minority interest income is subtracted) =  $\$300,000 + \$60,000 - \$12,000 = \$348,000$ . (Module 14.5, LOS 14.a)
3. **B** The beginning balance of the minority interest is \$30,000 ( $\$150,000 \text{ S equity} \times 20\%$ ). The minority interest is increased by the minority share of Company S's income of \$12,000 ( $\$60,000 \times 20\%$ ) and is decreased by the minority share of the dividends paid by Company S of \$3,000 ( $\$15,000 \times 20\%$ ). Thus, the ending balance is \$39,000 ( $\$30,000 + \$12,000 - \$3,000$ ). Note that the value of goodwill at the time of acquisition is zero; hence, there is no need to specify whether full or partial goodwill accounting is used. (Module 14.5, LOS 14.a)

### Module Quiz 14.7

1. **A**  $\$6,000,000 + 0.2(-\$450,000) - 0.2(\$600,000) = \$5,790,000$ . (Module 14.6, LOS 14.a)
2. **A**  $0.2(-\$450,000) = -\$90,000$ . (Module 14.7, LOS 14.a)
3. **A** After removing the investment gains in 2016 and 2017, operating income is \$500 each year. Based on a growth trend of 0%, the appropriate operating income forecast for 2018 is also \$500.

	2016	2017
Sales and operating revenues	\$1,000	\$1,140
Operating costs	500	640
Adjusted operating income	500	500

(Module 14.7, LOS 14.a)

### Module Quiz 14.8

1. **B** In testing goodwill for impairment, the carrying value of the reporting unit (including goodwill) is compared to the fair value of the reporting unit. Once an

impairment has been detected, the loss is equal to the difference in the book value of the goodwill and the implied value of the goodwill. (LOS 14.a)

2. **B** Adam is required to perform an annual impairment test. The carrying value cannot exceed the fair value; if it does, then an impairment has taken place and the goodwill must be written down. (LOS 14.a)

### Module Quiz 14.9

1. **B** Company C would include minority interest (50% of \$800) along with its own equity of \$5,950 in the consolidated financial statements. (Module 14.6, LOS 14.a)
2. **C** Company C would include all the assets of JVC and remove its equity investment in the consolidated balance sheet.  $\$13,450 - \$400 + \$4,400 = \$17,450$ . (Module 14.7, LOS 14.a)
3. **A** COGS = \$7,000 Company C + 50% of \$2,000 JVC = \$8,000.  
Net income of \$930 is not affected by proportionate consolidation. (Module 14.9, LOS 14.a)
4. **B** Under U.S. GAAP (and IFRS), equity method is required to be used to account for joint ventures. Only in rare cases is proportionate consolidation allowed. (Module 14.9, LOS 14.b)

### Module Quiz 14.10

1. **C** The equity method typically yields a higher measure of net profit margin. Consolidation is most likely to result in a net profit margin somewhere between the profit margins of the two entities. (LOS 14.c)

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 16.1

1. **A** This is an indirect quotation from the perspective of the U.S. firm. Since the peso depreciated from the sale date to the end of 2015, a loss is recognized in 2015. However, the peso appreciated from the end of 2015 to the payment date on January 20, 2016. Thus, a gain is recognized in 2016. (LOS 16.b)

### Module Quiz 16.2

1. **A** If the functional currency is the local currency, then the functional currency and the parent's presentation currency are different. In this case, the current rate method is used. (LOS 16.a)
2. **C** As a multinational firm, the location of Mazeppa's head office would most likely determine the currency to be used to prepare its final, consolidated financial statements. Since Mazeppa's is located in Canada, the presentation currency is likely the Canadian dollar. Based on the facts, the local currency is the euro and the functional currency is the U.S. dollar. (LOS 16.a)
3. **A** None of the situations will result in a gain. When total assets equal total liabilities, net assets are zero; thus, no gain or loss is recognized as a result of changing exchange rates. The other situations would result in a translation loss. (LOS 16.c)
4. **B** Fixed assets are the only nonmonetary assets. Deferred revenue is the only nonmonetary liability. Equity is not relevant to this question. (LOS 16.c)
5. **A** Reducing equity and increasing peso liabilities would be most effective in reducing currency risk to the parent. The other options leave the net exposure unchanged, since there is a one-for-one reduction in both monetary assets and monetary liabilities. (LOS 16.c)

### Module Quiz 16.3, 16.4

1. **A** Monetary asset accounts of a foreign subsidiary are translated using the current rate under the temporal method. (Module 16.3, LOS 16.d)
2. **C** Subsidiaries whose operations are well integrated with the parent will generally use the parent's currency as the functional currency. Remeasurement from the local currency to the functional currency is done with the temporal method. (Module 16.3, LOS 16.a)
3. **B** If the functional currency is the same as the parent's presentation currency, the temporal method is used. Under the temporal method, the subsidiary's net monetary asset or net monetary liability position is exposed to changing exchange rates. (Module 16.3, LOS 16.e)

4. **A** Since the functional currency (£) differs from the parent's presentation currency (\$), the current rate method is used. Under the current rate method, net income is translated at the average rate. Dividends are translated at the historical rate on the date the dividends were paid.

$$(\$1.55/\text{£} \times \text{£}400) - (\$1.60/\text{£} \times \text{£}100) = \$460$$

(Module 16.4, LOS 16.c)

5. **A** The current rate method will result in higher gross profit in a depreciating environment. Under the temporal method, the subsidiary's COGS will be remeasured at the historical rate. This means that COGS will be relatively less affected by the depreciating currency. Sales, however, will be affected by the depreciating currency. Thus, gross profit margin will be lower. Under the current rate method, both sales and COGS will be affected by the depreciating currency.  
(Module 16.4, LOS 16.d)

## Module Quiz 16.5, 16.6

1. **B** All pure income statement and balance sheet ratios are unaffected by the application of the current rate method. What we mean by "pure" is that the components of the ratio all come from the balance sheet, or the components of the ratio all come from the income statement. Return on assets is a "mixed ratio" because assets come from the balance sheet and are translated at the current rate and net income is translated at the average rate. Unless the exchange rate doesn't change during the year, the two inputs will be translated at different rates, and the local currency value of the ratio will change when translated into the reporting currency. The other ratios will *always* be the same using the current rate method.  
(Module 16.6, LOS 16.f)
2. **C** If Vibrant operates independently from FlexCo, the functional currency is the local and the current rate method applies.

The first step is to compute the ending balance of retained earnings of \$555 [ $\$383.3$  beginning retained earnings + ( $\text{LC}400$  net income  $\times \$0.4292$ )].

Next, translate assets, liabilities, and common stock. Assets are  $\$1,340$  ( $\text{LC}3350 \times 0.4$ ), liabilities are  $\$700$  ( $\text{LC}1,750 \times 0.4$ ), and common stock is  $\$200$  ( $\text{LC}400 \times 0.5$ ).

Finally, make the accounting equation balance with the CTA of  $-\$115$  ( $\$1,340$  assets  $- \$700$  liabilities  $- \$200$  common stock  $- \$555$  ending retained earnings).  
(Module 16.2, LOS 16.c)

3. **B** It might look like you have to construct the translated financial statements to answer this question, but you actually don't have to if you remember the relationships between the original subsidiary ratios measured in the local currency and the translated ratios measured in U.S. dollars.

Pure income statement ratios like gross profit margin will be the same. The gross profit margin measured in the local currency is LC1,700 gross profit / LC5,500 revenue = 30.9%; the gross margin measured in U.S. dollars must also be 30.9%.

Mixed ratios like ROA will be different. In this case, since the local currency is depreciating, the translated ROA will be greater than the original ROA. This occurs because net income (in the numerator) is translated at the higher average rate, and ending total assets (in the denominator) will be translated at the lower current rate. ROA measured in the local currency is LC400 net income / LC3,350 ending total assets = 11.9%. The ROA measured in U.S. dollars must be greater than 11.9%, which means 12.8% is the only possible answer.

If you did go through the process of calculating the translated ratios, you should have arrived at these numbers:

$$\begin{aligned}\text{translated gross margin} &= \frac{1,700 \times 0.4292}{5,500 \times 0.4292} = \frac{\$729.60}{2,360.60} \\ &= 30.9\%\end{aligned}$$

$$\text{translated ROA} = \frac{400 \times 0.4292}{3,350 \times 0.40} = \frac{\$171.70}{\$1,340} = 12.8\%$$

(Module 16.6, LOS 16.f)

4. **A** The local currency is depreciating, so the gross profit margin remeasured in U.S. dollars using the temporal method will be lower than the gross profit margin translated into U.S. dollars using the current rate method. This is because COGS will be measured at the higher historical rate under the temporal method and at the lower average rate under the current rate method. With temporal method COGS greater than current rate COGS, temporal method gross margin will be less than current rate method gross margin. Current rate gross margin is the same as in the original currency (from the previous problem), which means the only possible answer is “lower.” (Module 16.6, LOS 16.f)
  5. **C** Accounts receivable turnover will be the same under both methods. The numerator (sales) is converted at the average rate under both methods. The denominator (accounts receivable) is converted at the current rate under both methods. (Module 16.6, LOS 16.f)
  6. **B** Gross profit margin and interest coverage are pure income statement ratios that will not change. The quick ratio is a pure balance sheet ratio that will not change. Return on assets is a mixed ratio (income statement item in the numerator and balance sheet item in the denominator), so it will change as long as the average and current exchange rates are different. Given that the dollar is depreciating against the yen, the current and average rates are likely to be different.
- Therefore, Haskell is correct in his analysis of three of the four ratios: gross profit margin, interest coverage, and the quick ratio. (Module 16.6, LOS 16.f)

## Module Quiz 16.7

1. **A** In an inflationary environment, the temporal method is required under U.S. GAAP, even if the functional currency and the parent's presentation currency differ. Under the temporal method, inventory, fixed assets, and intangible assets are remeasured at the historical rate; that is, the actual rate when the assets were purchased. (LOS 16.g)
2. **B** Nonmonetary items are not exposed to purchasing power gains or losses during inflation. Monetary assets will result in purchasing power losses, and monetary liabilities will result in purchasing power gains. (LOS 16.g)

## Module Quiz 16.8

1. **B** Suparna's effective tax rate was lowered by 1.9% due to the effect of taxes in foreign jurisdictions. (LOS 16.h)
2. **A** Per the annual report, total revenue decreased 2.3% as reported and was flat at constant currency versus 2011. Hence, the constant currency growth rate was higher than the reported growth rate. (LOS 16.i)
3. **C** Pre-tax earnings offset by the net impact of hedging activities decreased approximately \$100 million in 2012 and increased by approximately \$600 million due to currency translation effects. (LOS 16.j)

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 17.1

1. **B** The three pillars of Basel III framework are minimum capital requirements (as a proportion of risk-weighted assets), minimum liquidity, and stable funding. While a positive spread on deposit is always needed for a bank to be profitable, it is not a recommendation of the Basel III framework. (LOS 17.b)
2. **A** The International Organization of Securities Commissions (IOSCO) seeks to promote fair and efficient securities markets. The Basel III Committee provides a framework for analyzing and regulating banks. The International Association of Insurance Supervisors (IAIS) seeks to promote effective supervision of insurance sector. (LOS 17.b)

### Module Quiz 17.2

1. **B** The most important tier of capital is the Common Equity Tier 1 capital, which includes common stock, additional paid-in capital, retained earnings, other comprehensive income and adjustments pertaining to deductions for intangible assets, and deferred tax assets. (LOS 17.c)
2. **B** Under Basel III guidelines, total Tier 1 capital must be at least 6% of risk-weighted assets. (LOS 17.c)
3. **A** Subordinated instruments without specified maturity or dividend/interest are considered part of Tier 1 capital. Together with Common Equity Tier 1 capital, it forms total Tier 1 capital. (LOS 17.c)
4. **A** Equity securities are carried on the balance sheet at fair value (and unrealized gains are shown in the income statement) under current U.S. GAAP standards. Under IFRS, equity is also carried at fair value on the balance sheet, but unrealized gains can be in OCI (fair value through OCI classification) or in the income statement (fair value through profit or loss classification). (LOS 17.c)

### Module Quiz 17.3

1. **A** Level 1 inputs are quoted prices of identical assets. (LOS 17.c)
2. **C** Out of service income, net interest income, and trading income, trading income is most volatile. (LOS 17.c)

### Module Quiz 17.4

1. **B** Maturity mismatch is a liquidity risk metric and measures the mismatch in maturity of a bank's assets and liabilities. (LOS 17.c)
2. **A** NSFR is the ratio of available stable funding sources to the required stable funding and measures liquidity of funding sources relative to liquidity needs of

the assets. (LOS 17.c)

3. **C** Basel III standards recommend a minimum NSFR of 100%. (LOS 17.c)
4. **C** Liquidity risk in a stress scenario is measured by LCR. Charlie has the lowest LCR and hence the highest liquidity risk. (LOS 17.c)
5. **C** Funding stability is captured by NSFR. Delta has the lowest NSFR (below the recommended 100%), indicating the highest liquidity risk. (LOS 17.c)

## Module Quiz 17.5

1. **C** While slower speed of adjustments of loss provisions and restatements of financial statements are used as an indicator of aggressive, risk-seeking culture, the tenure of the bank's management team is typically not included in an evaluation of the bank's culture. (LOS 17.d)
2. **A** Government ownership of part or all of a bank is an indication of implied government backing of the bank should the bank's capital prove inadequate to absorb losses. (LOS 17.d)
3. **B** Due to the significance of the banking sector to the overall economy, and to minimize the contagion effect of banking failures, governments often bail out troubled banks. This implicit government backing increases during times of economic stress (i.e., negatively related to the health of the banking sector) and is more likely for larger banks with a higher likelihood of causing contagion. Higher inter-linkages in the banking sector lead to a higher risk of bank failure-induced contagion and a higher probability of government backing. (LOS 17.d)
4. **A** Mission statements of many community banks include promoting community development and, hence, lead to community-focused lending. Often, this leads to a larger concentration of loan assets tied to the fortunes of a single industry. (LOS 17.d)

## Module Quiz 17.6

1. **A** The contract period (the time between receipt of premium and payment of claim) is typically much longer for L&H insurers than for P&C insurers. (LOS 17.f)
2. **A** Due to their longer contract period, float for L&H insurers is typically higher than for P&C insurers. (LOS 17.f)
3. **A** Due to duration mismatches between assets and liabilities of L&H insurers, interest rate risk is more of concern for L&H insurers compared to P&C insurers. (LOS 17.f)
4. **A** During a soft pricing period, price competition among P&C insurers leads to high combined ratios. (LOS 17.f)
5. **A** For a single insurer, a combined ratio in excess of 100% indicates a loss. (LOS 17.f)

**Use the following information for answers to Questions 6 through 10.**

Ratio	IPCO	SYMCO	DELPHI
Loss and loss adjustment expense ratio	59.38%	45.76%	54.47%
Underwriting expense ratio	17.21%	34.45%	29.53%
Combined ratio	76.59%	80.21%	84.00%
Dividends to policyholders ratio	1.61%	3.98%	2.47%
Combined ratio after dividends	74.99%	76.23%	81.53%

6. **A** IPCO with a loss and loss adjustment expense ratio of 59.38% has the highest ratio. (LOS 17.f)
7. **A** IPCO has the lowest underwriting expense ratio of 17.21%. (LOS 17.f)
8. **C** DELPHI has the highest combined ratio of 84%. (LOS 17.f)
9. **A** IPCO's dividend to policyholders ratio is lowest at 1.61%. (LOS 17.f)
10. **C** DELPHI has the highest combined ratio after dividends of 81.53%. (LOS 17.f)

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 15.1

1. **C** In a defined-benefit pension plan, the employer assumes the investment risk. Total periodic pension cost is calculated as a firm's contributions minus the change in funded status. In a defined-contribution plan, pension expense is equal to the employer's contribution to the plan. (LOS 15.a)

### Module Quiz 15.2

1. **A** The current service cost is the present value of new benefits earned by the employee working another year. Current service cost increases the PBO. Note that the interest cost increases every year regardless of whether the employee works another year or not. (LOS 15.b)

### Module Quiz 15.3

1. **C** The funded status equals plan assets minus PBO. This plan is underfunded by \$20 million (\$40 million plan assets – \$60 million PBO), which is reported as a liability on the balance sheet. Prior service cost is already included in the PBO (remember, PBO represents present value of all pension payments, whether reported in the income statement or not). (LOS 15.c)
2. **C** periodic pension cost in P&L = current service cost + interest cost – expected return on assets  
current service cost = \$0.90 million (given)

$$\begin{aligned}\text{interest cost} &= \text{PBO at the beginning of the period} \times \text{discount rate} \\ &= \$12 \text{ million} \times 0.09 \\ &= \$1.08 \text{ million}\end{aligned}$$

expected return on plan assets = \$0.96 million (given)

$$\begin{aligned}\text{periodic pension cost in P&L} &= \$0.90 \text{ million} + \$1.08 \text{ million} \\ &\quad - \$0.96 \text{ million} = \$1.02 \text{ million} \\ &\quad (\text{LOS 15.c})\end{aligned}$$

### Module Quiz 15.4

1. **C** The first step is to solve for benefits paid. The beginning PBO balance plus the cost components minus benefits paid is equal to the ending PBO balance: \$193 + \$38 – benefits paid = \$220 million, which implies benefits paid are equal to \$11 million. The question specifies that there are no contributions during the year. The

ending fair value of plan assets is equal to beginning value plus actual return on assets less benefits paid:  $\$159 + \$32 - \$11 = \$180$  million. (LOS 15.c)

## Module Quiz 15.5

1. **B** The use of a higher discount rate will result in lower present values and, hence, lower current service cost. Lower service cost will result in a lower PBO and lower periodic pension cost in P&L. (LOS 15.d)
2. **C** The expected return on assets does not affect the calculation of the PBO. Periodic pension cost reported in P&L is decreased by the expected return on assets. If the expected return assumption is increased, then periodic pension cost in P&L decreases. Lower reported pension expense will result in higher net income. (LOS 15.d)
3. **A** A higher compensation growth rate will increase periodic pension cost reported in P&L (as well as the total periodic pension cost) and, thus, lower net income. Lower net income results in lower retained earnings. A higher compensation growth rate will increase the PBO. The compensation growth rate does not affect the plan assets. (LOS 15.d)
4. **B** A decrease in the discount rate will increase the PBO. A higher PBO lowers the funded status (plan assets – PBO). (LOS 15.d)
5. **C** Neither inflation expectations nor asset returns are internally consistent. The discount rate is increasing, but the inflation rate is decreasing. There is usually a direct relationship between the discount rate and the inflation rate. In 2016, the expected rate of return increased; however, SPC decreased its allocation to equity investments. Normally, reducing exposure to equity investments in favor of debt investments will decrease returns. (LOS 15.d)

## Module Quiz 15.6

1. **B** Where there are no amortizations, the periodic pension cost reported in P&L is equal to service cost + interest cost – the expected return on assets ( $\$63 + \$29 - \$32 = \$60$ ). (Module 15.3, LOS 15.c)
2. **C** A plan is overfunded when the fair value of plan assets exceeds the PBO. The Tanner plan is \$120 overfunded ( $\$603 - \$483$ ). (Module 15.2, LOS 15.b)
3. **B** Total periodic pension cost = current service cost + interest cost – *actual* investment return ( $\$63 + \$29 - \$77 = \$15$ ). No figures for actuarial losses and prior service costs were given, so we assume they are zero. (Module 15.2, LOS 15.c)
4. **A** Tanner's contributions of \$48 exceeded the total periodic pension cost of \$15. Thus, the difference of \$33 should be treated similar to an excess principal payment on a loan. Principal payments are reported as financing activities in the cash flow statement. The adjustment calls for increasing operating cash flow and decreasing financing cash flow. (Module 15.6, LOS 15.f)

5. **B** An actuarial loss resulting from changes in actuarial assumptions (such as mortality rates) leads to an increase in the PBO. Prior service cost increases the PBO as a result of amendments to the pension plan. (Module 15.2, LOS 15.b)
6. **C** Beginning of the year funded status =  $522 - 435 = 87$  (overfunded). Tanner would have reported an asset of \$87 million. An increase in discount rate would lower the PBO but would not affect fair value of plan assets—increasing the funded status of the plan (higher reported asset).

Under IFRS, Tanner would report a net interest income of the discount rate multiplied by the asset value. If Tanner had reported a liability, it would have reported a net interest expense. An increase in discount rate when a pension asset is reported results in an increase in net interest income (because the asset is multiplied by a higher rate). (Module 15.3, LOS 15.c)

7. **A**

$$\begin{aligned}\text{total periodic pension cost} &= \text{contributions} - \text{change in funded status} \\ &= 321 - [(2,232 - 1,915) - (2,015 - 1,822)] \\ &= 197 \text{ million}\end{aligned}$$

$$\text{after-tax excess contribution} = (1 - 0.3) \times (321 - 197) = 86.8 \text{ million}$$

$$\text{adjusted cash flow from operating activities} = 469 + 86.8 = 555.8 \text{ million} \text{ (Module 15.6, LOS 15.f)}$$

### Module Quiz 15.7

1. **C** The stock price after the grant date and the firm's required cost of capital are not inputs to option pricing models. (LOS 15.h)
2. **C** For share-based compensation, expense is recognized based on the fair value of the compensation as of the grant date and allocated over the employee's service period. No expense is recognized when the option is exercised or the stock is sold. (LOS 15.h)

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 16.1

1. **A** This is an indirect quotation from the perspective of the U.S. firm. Since the peso depreciated from the sale date to the end of 2015, a loss is recognized in 2015. However, the peso appreciated from the end of 2015 to the payment date on January 20, 2016. Thus, a gain is recognized in 2016. (LOS 16.b)

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1. **A** If the functional currency is the local currency, then the functional currency and the parent's presentation currency are different. In this case, the current rate method is used. (LOS 16.a)
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3. **A** None of the situations will result in a gain. When total assets equal total liabilities, net assets are zero; thus, no gain or loss is recognized as a result of changing exchange rates. The other situations would result in a translation loss. (LOS 16.c)
4. **B** Fixed assets are the only nonmonetary assets. Deferred revenue is the only nonmonetary liability. Equity is not relevant to this question. (LOS 16.c)
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### Module Quiz 16.3, 16.4

1. **A** Monetary asset accounts of a foreign subsidiary are translated using the current rate under the temporal method. (Module 16.3, LOS 16.d)
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2. **C** If Vibrant operates independently from FlexCo, the functional currency is the local and the current rate method applies.

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2. **C** Out of service income, net interest income, and trading income, trading income is most volatile. (LOS 17.c)

### Module Quiz 17.4

1. **B** Maturity mismatch is a liquidity risk metric and measures the mismatch in maturity of a bank's assets and liabilities. (LOS 17.c)
2. **A** NSFR is the ratio of available stable funding sources to the required stable funding and measures liquidity of funding sources relative to liquidity needs of

the assets. (LOS 17.c)

3. **C** Basel III standards recommend a minimum NSFR of 100%. (LOS 17.c)
4. **C** Liquidity risk in a stress scenario is measured by LCR. Charlie has the lowest LCR and hence the highest liquidity risk. (LOS 17.c)
5. **C** Funding stability is captured by NSFR. Delta has the lowest NSFR (below the recommended 100%), indicating the highest liquidity risk. (LOS 17.c)

## Module Quiz 17.5

1. **C** While slower speed of adjustments of loss provisions and restatements of financial statements are used as an indicator of aggressive, risk-seeking culture, the tenure of the bank's management team is typically not included in an evaluation of the bank's culture. (LOS 17.d)
2. **A** Government ownership of part or all of a bank is an indication of implied government backing of the bank should the bank's capital prove inadequate to absorb losses. (LOS 17.d)
3. **B** Due to the significance of the banking sector to the overall economy, and to minimize the contagion effect of banking failures, governments often bail out troubled banks. This implicit government backing increases during times of economic stress (i.e., negatively related to the health of the banking sector) and is more likely for larger banks with a higher likelihood of causing contagion. Higher inter-linkages in the banking sector lead to a higher risk of bank failure-induced contagion and a higher probability of government backing. (LOS 17.d)
4. **A** Mission statements of many community banks include promoting community development and, hence, lead to community-focused lending. Often, this leads to a larger concentration of loan assets tied to the fortunes of a single industry. (LOS 17.d)

## Module Quiz 17.6

1. **A** The contract period (the time between receipt of premium and payment of claim) is typically much longer for L&H insurers than for P&C insurers. (LOS 17.f)
2. **A** Due to their longer contract period, float for L&H insurers is typically higher than for P&C insurers. (LOS 17.f)
3. **A** Due to duration mismatches between assets and liabilities of L&H insurers, interest rate risk is more of concern for L&H insurers compared to P&C insurers. (LOS 17.f)
4. **A** During a soft pricing period, price competition among P&C insurers leads to high combined ratios. (LOS 17.f)
5. **A** For a single insurer, a combined ratio in excess of 100% indicates a loss. (LOS 17.f)

**Use the following information for answers to Questions 6 through 10.**

Ratio	IPCO	SYMCO	DELPHI
Loss and loss adjustment expense ratio	59.38%	45.76%	54.47%
Underwriting expense ratio	17.21%	34.45%	29.53%
Combined ratio	76.59%	80.21%	84.00%
Dividends to policyholders ratio	1.61%	3.98%	2.47%
Combined ratio after dividends	74.99%	76.23%	81.53%

6. **A** IPCO with a loss and loss adjustment expense ratio of 59.38% has the highest ratio. (LOS 17.f)
7. **A** IPCO has the lowest underwriting expense ratio of 17.21%. (LOS 17.f)
8. **C** DELPHI has the highest combined ratio of 84%. (LOS 17.f)
9. **A** IPCO's dividend to policyholders ratio is lowest at 1.61%. (LOS 17.f)
10. **C** DELPHI has the highest combined ratio after dividends of 81.53%. (LOS 17.f)

## ANSWER KEY FOR MODULE QUIZ

### Module Quiz 18.1, 18.2, 18.3, 18.4, 18.5

1. **B** The bias in accounting choices means GGFT is lower on the spectrum than FSKA. FSKA appears to have high-quality financial reporting, but earnings are of low quality due to the lack of sustainability.  
(Module 18.1, LOS 18.a)
2. **B** Cash-based earnings are more persistent than accruals-based earnings. Hence, companies with a higher proportion of cash-based earnings will have a higher persistence of earnings and, hence, a higher beta coefficient in the AR(1) model.  
(Module 18.2, LOS 18.e)
3. **A** PSAA may still have to consolidate CRAFT as a VIE despite the voting rights residing with the equity holders. PSAA is exposed to a variable interest due to gains and losses on the conversion option on the convertible debt. If CRAFT is classified as a VIE, the interest income will not be recognized in the consolidated income statement.  
(Module 18.2, LOS 18.c)
4. **C** The AQI variable measures the change in proportion of assets other than PPE and current assets over time. A value greater than 1 for AQI indicates an increase in proportion of assets other than PPE and CA (from last period) and may indicate excessive expenditure capitalization. A DEPI variable of less than 1 results from a higher depreciation rate for the current year compared to the prior year and would not occur if the company was extending useful lives.  
(Module 18.2, LOS 18.d)
5. **C** The M-score is a standard normal variable. The larger (less negative) the M-score, the higher the probability of earnings manipulation. Using a cut off of –1.78, both companies would be considered to be likely manipulators of earnings.  
(Module 18.2, LOS 18.d)
6. **B** A clean audit report is unlikely to provide timely information about potential risks. Due to its focus on historical information, it is also unlikely to be useful to the analyst.  
(Module 18.5, LOS 18.m)

7. **B**

ZZYP	2013	2014	Growth
Op earnings	142.5	140.3	
Non recurring	(8.2)	(1.9)	
<b>Core earnings</b>	<b>134.3</b>	<b>138.4</b>	<b>3.05%</b>
<hr/>			
AART	2013	2014	Growth
Op earnings	209.8	195.4	

Dev costs	(20.1)	5.0
<b>Core earnings</b> 189.7 200.4 5.64%		
XXPG	2013	2014
Op/core earnings	220.9	233.2
		5.57%

(Module 18.5, LOS 18.l)

8. **C** Hartford's comment is incorrect. Discretionary accruals, and to a lesser extent non-discretionary accruals-based earnings, are more likely to be indications of manipulation than cash-based earnings. (Module 18.2, LOS 18.e)
9. **B** Studies have shown the accruals-based earnings are less sustainable than cash-based earnings and, hence, revert to the mean more quickly. (Module 18.2, LOS 18.e)

10. **B**

	\$ Millions
<b>Net income</b>	<b>98.5</b>
Depreciation, amortization and impairment	137.4
(Increase)/decrease in trade and other receivables	(11.5)
Decrease/(increase) in inventories	(4.1)
Increase/(decrease) in trade and other payables and provisions	12.4
<b>Decrease/(increase) in short term investments (CFI)</b>	<b>-</b>
Non-cash and other movements	7.7
<b>Interest paid (CFI)</b>	<b>-</b>
Tax paid	(25.1)
<b>Net cash flow from operating activities</b>	<b>215.3</b>

(Module 18.4, LOS 18.j)

11. **A** Start-ups typically take time to start showing positive operating cash flows. In the early years CFI is negative because the company is spending cash to buy assets and CFF is positive due to capital raised via debt or equity. (Module 18.4, LOS 18.j)
12. **A** Off-balance sheet financing indicates a lack of completeness. Completeness, along with unbiased reporting and clear presentation, is required for high quality financial reporting. (Module 18.5, LOS 18.k)

13. A

Year	Lease Payment
2015	9.9
2016	9.9
2017	9.9
2018	9.9
2019	8.0
<b>PV at 7.75%</b>	<b>38.48</b>

revised debt-to-equity =  $(182.1 + 38.5) / 120.2 = 1.84x$

(Module 18.5, LOS 18.l)

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 19.1

1. **C** Common-size financial statements are created in the data processing step of the framework for financial analysis. (LOS 19.a)
2. **C** Communication with management, suppliers, customers, and competitors is an input during the data collection step. (LOS 19.a)

### Module Quiz 19.2

1. **A**  $\text{ROE} = \text{tax burden} \times \text{interest burden} \times \text{EBIT margin} \times \text{asset turnover} \times \text{financial leverage}$   $= (1 - 0.35) \times 0.70 \times 0.11 \times 1.2 \times 1.5 = 0.09$   
 $\text{tax burden} = \text{net income} / \text{earnings before tax} = 1 - \text{tax rate}$   
(LOS 19.b)
2. **B**  $(158,650 \text{ net income} - 16,750 \text{ equity income}) / 236,500 \text{ EBT} = 60.0\%$  (LOS 19.b)
3. **B**  $848,000 \text{ revenue} / [(2016 \text{ total assets of } 468,000 - 2016 \text{ Creston investment of } 56,400 + 2015 \text{ total assets of } 363,600 - 2015 \text{ Creston investment of } 42,100) / 2] = 848,000 / 366,550 = 2.31$  (LOS 19.b)
4. **A** Rainbow may be overallocating resources to Red because Red has the lowest EBIT margin and a ratio of proportional capital expenditures to proportional assets that is greater than 1 ( $70\% / 40\% = 1.75$ ). Green has highest EBIT margin and a ratio of proportional capital expenditures to proportional assets that is less than 1 ( $30\% / 60\% = 0.50$ ). (LOS 19.b)

### Module Quiz 19.3, 19.4, 19.5

1. **A** Cash flow accruals ratio  $= (\text{NI} - \text{CFO} - \text{CFI}) \div \text{average NOA} = [12,000 - 33,000 - (-30,000)] / 180,000 = 5\%$ . (Module 19.5, LOS 19.e)

### Module Quiz 19.6

1. **B** Pro-rata share of Small's market cap / Big's market cap  $= (\text{€}150,000 \times 25\% \times 0.85) / \text{£}275,000 = 11.6\%$ . (LOS 19.e)
2. **B** Big's implied value without Small is £243,125, or £275,000 Big market cap - £31,875 pro-rata share of Small market cap ( $\text{€}150,000 \times 25\% \times 0.85$  current exchange rate).

Big's net income without Small is £14,800, or £16,000 Big net income - £1,200 pro-rata share of Small net income ( $\text{€}6,000 \times 25\% \times 0.80$  average exchange rate).

Implied P/E = 16.4 (£243,125 Big's implied value without Small / £14,800 Big's net income without Small). (LOS 19.e)

### Module Quiz 19.7

1. C When adjusting the income statement for an operating lease, the rent expense is added back to operating income and depreciation expense on the lease asset is subtracted. The rental payment will likely exceed the implied depreciation expense; thus, operating income will increase. Interest expense will also be increased by interest on the lease liability, but this will not affect operating income. The D/E ratio will increase. The current ratio will decrease because the current portion of the lease liability will increase current liabilities. (LOS 19.c)

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 20.1

1. **C** Previous expenditures associated with a market test would be a sunk cost and should not be included. (LOS 20.a)
2. **B** First-year depreciation =  $(\$60,000)(0.2) = \$12,000$ . Initial cash outlay =  $\$60,000$  cost -  $\$15,000$  NWC inflow =  $\$45,000$  net outlay. (LOS 20.a)
3. **C** Year 1 operating cash flow = [net income impact  $\times (1 - t)$ ] + (depreciation  $\times t$ ) =  $(\$5,000)(0.6) + (\$60,000)(0.2)(0.4) = \$7,800$ . Terminal year cash flow (excluding that year's operating cash flow) = after-tax proceeds from sale of the new machine less working capital return =  $\$10,000 - [(\$10,000)(0.4)] - \$15,000 = -\$9,000$ . (LOS 20.a)
4. **A** initial net investment =  $-\$60,000 + \$15,000 = -\$45,000$   
annual depreciation =  $\$60,000 / 6 = \$10,000$

$$CF(\text{years 1 through 6}) = \$5,000(1 - 0.4) + \$10,000(0.4) = \$7,000$$

$$TNOCF(\text{year 6}) = \$10,000 - [\$10,000(0.4)] - \$15,000 = -\$9,000$$

$$NPV = -\$45,000 + \$7,000 / 1.12 + \$7,000 / 1.12^2 + \$7,000 / 1.12^3 + \$7,000 / 1.12^4 + \$7,000 / 1.12^5 + (\$7,000 - \$9,000) / 1.12^6 = -\$20,780 \text{ (LOS 20.a)}$$

5. **B** Initial cash outlay
 
$$\begin{aligned} &= FCInv + NWCIInv - Sal_0 + T(Sal_0 - B_0) \\ &= 10,000 + (3,000 - 1,000) - 6,000 + 0.25(6,000 - 2,000) \\ &= 7,000 \end{aligned}$$

This indicates an initial cash flow of  $-\$7,000$ . (LOS 20.a)

6. **B** Statement 1 is incorrect. Depreciation reduces cash taxes paid, not interest expense. Statement 2 is correct. Accelerated depreciation methods applied for tax purposes result in higher tax savings and higher cash flows early in a project's life, which will serve to increase the project's NPV. (LOS 20.a)
7. **C** Spang is incorrect with respect to both statements. All projects should *not* be discounted at the real interest rate. Discount rates should be matched up with cash flows so that real cash flows are discounted at the real interest rate and nominal cash flows are discounted at the nominal interest rate. The second statement is incorrect because it is rare for inflation to affect revenues and costs uniformly. The profits for a company will be better or worse than expected depending on how sales outputs or cost inputs are affected by inflation. Also, contracting with

customers, suppliers, employees, and capital providers can all become more complicated as inflation rises. (LOS 20.b)

## Module Quiz 20.2

1. **B** Capital budgeting analysis for expansion and replacement projects are not the same; change in working capital can be positive or negative; and replacement projects are mutually exclusive—B is the only correct statement. (LOS 20.c)
2. **B** Using the least common multiple of lives approach:

$$\text{NPV Project A} = -100,000 + (75,000 / 1.10) + (75,000 - 100,000) / 1.10^2 + 75,000 / 1.10^3 + 75,000 / 1.10^4 = \$55,095.$$

$$\text{NPV Project B} = -100,000 + 50,000 / 1.10 + 50,000 / 1.10^2 + 50,000 / 1.10^3 + 50,000 / 1.10^4 = \$58,493.$$

(LOS 20.c)

3. **A**  $EAA_A$ : PV=20,000; N = 3; I/Y = 12; CPT PMT → \$8,327.  $EAA_B$ : PV = 25,000; N = 5; I/Y = 12; CPT PMT → \$6,935. Note: take the highest EAA. (LOS 20.c)
4. **A** The tax shield from the loss on the sale of the old equipment is equal to the loss times the marginal tax rate. The tax shield is treated as an initial cash *inflow*. Answer B describes a cash inflow (a tax savings). (LOS 20.c)
5. **B** Statement 2 is incorrect because the analyst should use either the least common multiple of lives or equivalent annual annuity methods to analyze mutually exclusive projects with unequal lives. Statement 1 is correct: the “equivalent annual annuity” approach is one method of comparing mutually exclusive projects in a replacement chain (where it is assumed that company assets will be replaced as they wear out.) (LOS 20.c)
6. **C** Scenario analysis uses best and worst case scenarios to determine the most likely outcome. The other statements are true. (LOS 20.d)
7. **C** The combination of projects with the highest total NPV should be selected, subject to the constraint that the total investment required not exceed the allocated capital budget. (LOS 20.c)
8. **B** Since the capital budget is only \$80,000, this is an example of capital rationing since Eldon has more profitable projects than it has capital. The objective here is to maximize the NPV within the budget, which means that Projects 2, 3, and 4 should be taken for a combined NPV of \$33,000. Note that even though money is left over with this combination, it has the highest total NPV of the answer choices listed. Choosing Projects 1, 3, and 5 uses the entire capital budget but results in a total NPV of only \$31,000. Choosing Projects 1, 3, and 4 would exceed the capital budget. (LOS 20.c)

9. **C** By ignoring the initial \$500,000 cash outflow, she has overestimated project NPV by \$500,000. By ignoring the terminal cash inflow of \$500,000, she has underestimated project NPV by  $\frac{\$500,000}{1.10^5} \approx \$310,000$ .

The net effect is to overestimate NPV by \$500,000 – \$310,000 = \$190,000. (LOS 20.c)

10. **A**  $R_{\text{project A}} = 5\% + 1.2(9\%) = 15.80\%$

$R_{\text{project B}} = 5\% + 0.6(9\%) = 10.40\%$

If the company uses the overall WACC of 10%, it will overestimate the value of both projects because the WACC is too low to reflect the higher risk of each project. (LOS 20.e)

### Module Quiz 20.3

- A** Financing costs or cost of debt is reflected in the cost of capital. The other statements are accurate. (Module 20.3, LOS 20.h)
- C** The project described has a production-flexibility option, which includes overtime for workers, producing a different product, or using different inputs. In any case, the use of real options offers flexibility that can improve the NPV estimates for individual projects. (Module 20.3, LOS 20.f)
- A** The expected annual after-tax operating cash flow is  $0.50(\$100,000) + 0.50(\$280,000) = \$190,000$ . The cash flows discounted at the 10% cost of capital for the project give an NPV of:

$$NPV = -\$500,000 + \sum_{t=1}^3 \frac{\$190,000}{1.10^t} = -\$27,498$$

(Module 20.1, 20.3, LOS 20.a, 20.h)

- B** The optimal abandonment strategy would be to abandon the project in one year if the subsequent cash flows are worth less than the abandonment value. If at the end of the first year the low cash flow occurs, McCool can abandon the project, receive \$250,000 instead of \$173,554 (present value of \$100,000 over the next two years). If the high cash flow occurs, the present value of the cash flow for the remaining two years is \$485,950, so McCool would not want to abandon the project.

If the high cash flow occurs, the total present value of the project would be:

$$NPV = -\$500,000 + \sum_{t=1}^3 \frac{\$280,000}{1.10^t} = \$196,319$$

If the low cash flow occurs, McCool would receive the first year cash flow and the abandon value, and no further cash flows. In that case, the NPV would be:

$$\text{NPV} = -\$500,000 + \frac{\$100,000 + \$250,000}{1.10} = -\$181,818$$

With the abandonment option, the expected NPV is  $0.50(\$196,319) + 0.50 (-\$181,818) = \$7,250$ . Note that the NPV was negative without the option but positive when the option is included in the analysis. (Module 20.3, LOS 20.f)

5. **B** Simply adjusting the numbers input into templates does not eliminate the possibility that the templates themselves may be incorrectly applied. Statement 1 is incorrect. Statement 2 is correct because a methodology is used that adjusts the discount rate for the risk of the project and does not simply use a single discount rate for all projects. (Module 20.3, LOS 20.g)
6. **B** First, determine the after-tax cash flow for years 1 and 2 as:

$$CF = (S - C - D)(1 - T) + D = €140(1 - 0.40) + €100 = €184$$

Note that EBIT is equal to  $(S - C - D)$ .

Next, determine the current market value of the project today and at the end of year 1 as:

$$\begin{aligned} \text{value today} &= \frac{€184}{1.15} + \frac{€184}{1.15^2} = €299, \text{value after year 1} \\ &= \frac{€184}{1.15} = €160 \end{aligned}$$

The economic income for years 1 and 2 are €45 million and €24 million respectively, as shown in the following table.

(all figures in millions)	Year 1	Year 2
Beginning market value	€299	€160
Ending market value	160	0
Change in market value	-139	-160
After-tax cash flow	184	184
<b>Economic income</b>	<b>€45</b>	<b>€24</b>
Economic rate of return	15%	15%

(Module 20.3, LOS 20.h)

7. **C** Economic profit is calculated as  $\text{NOPAT} - \$\text{WACC} = \text{EBIT}(1 - T) - \$\text{WACC}$   
 $\text{economic profit (year 1)} = €140 \text{ million}(1 - 0.4) - 0.15(€200 \text{ million}) = €54 \text{ million}$

$$\begin{aligned}\text{economic profit (year 2)} &= €140 \text{ million}(1 - 0.4) - 0.15(€100 \text{ million}) \\ &= €69 \text{ million}\end{aligned}$$

(Module 20.3, LOS 20.i)

8. **A** Both of Krause's comments are correct statements. (Module 20.3, LOS 20.i)

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 21.1

1. **A** The optimal capital structure minimizes the firm's WACC and maximizes the firm's value (stock price). (LOS 21.a)
2. **B** MM's Proposition I (No Taxes) states that the cost of equity increases linearly as a company increases its proportion of debt financing. Because debt is cheaper than equity, the net result is a zero change in the firm's WACC. The other statements are incorrect. Under MM's Proposition I (No Taxes), capital structure is irrelevant because value is based on operating cash flows. Note that we are not told whether to assume a world with taxation or without. The most appropriate answer choice is one that applies to either scenario. (LOS 21.a)

### Module Quiz 21.2

1. **B** The cost of insurance premiums to guarantee management performance is an example of a bonding cost associated with the net agency cost of equity. The expected costs of financial distress for a firm are based on direct costs such as fees associated with bankruptcy, indirect costs such as loss of trust from customers and suppliers, and the probability of financial distress associated with operating and financial leverage. (Module 21.2, LOS 21.a)
2. **C** Modigliani and Miller's original study was based on the assumption of perfect markets with no taxes and no costs of financial distress. Their conclusion [MM Proposition I (No Taxes)] was that under such assumptions, capital structure has no impact on firm value. (Module 21.1, LOS 21.a)
3. **B** MM Proposition I with taxes concludes that the optimal capital structure is 100% debt. This is because the tax deductibility of interest payments provides a tax shield that adds value to the firm, and the value of the tax shield is maximized with 100% debt. (Module 21.1, LOS 21.a)
4. **B** The static trade-off theory seeks to balance the costs of financial distress with the tax benefits provided by debt and states that there is some optimal capital structure with an optimal proportion of debt. Given Munn's choices, the 50% debt, 50% equity choice is most likely to provide this balance. (Module 21.2, LOS 21.a)
5. **B** Countries where companies have low levels of debt with long maturities in their capital structures tend to have a strong legal system. A small institutional investor presence, illiquid capital markets, and high inflation tend to be associated with either higher leverage or shorter maturity debt. (Module 21.2, LOS 21.e)
6. **A** A lack of analysts and auditors tends to increase information asymmetry, which leads to higher debt usage and shorter debt maturities. Note that a low reliance on the banking system, favorable dividend tax rates, and high GDP growth tend to be

associated with either lower debt ratios or the use of longer maturity debt.  
(Module 21.2, LOS 21.e)

7. **C** Iwinski's Statement 1 is indicative of the pecking order theory, which states that managers prefer financing choices that send the least visible signal to investors, with internal capital being most preferred, debt being next, and raising external equity the least preferred method of financing.

Iwinski's Statement 2 is indicative of the static trade-off theory. Additional leverage could increase or decrease the value of the firm depending on the relationship between the additional tax benefits of debt and the additional costs of financial distress. The key to static trade-off theory is to find the point where the marginal costs and benefits of additional debt balance, which is the optimal capital structure. (Module 21.2, LOS 21.a)

8. **B** Statement 3 is correct. The cost of debt is measured on an after-tax basis, and the higher the tax rate, the greater the tax shield benefits from using debt. Therefore, the WACC will decrease and firm value will increase, all else equal.

Statement 4 is incorrect. A firm's target capital structure is best described as a *moving target* where the actual capital structure will fluctuate around the optimal structure. One of the reasons why the actual capital structure may not match the target capital structure is that the financial markets may offer an opportunity to raise cheap debt or equity capital, in which case it makes sense to deviate slightly from the target. (Module 21.2, LOS 21.b)

9. **B** The drop in the bond rating may impact bond covenants but will not invalidate them. Bond covenants are discussed further in the debt securities topic reviews. Higher interest costs will increase WACC, making some borderline projects unviable. Higher debt costs would increase the firm's weighted average cost of capital. (Module 21.2, LOS 21.c)

10. **C** Management is not required to perform or disclose a scenario analysis of capital structure. The analyst may, however, find this tool useful. A capital structure policy evaluation should consider changes in the company's capital structure over time, capital structure of competitors with similar business risk, and factors affecting agency costs, such as quality of corporate governance. (Module 21.2, LOS 21.d)

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 22.1

1. **A** If most investors' marginal tax rates on capital gains are lower than their marginal tax rates on dividends, the share's price is most likely to drop by *less* than the amount of the dividend when the share goes ex-dividend. The amount of the price decrease is described by the equation  $D \times (1 - T_D) / (1 - T_{CG})$ . If  $T_D$  is greater than  $T_{CG}$ , then the price decrease should be less than  $D$ . (LOS 22.d)
2. **B** The effective tax rate on earnings distributed as dividends is  $0.35 + (1 - 0.35)(0.30) = 0.545 = 54.5\%$ . (LOS 22.f)
3. **B** The effective tax rate on earnings distributed as dividends is  $0.20 + (1 - 0.20)(0.28) = 0.424 = 42.4\%$ . (LOS 22.f)
4. **C** Under an imputation tax system, the effective tax rate on earnings distributed as dividends is the tax rate of the shareholder receiving the dividends. (LOS 22.f)
5. **B** Institutional investors such as income-oriented mutual funds would invest in companies that pay a high dividend. The clientele effect suggests a company should maintain its current dividend payout policy. A company in the early stage of its life cycle typically does not pay a dividend. Double taxation of dividends and debt covenants both encourage low dividend payout ratios. (LOS 22.d)
6. **C** The bird-in-hand argument for dividend policy is based on the fact that a dividend payment is more certain than future capital gains. (LOS 22.b)

### Module Quiz 22.2

1. **B** Over the past decades, it has been observed that the percentage of companies engaging in share repurchases has increased over time. At the same time, the fraction of companies paying cash dividends has decreased. In addition to changing over time, dividend policies have been noted to differ between countries. (LOS 22.l)
2. **B** An FCFE coverage ratio or dividend coverage ratio much less than one is not sustainable because the company is drawing on cash and marketable securities to make payments. A dividend payout ratio less than one indicates that the company is paying out less in dividends than it is earning, which is the normal (and desirable) situation. (LOS 22.n)
3. **C** Adams is incorrect with respect to Statement 1. If the firm pays its special dividend of \$20 million, both the assets and equity of the firm will drop by \$20 million. The total wealth from owning one share will be  $[(40 \text{ million})(\$28) - \$20 \text{ million}] / 40 \text{ million} = \$27.50$ , plus  $\$20 \text{ million} / 40 \text{ million} = \$0.50$  per share as a dividend, so the total shareholder wealth resulting from owning one share of stock is \$28. Note that the total shareholder wealth of \$28 is the same whether the cash

dividend or share repurchase option is chosen. Adams is also incorrect with respect to Statement 2. The current EPS is  $\$56 \text{ million} / 40 \text{ million} = \$1.40$ , so the current P/E ratio is  $\$28 / \$1.40 = 20$  times earnings. The price per share will remain the same. Share buyback =  $\$20 \text{ million} / 28 = 714,286$  shares. New price =  $[(40 \text{ million} \times \$28/\text{share}) - \$20 \text{ million}] / (40 \text{ million} - 714,286) = \$28/\text{share}$ . EPS will increase.  $\$56 \text{ million} / 39,285,714 = \$1.43$ . Since the price is the same, and EPS increases, the P/E ratio will fall slightly after the repurchase. (LOS 22.i)

4. **B** Management would repurchase shares of its own stock if it believed the shares were undervalued, not overvalued. (LOS 22.k)
5. **B** Under the residual dividend model, the firm pays dividends only if earnings are available to support the optimal capital budget. The firm would not take on additional equity to pay dividends. (LOS 22.g)
6. **A** If all earnings are used under a residual dividend policy, the firm would not pay any dividends. (LOS 22.g)
7. **C** 30% of \$5,000 or \$1,500 is equity.  $\$4,500 - \$1,500$  is \$3,000, which as a percent is  $\$3,000 / \$4,500 = 67\%$ . (LOS 22.g)
8. **B** 60% of \$1,200,000 is \$720,000.  $\$800,000 - \$720,000$  is \$80,000. (LOS 22.g)
9. **C** expected increase in dividends

$$\begin{aligned}
 &= [(\text{expected earnings} \times \text{target payout ratio}) - \text{previous dividend}] \times \text{adjustment factor} \\
 &= [(\$4.40 \times 30\%) - \$0.20] \times (1 / 8) \\
 &= \$0.14
 \end{aligned}$$

expected dividend for the current year

$$\begin{aligned}
 &= \text{previous dividend} + \text{expected increase in dividends} \\
 &= \$0.20 + \$0.14 \\
 &= \$0.34
 \end{aligned}$$

(LOS 22.g)

10. **A** The cost of new equity capital is always higher than the cost of retained earnings. Under pecking order, internally generated equity (i.e., retained earnings) is most favored and external equity (i.e., newly issued shares) is least favored. In this case, the equity half of these projects can be financed using retained earnings, so new equity does not need to be issued. The cost of retained earnings is thus the appropriate rate to use. First, determine the WACC.  $\text{WACC} = w_d \times r_d(1 - t) + w_e \times r_s$  where  $r_s$  is the required return on retained earnings.  $\text{WACC} = (0.5)(8) + (0.5)(13.5) = 10.75$ . Second, decide to accept projects A, B, and C since they all have

an IRR greater than WACC. This results in a total capital budget of  $\$1,000 + \$1,200 + \$1,200 = \$3,400$ . The equity portion is  $(0.5)(\$3,400) = \$1,700$ . Net income =  $\$2,500 - \$1,700$  is the amount used for the capital budget. \$800 remains.  $\$800 / \$2,500 = 0.32 = 32\%$ . (LOS 22.g)

## ANSWER KEY FOR MODULE QUIZ

### Module Quiz 23.1

1. **B** The purpose of the stakeholder impact analysis (SIA) is to force the company to identify which groups are most critical to the company and make choices among the stakeholders. Answer A is not wrong but it is very vague. C is incorrect because it is not reasonable to expect to meet all needs; priorities must be set. (LOS 23.a)
2. **A** Ways to mitigate the principal-agent problem are: (1) shape the behavior of agents so their actions are in alignment with the goals of the principals, (2) reduce the asymmetry of information between the agents who have more information about the business and the *principals* who have less information, and (3) implement methods to be able to remove and replace agents who violate the ethical standards of the company. (LOS 23.b)
3. **C** A and B are root causes of unethical behavior. A management goal of earning a reasonable profit is fundamental to any for-profit business. An excessive and unrealistic focus on profit that encourages employees to “cut corners” would be a root cause. (LOS 23.c)
4. **C** Utilitarianism focuses on maximization of collective good. (LOS 23.d)

## ANSWER KEY FOR MODULE QUIZ

### Module Quiz 24.1

1. **B** Although fair compensation for management that is reflective of job performance may result from an effective corporate governance system, it is not considered one of the core attributes. (LOS 24.a)
2. **A** The objectives of corporate governance are to (1) eliminate or reduce conflicts of interest, particularly those between managers and shareholders, that are inherent with the corporate form of doing business, and (2) ensure that company assets are used in a manner consistent with the best interests of investors and other stakeholders. (LOS 24.a)
3. **C** The principal-agent problem in a corporation refers to a situation where agents, such as management or directors, act in their own best interests rather than those of the principal (i.e., the shareholders). The best example of the principal-agent problem is the biotech company whose management generates big payoffs from their stock options if a risky project succeeds, but has little downside risk if the project fails. The condiment supplier to the restaurant industry seems to be engaging in a vertical merger that makes sense for shareholders. Having directors that are paid in stock is a way to align director interests with those of shareholders, and having directors only serve on one board is a means of having directors focus their energies on one firm. (LOS 24.c)
4. **B** Observation 1 is not consistent because meetings of the independent directors should be held at least annually. Meeting on an as-needed basis is too vague. Best practice dictates that 75% of directors should be independent. In the case of Brinley, it appears 80% are independent, so Observation 2 is consistent. (LOS 24.d)
5. **C** Observation 3 is not consistent because best practice calls for annual elections. Observation 4 is not consistent—boards should use independent counsel rather than corporate counsel for legal issues. (LOS 24.e)
6. **A** Quarterly conference calls may be useful to learn about operations and management's assessment of the business environment, but of the choices listed, they are the least likely to provide information about a company's corporate governance practices. (LOS 24.f)
7. **B** Having an individual serve the dual role of CEO and Chairman is considered a poor corporate governance practice. Not only does it cause a conflict of interest when determining management compensation, there is a concern that the CEO/Chairman could drive the board agenda and influence the boardroom culture, diminishing the independence of independent directors. Note that while separating the CEO and Chairman positions reduces potential questions about the

board's commitment to shareholders, it does not guarantee the board will function properly. (LOS 24.e)

8. **C** The nontraditional ESG business factors that should be considered when analyzing a firm are a company's environmental, social, and governance risk exposures. (LOS 24.g)
9. **A** Both of Myers' statements about the valuation characteristics of corporate governance support his claim. The lack of corporate governance structure increases accounting risk and asset risk, which are both described in his statement, as well as liability risk and strategic policy risk. Companies with strong corporate governance systems have been shown in studies to have higher profitability measures such as ROE. (LOS 24.h)
10. **A** The board structure that Karazim has proposed would consist of 15 board members. Former employees would not be considered independent, but having only two former employees on the board would be a ratio of 2:15, which would meet the best practice that at least 75% of the board members are independent. A bigger concern would be having five family members on the board, which would be one-third of the directors. In general, there is no problem with having directors that serve on other boards, however, if an individual serves on more than two or three boards, it raises the question of how much time they have to devote to each board. Another big concern would be having lenders serve on the board. If the lenders have an ongoing relationship with the company, they cannot be classified as independent. (LOS 24.e)
11. **C** The statement in Albright-Williams' letter is inconsistent with corporate governance best practice. Although it is admirable that elections will not be staggered, best practice would have elections take place annually. Davidson's suggestion is a nice gesture, but it is incomplete—shareholders should be able to vote on the board members before the first meeting. Pyle's statement is most consistent with best practice—board members should be trained so they can adequately perform board functions. (LOS 24.e)
12. **A** The internal board appears to be protecting management at the expense of shareholders; this is a principal-agent problem. "Disclosure assessment" has little or no meaning in this context. An "exogenous change" (i.e., an SEC investigation) could help or hurt Yellow Frond shareholders, but has nothing to do with this topic review. (LOS 24.e)

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 25.1

1. **B** Since the two companies will cease to exist in their prior form and a new company will be formed, the form of integration is a consolidation. Also, Uritis Pharmaceuticals, a drug manufacturer, is moving up the supply chain by acquiring Troup Healthcare Systems, a distributor, which is an example of a vertical merger. (LOS 25.a)
2. **B** Achieving more rapid growth by external acquisition, gaining access to unique capabilities, and unlocking hidden value are all potential motivations for mergers. Tax benefits are also a potential motivation for a merger, but the acquirer would want the target to have tax losses, not the other way around. (LOS 25.b)
3. **C** Bootstrapping occurs when the high P/E firm purchases the low P/E firm in exchange for stock. By purchasing the firm with a lower P/E, the acquiring firm is essentially exchanging higher priced shares for lower priced shares. As a result, the number of shares outstanding for the acquiring firm increases, but at a ratio that is less than 1-for-1. When we compute the EPS for the combined firm, the numerator (total earnings) is equal to the sum of the combined firms, but the denominator (total shares outstanding) is less than the sum of the combined firms, resulting in the appearance of EPS growth. (LOS 25.b)
4. **A** A firm with high profit margins that is looking for a conglomerate merger with the goal of gaining access to capital to finance growth is most likely in the rapid growth stage of the industry life cycle. (LOS 25.d)

### Module Quiz 25.2

1. **B** In an asset purchase, payment is made directly to the target company, no shareholder approval is needed (unless the asset sale is more than 50% of the company), the acquirer avoids the assumption of the target's liabilities, and the target is responsible for any capital gains taxes, not the shareholder. (LOS 25.e)
2. **C** Pre-offer merger defense mechanisms are usually easier to defend in court than a post-merger defense mechanisms once a hostile takeover has been announced. Poison pills, restricted voting rights, and supermajority voting provisions are all examples of pre-merger defense mechanisms. The crown jewel defense is a post-merger defense mechanism in which the target tries to sell valuable assets to a neutral third party in order to cause the acquirer to call off the merger. (LOS 25.f)
3. **B** The industry the firms operate in is considered moderately concentrated because the post-merger HHI falls between 1,000 and 1,800. With a change in HHI greater than 100, a challenge is possible. (LOS 25.g)

$$\text{pre-merger HHI} = (0.20 \times 100)^2 + (0.18 \times 100)^2 + (0.12 \times 100)^2 + (0.10 \times 100)^2 + [(0.08 \times 100)^2 \times 5] = 1,288$$

$$\text{post-merger HHI} = (0.20 \times 100)^2 + (0.18 \times 100)^2 + (0.22 \times 100)^2 + [(0.08 \times 100)^2 \times 5] = 1,528$$

$$\text{change in HHI} = 1,528 - 1,288 = 240$$

(LOS 25.g)

### Module Quiz 25.3

1. **A** Hirauye should agree with both of Klinkenfus's statements. One of the key advantages to using the discounted cash flow method to value a target firm is that it makes it easy to model any changes that may result from operating synergies or changes in cash flow from the merger. One of the key advantages to the comparable transaction approach is that there is no need to compute a separate takeover premium as there is in the comparable company approach. (LOS 25.i)
2. **C** Discounted FCFE =  $\frac{\$24}{1.105} + \frac{\$27}{1.105^2} + \frac{\$32}{1.105^3} + \frac{\$36}{1.105^4} = \$91.69 \text{ million}$   
 $\text{Terminal value}_4 = \frac{\text{FCFE}_4(1+g)}{(k_e - g)} = \frac{\$36(1+0.06)}{(0.105-0.06)} = \$848.0 \text{ million}$   
 $\text{Terminal value}_0 = \frac{\$848.0}{1.105^4} = \$568.78 \text{ million}$

estimated value for Flueger = (\$91.69 million + \$568.78 million) / 20 million shares = \$33.02

(LOS 25.i)

3. **B** The calculation for the relative value valuation is shown in the following figures:

Company Statistics	Behar Corporation	Walters Inc.	Hasselbeck Dynamics	Mean
Current stock price	\$54.00	\$36.50	\$108.20	
P/E Ratio	\$54.00 / 2.80 = 19.29	\$36.50 / 2.10 = 17.38	\$108.20 / 6.50 = 16.65	17.77
P/B Ratio	\$54.00 / 17.25 = 3.13	\$36.50 / 12.10 = 3.02	\$108.20 / 35.75 = 3.03	3.06
P/S Ratio	\$54.00 / 52.75 = 1.02	\$36.50 / 37.80 = 0.97	\$108.20 / 105.00 = 1.03	1.01

Multiple	Mean	Flueger Systems Statistics	Flueger Systems Valuation
P/E Ratio	17.77	1.75	\$31.10
P/B Ratio	3.06	9.75	\$29.84
P/S Ratio	1.01	29.75	\$30.05
<b>Mean value for Flueger Systems using comparable firms: \$30.33</b>			

(LOS 25.j)

4. **A** The calculation for the mean takeover premium is:

Company Statistics	Bullseye	Dart Industries	Arrow Corp.	Mean Takeover Premium
Stock price pre-takeover	\$18.25	\$27.80	\$43.00	
Acquisition stock price	\$22.00	\$35.00	\$52.00	
Takeover premium = $(DP - SP) / SP$	20.5%	25.9%	20.9%	<b>22.4%</b>

Applying this value to the mean comparable company valuation calculated in the previous question gives us:  $\$30.33 \times 1.224 = \$37.12$ . (LOS 25.j)

5. **C** The calculation for the fair acquisition price under the comparable transaction approach is shown in the following figures:

Company Statistics	Bullseye	Dart Industries	Arrow Corp.	Mean
Takeover price	\$22.00	\$35.00	\$52.00	
P/E Ratio	$\$22.00 / 0.95 = 23.16$	$\$35.00 / 1.65 = 21.21$	$\$52.00 / 2.50 = 20.80$	21.72
P/B Ratio	$\$22.00 / 6.10 = 3.61$	$\$35.00 / 9.85 = 3.55$	$\$52.00 / 14.20 = 3.66$	3.61
P/S Ratio	$\$22.00 / 17.60 = 1.25$	$\$35.00 / 26.75 = 1.31$	$\$52.00 / 39.75 = 1.31$	1.29

Company Statistics	Mean	Flueger Systems Statistics	Flueger Systems Valuation
P/E Ratio	21.72	1.75	\$38.01
P/B Ratio	3.61	9.75	\$35.20
P/S Ratio	1.29	29.75	\$38.38

Fair acquisition value using the comparable transaction approach: \$37.20

(LOS 25.j)

6. **B** Both Collier's statement and Baldwin's statement are incorrect. Collier suggests using a fair price amendment after the takeover is announced; however, a fair price amendment is a pre-offer defense, not a post-offer defense. Baldwin's statement is incorrect because he is actually describing a white squire defense, not a white knight defense. (LOS 25.f)

## Module Quiz 25.4

1. **C** Barton's first statement is correct. Empirical evidence shows that the majority of gains from a merger go to the target: target firm stock prices increased 30% on average, while acquiring firm stock prices declined. Barton's second statement is incorrect. Longer-term studies of post-merger firms show that most have negative stock performance three years after a merger, and they lag their peer group. This indicates that there may be a failure to capture promised synergies from the merger. (LOS 25.m)
2. **C** Both the acquirer and the target are confident about the estimate of merger synergies. In this scenario, Vinova Corporation's shareholders, as the acquirer, would prefer to make a cash offer because it would allow Vinova to keep more of the gain from the merger synergies and limit JJK's gain to the takeover premium. JJK's shareholders would want to share in the rewards as well, so they would prefer to receive a stock offer that would give them ownership in the combined company and enable them to profit from the potential synergies. (LOS 25.l)
3. **A** Statement 1 reflects a carve-out. In a carve-out, a new independent company is created by issuing shares in a public offering of stock. Statement 2 reflects a split-off. Split-offs allow shareholders to receive new shares of a division in exchange for a portion of their shares in the parent company. (LOS 25.n)
4. **B** A declining, low growth division is more likely to be part of a divestiture than a division that is making significant profits as part of a high-growth industry. Other common reasons for making a divestiture include greater access to capital markets, reverse synergy, or lack of profitability. (LOS 25.o)
5. **B** The form of integration in this transaction is a statutory merger because Dorman-Gladwell's assets and liabilities will be absorbed by Madura, and Dorman-Gladwell will cease to exist. Since both companies are in the publishing business, this is a horizontal merger. (LOS 25.a)
6. **C** *Gain to target:* Dorman-Gladwell's gain in the merger as the target =  
$$\text{Gain}_T = \text{TP} - \text{V}_T = (\$56 \times 20) - \$960 = \$160 \text{ million.}$$
This represents the takeover premium in the transaction. (LOS 25.j)
7. **B** First, calculate the post-merger value of the combined firm as:  
$$V_{AT} = V_A + V_T + S - C$$

where:

$$V_A = \$2,400$$

$$V_T = \$960$$

$$S = \$180$$

C = \$0 because no cash is changing hands

The value of the combined firm is:

$$V_{AT} = \$2,400 + \$960 + \$180 - 0 = \$3,540$$

Next, to account for dilution and find the price per share of the combined firm, divide the post-merger value by the post-merger shares outstanding. Since the exchange ratio is 0.7, Madura will need to issue 14 million new shares to acquire the 20 million shares of Dorman-Gladwell. Adding 14 million new shares to the 30 million shares of Madura already outstanding means the post-merger shares outstanding is 44 million.

$$P_{AT} = \frac{\$3,540}{44} = \$80.45$$

This means that the actual value of each share given to Dorman-Gladwell's shareholders is \$80.45, and that the actual price paid for the target is:

$$P_T = (N \times P_{AT}) = (14 \times \$80.45) = \$1,126.3 \text{ million}$$

Madura Publishing's gain in the merger as the acquirer is:

$$\begin{aligned} \text{Gain}_A &= S - TP = S - (P_T - V_T) = \$180 - (\$1,126.3 - \$960) = \$13.7 \text{ million} \\ &\text{(LOS 25.k)} \end{aligned}$$

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 26.1

1. **C** The difference between the analyst's estimate of intrinsic value and the current price is made up of two components:

$$IV_{\text{analyst}} - \text{price} = (IV_{\text{actual}} - \text{price}) + (IV_{\text{analyst}} - IV_{\text{actual}})$$

(LOS 26.a)

2. **C** The liquidation value is the estimate of what the assets of the firm will bring when sold separately, net of the company's liabilities. It is most appropriate because the firm is not a going concern and will not pay dividends. The residual income model is based on the going concern assumption and is not appropriate for valuing a firm that is expected to go out of business. (LOS 26.b)
3. **A** Communication with analysts and investors is one of the common uses of an equity valuation. Technical analysis and benchmarking do not require equity valuation. (LOS 26.d)
4. **A** The five elements of industry structure as developed by Professor Michael Porter are:

1. Threat of new entrants in the industry.
2. Threat of substitutes.
3. Bargaining power of buyers.
4. Bargaining power of suppliers.
5. Rivalry among existing competitors.

(LOS 26.e)

5. **B** Absolute valuation models estimate value as some function of the present value of future cash flows (e.g., dividend discount and free cash flow models) or economic profit (e.g., residual income models). Relative valuation models estimate an asset's value relative to the value of other similar assets. The price-to-earnings market multiple model is an example of a relative valuation model. (LOS 26.f)

6. **A** Jarvis is most likely trying to be sure the selected model fits the characteristics of the investment. Model selection will depend heavily on the answers to these questions. (LOS 26.f)

7. **B** The appropriate valuation for Sun Pharma's acquisition is the investment value, which incorporates the value of any synergies present in the acquisition. Sum-of-the-parts value is not applicable, as the valuation does not require separate valuation of different divisions of Island Cookware. Liquidation value is also not relevant, as Sun Pharma does not intend to liquidate the assets of Island Cookware. (LOS 26.c)

8. **C** Upon announcement of the acquisition, the market price of Sun Pharma should not change if the acquisition was at fair value. However, the market is valuing the whole company at a value less than the value of its parts: this is a conglomerate discount. We are not given any information about tax consequences of the merger and hence a tax effect is unlikely to be the cause of the market price drop. The acquisition of an unrelated business may result in a conglomerate discount, but there is no defined ‘unrelated business effect.’ (LOS 26.c)

The following is a review of the Equity Valuation (1) principles designed to address the learning outcome statements set forth by CFA Institute. Cross-Reference to CFA Institute Assigned Reading #27.

# READING 27: RETURN CONCEPTS

Study Session 9

## EXAM FOCUS

Much of this material builds on concepts covered elsewhere in the Level II curriculum. Be able to distinguish among return concepts such as holding period return, realized return, expected return, required return, and discount rate. Understand the concept of convergence of price to intrinsic value. Be able to explain the equity risk premium, the various methods and models used to calculate the equity risk premium, and the strengths and weaknesses of those methods. The review also covers the weighted average cost of capital (WACC). You must be able to explain and calculate the WACC and be able to select the most appropriate discount rate for a given cash flow stream.

## MODULE 27.1: RETURN CONCEPTS



**LOS 27.a: Distinguish among realized holding period return, expected holding period return, required return, return from convergence of price to intrinsic value, discount rate, and internal rate of return.**

Video covering this content is available online.

*CFA® Program Curriculum: Volume 4, page 53*

### Holding Period Return

**Holding period return** is the increase in price of an asset plus any cash flow received from that asset, divided by the initial price of the asset. The measurement or *holding period* can be a day, a month, a year, and so on. In most cases, we assume the cash flow is received at the end of the holding period, and the equation for calculating holding period return is:

$$\text{holding period return} = r = \frac{P_1 - P_0 + CF_1}{P_0} = \frac{P_1 + CF_1}{P_0} - 1$$

The subscript 1 simply denotes one period from today. *P* stands for price and *CF* stands for cash flow. For a share of common stock, we might think of this in terms of

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 28.1, 28.2

1. **C** Myers is using a “growth relative to GDP growth” approach, which is top-down. Conway is using a market growth and market share approach, which is also top-down. Dominguez is using both a “growth relative to GDP” and historic data for Retail Inc., which is a hybrid approach. (Module 28.1, LOS 28.b)
2. **B** Myers is using the “growth relative to GDP growth” approach.

Growth rate predicted:

$$\text{GDP growth} \quad 2\%$$

$$\text{Revenue growth} \quad 2\% \times 1.10 = 2.2\%$$

Conway is using the “market growth and market share” approach.

Growth rate predicted:

$$\text{Revenue this year} \quad 40\text{bn} \times 35\% = 14\text{bn}$$

$$\text{Revenue next year} \quad 38\text{bn} \times 38\% = 14.44\text{bn}$$

$$\text{Growth rate} \quad 0.44 / 14 = 3.1\%$$

(Module 28.1, LOS 28.b)

3. **B**

$$\text{Retail, Inc., operating margin 2019} \quad 1,480/15,091 = 9.8\%$$

$$\text{Midsize, Inc., operating margin 2019} \quad 598/8,488 = 7.0\%$$

Retail, Inc., is a bigger firm and has a larger operating margin, suggesting that economies of scale are more likely to exist.

$$\text{Retail COGS as a \% of Revenue 2019} \quad 9,966/15,091 = 66\%$$

$$\text{Midsize COGS as a \% of Revenue 2019} \quad 5,857/8,488 = 69\%$$

$$\text{Retail SG&A as a \% of Revenue 2019} \quad 3,645/15,091 = 24\%$$

$$\text{Midsize SG&A as a \% of Revenue 2019} \quad 2,033/8,488 = 24\%$$

Analysis of the expense ratios shows that the economies of scale are realized in COGS rather than in SG&A. (Module 28.2, LOS 28.c)

## 4. A

**Retail, Inc.**

	2019 (\$ million)	2020 (\$ million)
Profit before tax	1,480	1,628
Tax (@ 28%)	414.4	455.8
Tax reduction (25%)	(103.6)	(113.95)
Postponed tax		103.6
Total tax	310.8	445.45
Cash tax rate	21%	27.4%

(Module 28.1, LOS 28.d)

5. **B** Given a constant debt-to-equity ratio, the level of debt will remain constant if the level of equity remains constant. Given that Retail, Inc., intends to pay out all net income as dividends over the period, and there are no share repurchases or gains and losses in other comprehensive income, Retail, Inc.'s, equity will remain constant. (Module 28.1, LOS 28.e)
6. **B** Owning a successful patent will give a company a competitive advantage, which, in turn, is likely to lead to a high and persistent ROIC. High levels of capital invested will not necessarily result in higher returns. A high level of new assets will increase invested capital but may not generate returns in the short term and, hence, may actually decrease ROIC. (Module 28.2, LOS 28.f)
7. **C** Government involvement is best analyzed by considering the impact on all five of Porter's forces. (Module 28.2, LOS 28.h)
8. **B** High barriers to entry result in a low threat to profitability. (Module 28.2, LOS 28.g)

## 9. A

Entertaining Kids, Inc.	2019 (\$ million)	Scenario 1 (\$ million)	Explanation
Revenue	13,201	13,869	$13,201 \times 1.03 \times 1.02$
Cost of goods sold	8,755	9,377	$8,755 \times 1.05 \times 1.02$
Gross profit	4,446	4,492	
Gross margin	33.7%	32.4%	
			Explanation

**Entertaining Kids, Inc.    2019 (\$ million)    Scenario 2 (\$ million)**

Revenue	13,201	13,861	$13,201 \times 1.05$
Cost of goods sold	8,755	9,193	$8,755 \times 1.05$
Gross profit	4,446	4,668	
Gross margin	33.7%	33.7%	

(Module 28.2, LOS 28.i)

10. **C**

	2019 (\$ million)	2020 Forecast (\$ million)	
Existing console			
Individual sales	2,640	1,980	$2,640 \times 0.75$
ALFs	400	400	
Total existing	3,040	2,380	
XTF 2500			
Individual sales	45	214	$45 \times 4.75$
ALFs	0	0	
Total XTF 2500	45	214	
Total consoles	3,085	2,594	

Note: To forecast new sales after a 100% increase in sales, we would multiply old sales by  $(100\% + 100\%) = 2$ . Similarly, an increase of 375% means that old sales needs to be multiplied by  $(100\% + 375\%) = 4.75$  (not 3.75) to forecast new sales. (Module 28.2, LOS 28.j)

11. **B** The forecast horizon should be influenced by the investment strategy for which the stock is being considered. (Module 28.2, LOS 28.k)
12. **B** A gradual reduction in prices can be incorporated into a long-term growth rate and so does not represent an inflection point. (Module 28.2, LOS 28.l)
13. **B** Depreciation is typically forecasted as a constant percentage of sales—or, if the company has an expanding asset base, as an increasing percentage of sales. (Module 28.2, LOS 28.m)

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 29.1

1. **C** Residual income models are the best valuation method if the firm does not pay dividends, has negative free cash flow over the forecast horizon, and has transparent financial reporting and high earnings quality. (LOS 29.a)
2. **A** EBEE's stock price today can be calculated using the two-stage model. Start by finding the value of the dividends during the high-growth period of five years.

$$D_1 = D_0(1 + g)^1 = \$2.50(1.30)^1 = \$3.25$$

$$D_2 = D_0(1 + g)^2 = \$2.50(1.30)^2 = \$4.225$$

$$D_3 = D_0(1 + g)^3 = \$2.50(1.30)^3 = \$5.493$$

$$D_4 = D_0(1 + g)^4 = \$2.50(1.30)^4 = \$7.140$$

$$D_5 = D_0(1 + g)^5 = \$2.50(1.30)^5 = \$9.282$$

(Alternatively, you could use your financial calculator to solve for the future value to find  $D_1$ ,  $D_2$ ,  $D_3$ ,  $D_4$ , and  $D_5$ .)

Next find the value of the stock at the beginning of the constant growth period using the constant growth model:  $P_5 = \frac{D_6}{r-g}$

$$\text{CAPM: } r = 0.05 + (1.2 \times 0.06) = 0.122$$

$$D_6 = D_5 \times (1 + g) = \$9.282 \times 1.07 = \$9.932$$

$$P_5 = \frac{D_6}{r-g} = \frac{\$9.932}{0.122 - 0.07} = \$191.00$$

The easiest way to proceed is to use the NPV function on the financial calculator.

$$\begin{aligned} CF_0 &= 0; CF_1 = 3.25; CF_2 = 4.225; CF_3 = 5.493; CF_4 = 7.140; \\ CF_5 &= 9.282 + 191.00 = 200.282 \end{aligned}$$

$$I = 12.2; \text{NPV} = 127.28$$

The value of the firm today is \$127.28 per share. (LOS 29.b)

### Module Quiz 29.2

1. **A** The value of a perpetuity (equal payments forever) is equal to annual cash flow divided by required return:

$$V = \frac{C\$5.00}{0.09} = C\$55.56$$

(LOS 29.g)

2. **C** The constant DDM can be used to solve for the required rate of return:

$$r = \frac{D_0 \times (1+g)}{P_0} + g = \frac{\$2.50 \times 1.08}{\$89} + 0.08 = 0.110 = 11.0\%$$

(LOS 29.c)

3. **B** Solve the following equation for  $g$ :

$$30.28 = \frac{2(1+g)}{0.13-g}$$

$$30.28(0.13 - g) = 2(1 + g)$$

$$3.9364 - 30.28g = 2 + 2g$$

$$1.9364 = 32.28g$$

$$g = 6\%$$

(LOS 29.c)

4. **A** The growth rate is  $-3\%$ . Therefore,

$$\text{stock value} = \frac{D_1}{r-g} = \frac{\$4.00}{0.09 - (-0.03)} = \$33.33.$$

(LOS 29.c)

5. **A** We calculate the value of the expected cash flows at nine years because the formula uses the value of the dividend of  $t + 1$  and then discounts that value to the present at the required rate of return of  $12\%$ .

$$V_9 = \frac{\$1.25}{0.12 - 0.04} = \$15.63$$

$$V_0 = \frac{\$15.63}{1.12^9} = \$5.64$$

(LOS 29.c)

6. **C** The PVGO must be less than zero because the ROE is less than the required return, but the firm is still retaining and reinvesting its cash flow. That means it is destroying value!

$$D_1 = \$4.50 \times 0.40 = \$1.80$$

$$g = 0.0833 \times (1 - 0.4) = 0.05 = 5\%$$

$$V_0 = \frac{\$1.80}{0.15 - 0.05} = \$18.00$$

$$V_0 = \frac{E}{r} + \text{PVGO}$$

$$\text{PVGO} = V_0 - \frac{E}{r} = \$18.00 - \frac{\$4.50}{0.15} = \$18.00 - \$30.00 = -\$12.00$$

(LOS 29.e)

### Module Quiz 29.3

1. **B** Based on its fundamentals, Aerosail is most appropriately categorized as being in the transition phase. Multistage models are most appropriate for firms in the transition phase. (LOS 29.j)
2. **B** Solve for the internal rate of return of the expected cash flows.

$$CF_0 = -39.71$$

$$C_{01} = 1.00$$

$$C_{02} = 2.00$$

$$C_{03} = 54.50 = 52.00 + 2.50 \text{ CPT} \rightarrow IRR 13.5\% \text{ (LOS 29.l)}$$

3. **B** Sustainable growth is equal to return on equity multiplied by retention ratio:

$$SGR(AAA) = 0.30 \times 0.40 = 0.120 = 12.0\%$$

$$SGR(TST) = 0.22 \times 0.30 = 0.66 = 6.6\%$$

(LOS 29.o)

4. **C** The required returns for the two companies based on the CAPM are calculated below.

$$AAA: r = 0.04 + 1.2(0.11 - 0.04) = 0.04 + 0.084 = 0.124$$

$$TST: r = 0.04 + 0.9(0.11 - 0.04) = 0.04 + 0.063 = 0.103$$

The current values of the two stocks using the constant DDM are calculated next.

Sustainable growth is equal to return on equity multiplied by retention ratio:

$$SGR(AAA) = 0.30 \times 0.40 = 0.120 = 12.0\%$$

$$SGR(TST) = 0.22 \times 0.30 = 0.66 = 6.6\%$$

Current dividend is current EPS multiplied by payout ratio:

$$D_0(AAA) = \$2.50 \times (1 - 0.4) = \$1.50$$

$$D_0(TST) = \$4.60 \times (1 - 0.3) = \$3.22$$

Value is calculated with the Gordon constant growth model:

$$P_0(AAA) = \frac{\$1.50 \times 1.12}{0.124 - 0.12} = \$420.00$$

$$P_0(TST) = \frac{\$3.22 \times 1.066}{0.103 - 0.066} = \$92.77$$

(LOS 29.b)

5. **A** AAA's stock price today can be calculated using the two-stage model. Start by finding the value of the dividends during the high growth period of five years.

$$D_0 = (\text{current EPS})(1 - \text{retention ratio}) = \$2.50 \times (1 - 0.40) = \$1.50$$

$$D_1 = D_0(1 + g)^1 = \$1.50(1.2)^1 = \$1.800$$

$$D_2 = D_0(1 + g)^2 = \$1.50(1.2)^2 = \$2.160$$

$$D_3 = D_0(1 + g)^3 = \$1.50(1.2)^3 = \$2.592$$

$$D_4 = D_0(1 + g)^4 = \$1.50(1.2)^4 = \$3.110$$

Next, find the value of the stock at the beginning of the constant growth period using the constant dividend discount model:  $P_4 = \frac{D_5}{r-g}$

$$\text{CAPM: } r = 0.04 + (1.2 \times 0.07) = 0.124$$

$$D_5 = D_4 \times (1 + g) = \$3.11 \times 1.07 = \$3.3277$$

$$P_4 = \frac{D_5}{r-g} = \frac{\$3.3277}{0.124 - 0.07} = \$61.624$$

The easiest way to proceed is to use the NPV function in the financial calculator.

$$CF_0 = 0; CF_1 = 1.8; CF_2 = 2.16; CF_3 = 2.592; CF_4 = 3.110 + 61.624 = 64.734$$

$$I = 12.4; \text{NPV} = 45.69$$

The value of the firm today is \$45.69 per share. (LOS 29.l)

**6. C** The estimated value of AAA using the H-model is calculated as follows:

$$V_0 = \frac{(\$1.50 \times 1.07) + \left[ \$1.50 \times \frac{4}{2} \times (0.20 - 0.07) \right]}{0.153 - 0.07} = \$24.04$$

The estimated value of TST using the H-model is calculated as follows:

$$V_0 = \frac{(\$3.22 \times 1.05) + \left[ \$3.22 \times \frac{4}{2} \times (0.15 - 0.05) \right]}{0.126 - 0.05} = \$52.96$$

(LOS 29.l)

**7. B** Required rate of return from the macroeconomic multifactor model:

$$\text{AAA: } 0.04 + (0.048 \times 0.63) + (0.031 \times 0.47) + (0.045 \times 0.70) + (0.038 \times 0.98) + (-0.018 \times 0.05) = 0.1527$$

$$\text{TST: } 0.04 + (0.048 \times 0.42) + (0.031 \times 0.39) + (0.045 \times 0.51) + (0.038 \times 0.91) + (-0.018 \times 0.21) = 0.126$$

$$\text{Justified leading P/E (AAA)} = \frac{1-b}{r-g} = \frac{0.6}{0.1527 - 0.07} = 7.26$$

$$\text{Justified leading P/E (TST)} = \frac{1-b}{r-g} = \frac{0.7}{0.126 - 0.05} = 9.21$$

(LOS 29.f)

8. **C**  $\text{ROE} = \frac{\$322}{\$1,875 - \$1,465} = 78.5\%$  (LOS 29.o)

9. **C** The higher ROE for JFOI is largely due to higher leverage. Assets-to-equity for the industry is calculated as:

$$0.405 = 0.1570 \times 1.1 \times (\text{assets/equity}) \Rightarrow (\text{assets/equity}) = 2.35$$

The ratios for JFOI are calculated as:

$$(\text{NI/sales}) = \frac{\$322}{\$2,044} = 0.1575$$

$$(\text{sales/assets}) = \frac{\$2,044}{\$1,875} = 1.09$$

$$(\text{assets/equity}) = \frac{\$1,875}{\$1,875 - \$1,465} = \frac{\$1,875}{\$410} = 4.57$$

The comparison of DuPont equations for JFOI and the industry are shown below.

$$\text{ROE} = \text{profitability} \times \text{asset efficiency} \times \text{leverage}$$

$$\text{ROE} = \text{NI/sales} \times \text{sales/assets} \times \text{assets/equity}$$

$$\text{Industry: } 0.405 = 0.1570 \times 1.1 \times 2.35$$

$$\text{JFOI: } 0.785 = 0.1575 \times 1.09 \times 4.57$$

Therefore, the higher leverage resulted in a larger ROE for JFOI relative to the industry. (LOS 29.o)

10. **C** The H-model uses a half-life factor equal to one-half of the declining stage in years. This approach values the dividend growth at the long-term rate and adds an estimate for the additional value of the supernormal growth during the first stage.

$$V = \frac{[\epsilon 2.00 \times (1.10)] + \left[ \epsilon 2.00 \times \left( \frac{4}{2} \right) \times (0.20 - 0.10) \right]}{(0.18 - 0.10)} = \epsilon 32.50$$

(LOS 29.m)

11. **C**  $D_1 = 2(1.20) = \epsilon 2.40; D_2 = 2(1.20)^2 = \epsilon 2.88; D_3 = 2(1.20)^3 = 3.46;$   
 $D_4 = 2(1.20)^4 = \epsilon 4.15$

$$P_4 = \frac{D_5}{r-g} = \frac{2(1.20)^4(1.10)}{0.18 - 0.10} = \epsilon 57.02$$

$$\text{PV}(D_1, D_2, D_3, D_4 + P_4; r = 18\%) = \epsilon 37.76$$

(LOS 29.l)

12. **C** Stock P has model price higher than the market price and hence is undervalued by the market. Stock Q has model price lower than the market price and hence is

overvalued. Stock R has model price equal to the market price and hence is fairly valued. (LOS 29.p)

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 30.1

1. **C** Dividend discount models like the Gordon growth model and the dividend discount H-model are not appropriate in this case for two reasons: (1) dividends are not related to the firm's earnings stream, and (2) this is a takeover situation in which a free cash flow model is more appropriate.

The FCFF model is preferred to the FCFE model because (1) FCFE is negative and volatile and (2) leverage is relatively high. (LOS 30.a)

2. **C** The firm must have interest expense on its income statement because of the debt on its balance sheet. By ignoring the after-tax interest cash flow, the analyst has understated FCFF, which is actually equal to CFO plus after-tax interest cash flow less fixed capital investment. He has, however, calculated FCFE correctly because FCFE is equal to CFO less fixed capital investment (his incorrect FCFF calculation) plus net borrowing. (LOS 30.c)
3. **A** Although the calculation is a bit unusual (we usually calculate firm value as the present value of FCFF discounted at the weighted average cost of capital), the analyst has correctly calculated firm value. The first term is equal to the market value of equity on 12/31/2017; firm value is equal to the market value of equity plus the market value of debt. (LOS 30.a)

### Module Quiz 30.2

1. **A**

$$\text{FCFF}_0 = [\text{EBIT} \times (1 - \text{tax rate})] + \text{Dep} - \text{FCInv} \\ - \text{WCInv}$$

$$\text{FCFF}_0 (\text{in millions}) = [\text{C\$}30 \times (1 - 0.40)] + \text{C\$}15 - \text{C\$}20 \\ - \text{C\$}6 = \text{C\$}7.0$$

$$\text{value of firm (in millions)} = \frac{\text{C\$}7.0 \times 1.05}{0.1245 - 0.05} = \text{C\$}98.7$$

$$\text{value of equity (in millions)} = \text{C\$}98.7 - \text{C\$}25.0 = \text{C\$}73.7 \\ (\text{LOS 30.c})$$

2. **B Given:** NI = \$50; depreciation = \$27; ending net PP&E = ending gross fixed assets – ending accumulated depreciation = \$136 – \$40 = \$96; beginning net PP&E = beginning gross fixed assets – beginning accumulated depreciation = \$90 – \$30 = \$60; WCInv = \$4; net borrowings = \$0; gains on sale of equipment = \$8.

$$\text{FCInv} = \text{ending net PPE} - \text{beginning net PPE} + \text{depreciation} - \text{gain on sale} = 96 - 60 + 27 - 8 = \$55$$

$$\text{NCC} = \text{depreciation} - \text{gain} = 27 - 8 = \$19$$

$$\begin{aligned}\text{FCFE} &= \text{NI} + \text{NCC} - \text{FCInv} - \text{WCInv} + \text{net borrowings} \\ &= 50 + 19 - 55 - 4 + 0 = \$10\end{aligned}$$

(LOS 30.c)

### Module Quiz 30.3

For Questions 1 through 3, items #1, 2, 4, 5, 6, and 7 were applied correctly. Only item #3 related to the reversal of restructuring charges was applied incorrectly: income from restructuring charge reversals is a noncash gain that should be subtracted from net income to calculate FCFF. Depreciation and software amortization should be added back to net income, after-tax interest should be added back, and the increase in deferred taxes should be added back (because it is not expected to reverse in the foreseeable future). Net working capital and fixed capital investments should be subtracted from net income to arrive at FCFF. The correct calculation of FCFF is

$$\begin{aligned}\text{FCFF}_{2016} &= \$173 + \$23 - \$6 + \$17 + [\$19(1 - 0.35)] - \$86 - \$47 \\ &= \$86.35 \text{ million}\end{aligned}$$

1. **A** See answer explanation above for Questions 1 through 3. (LOS 30.c)
2. **B** See answer explanation above for Questions 1 through 3. (LOS 30.c)
3. **A** See answer explanation above for Questions 1 through 3. (LOS 30.c)

### Module Quiz 30.4

1. **B** Free cash flow to the firm is equal to cash flow from operations plus after-tax interest expense [interest(1 - tax rate)] minus fixed capital investment. (LOS 30.d)

### Module Quiz 30.5

1. **C**

$$\begin{aligned}\text{FCFE} &= \text{NI} - (\text{1-DR}) (\text{FCInv-Dep}) - (\text{1-DR}) (\text{WCInv}) \\ &= £3.50 - [(1 - 0.4) (£2.00 - £1.60)] - [(1 - 0.4) (£0.50)] \\ &= £2.96\end{aligned}$$

$$\text{equity value per share} = \frac{\text{£2.96} \times 1.04}{0.14 - 0.04} = \text{£30.78}$$

(LOS 30.e)

2. **B** The following table shows FCFF for years 0 through 6 (in \$):

Year	0	1	2	3	4	5	6
------	---	---	---	---	---	---	---

Sales	60.00	67.20	75.26	84.30	94.41	105.74	109.97
EBIT	20.00	22.40	25.09	28.10	31.47	35.25	36.66
EBIT(1 - T)	12.00	13.44	15.05	16.86	18.88	21.15	21.99
Dep	8.00	8.96	10.04	11.24	12.59	14.10	—
FCInv	12.00	13.44	15.05	16.86	18.88	21.15	—
WCInv	3.00	3.36	3.76	4.21	4.72	5.29	5.50
FCFF	5.00	5.60	6.28	7.03	7.87	8.81	16.49

$$FCFF = [EBIT \times (1 - \text{tax rate})] + Dep - FCInv - WCInv$$

$$FCFF_6 = 21.99 + 0 + 0 - 5.50 = 16.49$$

(LOS 30.c)

3. C The terminal value (as of Year 5) is found by using the FCFF in Year 6 and WACC of 8% and growth rate of 4% in the stable growth stage:

$$\text{terminal value}_5 = \frac{\$16.49}{0.08 - 0.04} = \$412.25$$

(LOS 30.j)

4. C The value of the firm today is the present value of the forecasted cash flows, discounted at the WACC during the high-growth stage of 11%:

$$\text{value of firm} = \frac{\$5.60}{1.11} + \frac{\$6.28}{1.11^2} + \frac{\$7.03}{1.11^3} + \frac{\$7.87}{1.11^4} + \frac{\$8.81 + \$412.25}{1.11^5} = \$270.35$$

Using the calculator, enter  $CF_0 = 0.00$ ;  $C01 = 5.60$ ;  $C02 = 6.28$ ;  $C03 = 7.03$ ;  $C04 = 7.87$ ;  $C05 = 8.81 + 412.25 = 421.06$ ;  $I = 11$ ;  $CPT \rightarrow NPV = 270.35$

(LOS 30.j)

5. C With the bonds trading at par, the interest expense is based on the before-tax yield:

$$\text{interest} = \$600 \times 0.075 = \$45$$

Add back preferred dividends to net income available to common to get FCFF:

$$\begin{aligned} \text{FCFF} &= \text{NI}(\text{available to common}) + \text{NCC} + [\text{Int} \times (1 - \text{tax rate})] \\ &\quad + \text{preferred dividends} - \text{FCInv} - \text{WCInv} \\ \text{FCFF} &= 125 + 50 + [45 \times (1 - 0.40)] + 14 - 100 - 30 = \$86 \end{aligned}$$

(LOS 30.c)

6. **C** The value of the firm is the present value of the constantly growing FCFF.  
Using single-stage FCFF model we get:

$$\text{value of firm} = \frac{\text{FCFF}_0 \times (1 + g)}{\text{WACC} - g} = \frac{\$86 \times 1.04}{0.0927 - 0.04} = \$1,697.15$$

(LOS 30.j)

7. **A** The value of the equity is equal to firm value less the market value of debt and preferred stock:

$$\text{value of equity} = \$1,697.15 - \$600 - \$200 = \$897.15$$

(LOS 30.j)

8. **B**  $\text{FCFF} = 86$  (computed earlier).

$$\begin{aligned} \text{FCFE} &= \text{FCFF} - [\text{Int} \times (1 - \text{tax rate})] - \text{preferred dividends} + \text{net borrowing} \\ &= 86 - [45 \times (1 - 0.4)] - 14 + 40 = \$85 \end{aligned}$$

(LOS 30.c)

9. **C**  $\text{value of equity} = \frac{\$85 \times 1.04}{0.14 - 0.04} = \$884$  (LOS 30.j)

10. **B** Free cash flow to the firm (FCFF) is the estimate of the cash flows available to the firm's investors after the firm buys and sells products, provides services, pays its cash operating expenses, and makes short- and long-term investment decisions, but before the firm makes any financing decisions. EBITDA is a poor proxy for free cash flow. FCFF is calculated as:

$$\text{FCFF} = [\text{EBITDA} \times (1 - \text{tax rate})] + (\text{Dep} \times \text{tax rate}) - \text{FCInv} - \text{WCInv}$$

(LOS 30.h)

11. **A** Based on the CAPM, the required return on MWC's common equity can be computed as follows:

$$r = 6.4\% + (1.2 \times 5.5\%) = 13\%$$

The current value of MWC common stock can be estimated using the two-stage DDM approach as follows:

$$\begin{aligned}g &= 15\% \\D_{2017} &= \$2.30 \\D_{2018} &= \$2.30 \times 1.15 = \$2.65 \\D_{2019} &= \$2.65 \times 1.15 = \$3.05\end{aligned}$$

$$\text{terminal value} = \frac{\$3.05 \times 1.08}{(0.13 - 0.08)} = \$65.88$$

$$\text{equity value} = \frac{\$2.65}{1.13} + \frac{\$3.05 + \$65.88}{1.13^2} = \$56.33$$

(LOS 30.j)

12. **B** The current value of MWC common stock can be estimated using the two-stage FCFE approach as follows:

$$\begin{aligned}\text{FCFE}_{2017} &= \text{CFO} - \text{FCInv} + \text{net borrowing} = 33,960 - 12,000 + 3,200 \\&= \$25,160\end{aligned}$$

$$\text{shares outstanding} = \text{dividends paid} / \text{dividends per share} = \frac{\$23,920}{\$2.30} = 10,400$$

$$\text{FCFE}_{2017} \text{ per share} = \frac{\text{FCFE}_{2017}}{10,400} = \frac{\$25,160}{10,400} = \$2.42$$

$$\begin{aligned}g &= 15\% \\ \text{FCFE}_{2017} &= \$2.42 \\ \text{FCFE}_{2018} &= \$2.42 \times 1.15 = \$2.78 \\ \text{FCFE}_{2019} &= \$2.78 \times 1.15 = \$3.20\end{aligned}$$

$$\text{terminal value} = \frac{\$3.20 \times 1.08}{(0.13 - 0.08)} = \$69.12$$

$$\text{equity value} = \frac{\$2.78}{1.13} + \frac{\$3.20 + \$69.12}{1.13^2} = \$59.10$$

(LOS 30.d)

13. **B** The following table shows FCFE for years 0 through 6 (in £).

$$\text{FCFE} = \text{NI} - [(1 - \text{DR}) \times (\text{FCInv} - \text{Dep})] - [(1 - \text{DR}) \times \text{WCInv}]$$

	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
NI	1.50	1.73	1.98	2.28	2.62	3.02	3.17
(-) $[(1 - \text{DR})(\text{FCInv} - \text{Dep})]$	0.35	0.40	0.46	0.53	0.61	0.70	0
(-) $[(1 - \text{DR})(\text{WCInv})]$	0.14	0.16	0.19	0.21	0.24	0.28	0.29
(=) FCFE	1.01	1.17	1.33	1.53	1.76	2.03	2.88

Example of FCFE calculation (Year 1):

$$\begin{aligned} \text{FCFE} &= \text{NI} - [(1 - \text{DR}) \times (\text{FCInv} - \text{Dep})] - [(1 - \text{DR}) \times \text{WCInv}] \\ &= 1.73 - [(1 - 0.3) \times (0.92 - 0.35)] - [(1 - 0.3) \times 0.23] \\ &= 1.17 \end{aligned}$$

Calculate terminal value in year five using FCFE estimate for Year 6, discounted at required return of 10% in the stable growth period.

$$\text{terminal value}_5 = \frac{\text{£}2.88}{0.10 - 0.05} = \text{£}57.60$$

Use the short-term discount rate of 17% to discount the cash flows back to the present:

$$\text{equity value per share} = \frac{1.17}{1.17^1} + \frac{1.33}{1.17^2} + \frac{1.53}{1.17^3} + \frac{1.76}{1.17^4} + \frac{2.03 + 57.60}{1.17^5} = \text{£}31.08$$

Using the calculator, enter the following:  $\text{CF}_0 = 0.00$ ;  $\text{C01} = 1.17$ ;  $\text{C02} = 1.34$ ;  $\text{C03} = 1.54$ ;  $\text{C04} = 1.76$ ;  $\text{C05} = 2.03 + 57.60 = 59.63$ ;  $\text{I} = 17$ ;  $\text{CPT} \rightarrow \text{NPV} = 31.08$  (LOS 30.j)

14. **A** WACC is less than required return on equity. Incorrectly using the WACC (which is too low) in the FCFE model will overestimate equity value. Incorrectly using required return on equity (which is too high) in the FCFF model will underestimate firm value and equity value. (LOS 30.j)
15. **A** The increased net borrowing for 2018 will cause the forecasted free cash flow to *equity* (FCFE) to increase in 2018. However, in future years, the higher interest expense associated with the debt issue will cause the FCFE forecast to decrease. (LOS 30.g)
16. **C** Free cash flow to the *firm* (FCFF) represents cash flow available to all investors before any financing cash flows, including interest payments. Changes in leverage are uses of cash (i.e., financing decisions) that do not affect FCFF. (LOS 30.g)

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 31.1

1. A

$$\text{trailing P/E} = \frac{P_0}{E_0} = \frac{(1-b) \times (1+g)}{r-g} = \frac{\left(\frac{\$0.40}{\$1.00}\right) \times 1.05}{0.12 - 0.05} = 6.0$$

$$\text{leading P/E} = \frac{P_0}{E_1} = \frac{1-b}{r-g} = \frac{0.40}{0.12 - 0.05} = 5.7$$

(LOS 31.h)

2. A Predicted P/E =  $8.57 + (5.38 \times 0.65) + (15.53 \times 0.032) - (0.61 \times 0.56)$   
 $= 12.2$  (LOS 31.i)

3. B The firm's PEG is  $18.75 / 15.32 = 1.22$ . Given the comparable group median PEG of 0.92, it appears that Party Favors, Inc. may be overvalued. (LOS 31.k)

4. C Consumer Products appears to be undervalued with a trailing P/E of 27.52 compared with the benchmark of 33.25. (LOS 31.r)

5. B Underlying earnings =  $\$1.29 + \$0.22 + \$0.04 - \$0.08 = \$1.47$

$$\text{P/E ratio} = \frac{\$42.50}{\$1.47} = 28.9$$

(LOS 31.e)

6. A Only the average ROE and the book value per share are relevant for calculating normalized earnings:

$$\begin{aligned} \text{normalized earnings} &= \text{average ROE} \times \text{BVPS} = 0.32 \times \$14 \\ &= \$4.48 \text{ per share} \end{aligned}$$

(LOS 31.e)

7. B

$$\text{net profit margin} = \frac{\text{trailing earnings}}{\text{sales}} = \frac{E_0}{S}$$

so

$$\text{trailing P/E} = \frac{P/S}{E_0/S} = \frac{P/S}{\text{net profit margin}}$$

$$\text{trailing P/E} = \frac{P/S}{\text{net profit margin}} = \frac{2.0}{0.05} = 40$$

$$\text{leading P/E} = \frac{\text{trailing P/E}}{1 + g} = \frac{40}{1.04} = 38.5$$

(LOS 31.h)

8. A Copyright's justified leading P/E multiple using the valuation from the H-model is  $\$84 / \$4.20 = 20$  times. The firm is underpriced if its actual P/E is less than 20; it is overpriced if its actual P/E is greater than 20. (LOS 31.r)

## Module Quiz 31.2

1. C Based on the fundamentals:

$$\frac{P_0}{B_0} = \frac{0.23 - 0.076}{0.14 - 0.076} = 2.41$$

(LOS 31.h)

## Module Quiz 31.3

1. C Profit margin is measured as E/S. In this example, the profit margin is  $\$5.35 / \$342 = 0.0156$ . Thus:

$$\frac{P_0}{S_0} = \frac{0.0156 \times 0.75 \times 1.045}{0.150 - 0.045} = 0.1164 \text{ times}$$

(LOS 31.h)

2. C

$$\text{book value / share} = \frac{\text{book value of equity}}{\text{number of shares outstanding}} = \frac{\$19,950}{6,162} = \$3.238$$

$$P/B = \frac{\text{market price per share}}{\text{book value per share}} = \frac{\$31.37}{\$3.238} = 9.688$$

$$\text{sales/share} = \frac{\text{sales}}{\text{number of shares outstanding}} = \frac{\$32,373}{6,162} = \$5.254$$

$$P/S = \frac{\text{market price per share}}{\text{sales per share}} = \frac{\$31.37}{\$5.254} = 5.971$$

(LOS 31.b)

3. A

$$\text{book value/share} = \frac{\text{book value of equity}}{\text{number of shares outstanding}} = \frac{\$61,020}{10,771} = \$5.665$$

$$P/B = \frac{\text{market price per share}}{\text{book value per share}} = \frac{\$25.63}{\$5.665} = 4.524$$

$$\text{sales/share} = \frac{\text{sales}}{\text{number of shares outstanding}} = \frac{\$32,187}{10,771} = \$2.988$$

$$P/S = \frac{\text{market price per share}}{\text{sales per share}} = \frac{\$25.63}{\$2.988} = 8.578 \text{ (LOS 31.b)}$$

4. **A** Both stocks are relatively overvalued. The P/B and P/S ratios for Pfeiffer are 9.688 and 5.971. The P/B ratio for Pfeiffer exceeds the mean P/B ratio for the peer group (5.622) as well as the median P/B ratio (4.250) for the peer group, and therefore, by this measure, the stock would appear to be overvalued.

The P/S ratio also exceeds the median P/S (4.530) for the peer group, which further suggests that the stock is relatively overvalued. The P/B and P/S ratios for Mapps are 4.524 and 8.578. The P/B ratio for Mapps is greater than the mean P/B ratio for the peer group (4.100), and Mapps's P/B ratio exceeds the median ratio (2.140) for the peer group, and therefore, by this measure, Mapps is overvalued. Mapps's P/S ratio exceeds both the mean P/S (3.420) and the median P/S (1.440) for the peer group. The P/S ratio also indicates that Mapps is relatively overvalued. (LOS 31.r)

5. **A** Home Decor appears to be undervalued relative to Lester's. This conclusion is based on the fact that (1) Home Decor is selling at a P/CF of 20.88, which is 87.4% of the P/CF for Lester's (23.90), and (2) the P/FCFE for Home Decor (28.69) is 21.6% of the P/FCFE for Lester's (132.78). We would expect that Home Decor would have a higher P/CF because of its higher expected growth. However, because P/CF is actually lower, this is an indication that Home Decor is undervalued relative to Lester's. (LOS 31.r)
6. **C** In the home improvement segment of the retail industry, Home Decor appears to be a more attractive investment than Lester's for the following reasons:
- Home Decor is trading at a P/B that is 91% of the average P/B for the home improvement segment of the retail industry, with a forecasted ROE that is the same as that of the industry. This indicates that Home Decor is undervalued relative to its industry.
  - Home Decor is currently trading at a P/B that is 76.6% of the P/B for Lester's, with an estimated ROE that is slightly greater than the forecasted ROE for Lester's. This indicates that Home Decor is undervalued relative to Lester's.
  - Lester's is trading at a P/B that is 119% of the industry average P/B, with a forecasted ROE that is slightly below the industry's forecasted ROE. This indicates that Lester's is overvalued relative to its industry.
  - It should be noted that Home Decor's higher beta may account for Home Decor's low P/B and high forecast ROE relative to Lester's.

(LOS 31.r)

7. **A** In the department and discount segment of the retail industry, Harmon's appears to be a more attractive investment than Wally's for the following reasons:
- Harmon's is trading at a P/B that is 57% of the average P/B for the department and discount store segment of the retail industry with a forecasted ROE that is very close to that of the industry. This indicates that Harmon's is undervalued relative to the industry.

- Harmon's is currently trading at a P/B that is 50% of the current P/B for Wally's, with an estimated ROE that is just slightly less than the forecasted ROE for Wally's. This indicates that Harmon's is undervalued relative to Wally's. It should be noted that the beta values for Harmon's and Wally's are only slightly different, indicating similar risk.
- Wally's is trading at a P/B that is 114% of the industry average P/B, with a forecasted ROE that is only slightly above the ROE forecast for the industry. This indicates that Wally's is overvalued relative to its industry.

(LOS 31.r)

8. **B**  $P = \$42.10/\text{share}$

$$\begin{aligned}CF &= \text{net income} + \text{depreciation} = \$1,023,262,000 + \$534,102,000 \\&= \$1,557,364,000\end{aligned}$$

$$\text{number of basic shares outstanding} = 631,643,000$$

$$CF/\text{share} = \$1,557,364,000 / 631,643,000 = \$2.4656$$

$$P/CF = \$42.10 / \$2.4656 = 17.08 \text{ times}$$

(LOS 31.m)

9. **B** It is appropriate to make one adjustment to CFO in this problem to reflect nonrecurring items:

- The nonrecurring expense of \$139,870,000 that appears on the income statement should be added back after adjusting for taxes.

$$\text{CFO (reflecting nonrecurring items)} = \$1,497,442,000 + \$139,870,000(1 - 0.37) = \$1,585,560,100$$

$$\text{adjusted CFO per share} = \$1,585,560,100 / 631,643,000 = \$2.51$$

$$\text{adjusted P/CFO} = \$42.10 / \$2.51 = 16.77 \text{ or closest to 17}$$

(LOS 31.m)

### Module Quiz 31.4

1. **A**

$$\begin{aligned}\text{EBITDA} &= 119.4 + 5.8 + 85.9 + 6.9 + 2.3 \\&= \$220.3 \text{ million}\end{aligned}$$

$$EV = (31.25 \times 30) + 115 - 47.6 - 247 = \$757.9 \text{ million}$$

$$EV/EBITDA = \frac{\$757.9}{\$220.3} = 3.44$$

(LOS 31.n)

2. **C** Dividend yield is positively related to the required rate of return and negatively related to the forecasted growth rate in dividends. Thus, choosing high dividend yield stocks reflects a value- rather than a growth-style orientation. (LOS 31.g)

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## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 32.1, 32.2

1. **C** The stock's terminal value as of Year 5 is:

$$TV_5 = \frac{C\$11.25}{0.10} = C\$112.50$$

The present value of this Year 5 terminal value is:

$$PV = \frac{C\$112.50}{(1.10)^5} = C\$69.85$$

Thus, the justified value of SS is currently C\$75.00 + C\$69.85 = C\$144.85.  
(Module 32.2, LOS 32.c)

2. **C**

$$B_0 = \frac{\text{book value of equity}}{\text{shares outstanding}} = \frac{€435,000,000}{60,000,000} = €7.25 \text{ per share}$$

Year	$E_t$	$B_t$	ROE*	Equity Charge ( $r \times B_{t-1}$ )	Residual Income $E_t - (r \times B_{t-1})$
0		€7.25			
1	€1.16	8.41	0.16	€0.87	€0.29
2	1.35	9.76	0.16	1.01	0.34
3	1.56	11.32	0.16	1.17	0.39
4	1.81	13.13	0.16	1.36	0.45

\* Earnings per share (EPS) is equal to beginning book value multiplied by ROE.

In this case,  $\omega = 0$ . The present value of continuing residual income in Year 3 =

$$\frac{RI_4}{1+r-\omega} = \frac{0.45}{1+0.12-0} = \frac{0.45}{1.12} = \$0.40.$$

$$V_0 = €7.25 + \left[ \frac{€0.29}{1.12} + \frac{€0.34}{1.12^2} + \frac{€0.39 + €0.40}{1.12^3} \right] = €8.34$$

Since the shares are valued at €8.34 each and the current market price per share is €8.75, the shares are overpriced, and the analyst should consider issuing a sell recommendation. (Module 32.2, LOS 32.c)

3. **B** We now modify the information in the last problem and assume that residual income remains constant at €0.45 after the initial forecast period, so  $\omega = 1$ .

Continuing residual income in Year 3 is  $\frac{0.45}{1+0.12-1} = \frac{0.45}{0.12} = €3.75$ .

$$V_0 = €7.25 + \left[ \frac{€0.29}{1.12} + \frac{€0.34}{1.12^2} + \frac{€0.39 + €3.75}{1.12^3} \right] = €10.73$$

In this case, the value of the shares exceeds the current price of €8.75 and the analyst should consider issuing a buy recommendation. (Module 32.2, LOS 32.c)

4. C Residual income begins to decline after Year 4, ( $\omega = 0.3$ ) so the present value of continuing residual income in Year 3 is:

$$\text{present value of continuing residual income in year 3} = \frac{€0.45}{1+0.12-0.3} = €0.55$$

The intrinsic value today is book value plus the present value of years 1 through 3 residual income plus the present value of continuing residual income:

$$V_0 = €7.25 + \frac{€0.29}{1.12} + \frac{€0.34}{1.12^2} + \frac{€0.39 + €0.55}{1.12^3} = €8.45$$

Since the shares are valued at €8.45 and the current market price is €8.75, the shares are overpriced and the analyst should consider issuing a sell recommendation. (Module 32.2, LOS 32.c)

### Module Quiz 32.3

1. C We know that:  $V_0 = B_0 + \left( \frac{(ROE-r) \times B_0}{r-g} \right)$ . Since the shares are fairly priced,  $V_0 = P = \$25.00$ . It follows that:

$$B_0 = \frac{V_0}{P/B} = \frac{\$25.00}{5.00} = \$5.00$$

Substituting, we get:

$$\$25.00 = \$5.00 + \left( \frac{(0.18-r) \times \$5.00}{r-0.08} \right)$$

Dividing both sides by \$5.00 and rearranging, we get:

$$4.00 = \left( \frac{0.18-r}{r-0.08} \right) \Rightarrow 4r - 0.32 = 0.18 - r$$

$$5r = 0.50 \Rightarrow r = 0.10 = 10\%$$

(LOS 32.f)

2. C Use the single-stage residual income model to solve for the justified P/B multiple, then solve for ROE given the other variables:

$$V_0 = B_0 + \left[ \frac{(ROE - r) \times B_0}{r - g} \right] \Rightarrow \frac{V_0}{B_0} = 1 + \frac{ROE - r}{r - g}$$

$$2.14 = 1 + \frac{ROE - 0.12}{0.12 - 0.05} \Rightarrow ROE = 0.20 = 20\%$$

or alternatively:

$$\text{Justified P/B} = (ROE - g) / (r - g)$$

rearranging ...

$$ROE = [(Justified P/B) \times (r - g)] + g$$

$$ROE = [(2.14) \times (0.12 - 0.05)] + 0.05 = 0.20$$

(LOS 32.f)

3. A The single-stage residual income model is:

$$V_0 = B_0 + \left[ \frac{(ROE - r) \times B_0}{r - g} \right]$$

The second term in the equation is the present value of future expected residual income. Rocky's ROE is greater than its cost of equity capital, so that second term is positive. That means intrinsic value is greater than book value, and the justified price-to-book ratio is greater than one. (LOS 32.f)

4. A ROE is equal to forecasted earnings per share divided by current book value per share:

$$ROE = \frac{\$0.45}{\$4.50} = 0.10 = 10\%$$

The single-stage residual income model is:

$$V_0 = B_0 + \left[ \frac{(ROE - r) \times B_0}{r - g} \right]$$

The second term in the equation is the present value of future expected residual income. The ROE is equal to the cost of equity capital (both are 10%), so the second term is zero. That means intrinsic value is equal to book value and the justified price-to-book ratio is equal to one. (LOS 32.f)

## Module Quiz 32.4

1. C All three alternative assumptions will reduce continuing residual income below the level implied by the assumption that it remains constant forever. A falling ROE will reduce residual income over time because residual income decreases as the spread between ROE and the cost of equity decreases. Therefore, the value estimate will drop below \$68 in all three cases. (LOS 32.h)

2. **B** BCB's required rate of return,  $r$ , can be computed using the capital asset pricing model (CAPM) as follows:

$$r = 4.5\% + (0.7 \times 5.0\%) = 8.0\%$$

The calculation of  $RI = Earnings_t - r \times Book_{t-1}$  for the next three years is shown in the following table.

### Expected RI Computations

	2018	2019	2020	2021
Beginning book value per share ( $B_{t-1}$ )	£10.62	£11.89	£13.32	£14.91
Earnings per share forecast ( $E_t = 0.2 \times B_{t-1}$ )	2.12	2.38	2.66	
Dividends per share forecast ( $D_t = 0.4 \times E_t$ )	0.85	0.95	1.07	
Forecast book value per share ( $B_{t-1} + E_t - D_t$ )	11.89	13.32	14.91	
Equity charge per share ( $B_{t-1} \times r$ )	0.85	0.95	1.07	
Per share RI [ $E_t - (B_{t-1} \times r)$ ]	£1.27	£1.43	£1.59	

The present value in 2017 of 2018 and 2019 residual income is:

$$\begin{aligned} PV(RI_{2018, 2019}) &= \frac{\text{£1.27}}{1.08} + \frac{\text{£1.43}}{1.08^2} \\ &= 1.18 + 1.23 \\ &= \text{£2.41} \end{aligned}$$

As indicated in the preceding table, the book value at the beginning of 2021 (end of 2020) is £14.91. The market price in 2020 for BCB is assumed to be four times  $B_{2020}$ , so:

$$P_{2020} = 4 \times 14.91 = \text{£59.64}$$

The present value of continuing residual income as of the end of 2019 is:

$$\frac{(P_{2020} - B_{2020}) + RI_{2020}}{1+r} = \frac{(\text{£59.64} - \text{£14.91}) + \text{£1.59}}{1.08} = \text{£42.89}$$

(LOS 32.h)

3. **B** The present value of residual income in 2017 is:

$$\frac{\text{£42.89}}{1.08^2} = \text{£36.77}$$

end of 2017 value per share of BCB stock

$$\begin{aligned} &= \text{current book value} + \text{sum of discounted RIs} + \text{PV of continuing residual income} \\ &= £10.62 + £2.41 + £36.77 = £49.80 \end{aligned}$$

(LOS 32.h)

## Module Quiz 32.5

1. **C** Dividend discount model:

$$r = 4\% + (0.75 \times 8\%) = 10\%$$

$$\text{dividend} = \text{earnings} = \$3.00$$

$$\text{value} = \frac{\$3.00}{0.10} = \$30.00$$

Residual income model:

$$\text{residual income} = \$3.00 - (0.10 \times \$15) = \$1.50$$

$$\text{value} = \$15.00 + \frac{\$1.50}{0.10} = \$30.00$$

(LOS 32.i)

2. **C** Improperly capitalizing expenditures that should have been expensed will cause return on equity and book value forecasts to be overstated. Correcting the valuation to reflect the overstatement of both of these forecasts would cause the ROE estimate to decrease, the book value per share to decrease, and the intrinsic value from the residual income model to decrease. (LOS 32.k)
3. **B** The foreign currency translation gains were recorded directly to equity as part of comprehensive income and were not reflected in income, so his ROE forecast was understated. If he expects these gains to continue, he should revise his forecast upward of ROE. Book value was not affected, however, because the gains were recorded to equity. Correcting the valuation to reflect these changes would cause his ROE estimate to increase, the book value per share to stay the same, and the intrinsic value from the residual income model to increase. (LOS 32.k)
4. **C** Stock P has model price higher than the market price and hence is undervalued. Stock Q has model price lower than the market price and hence is overvalued. Stock R has model price equal to the market price and hence is fairly valued.

(LOS 32.l)

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 33.1

1. **B** Private firms can take a longer-term view because their managers/owners do not have to focus on the short-term needs of external shareholders. Private firms, however, are more concerned with taxes because of the impact of firm policies on the taxation of the firm's owners. In most private firms, management has substantial ownership. (LOS 33.a)
2. **A** In venture capital financing, the private company valuations are usually subject to negotiation and are informal due to the uncertainty of future cash flows. (LOS 33.b)
3. **C** The appraiser will most likely use investment value. This valuation provides value to a particular buyer. In this case, the multinational may place a higher value on the private firm due to the perceived synergies. (LOS 33.c)
4. **C** The analyst will most likely use the asset-based approach which values a firm as its assets minus liabilities. The firm's future cash flows are uncertain, and it may have to be liquidated given its distress. Therefore, the income approach should not be used, and the firm should not be compared to other firms that are going concerns, as in the market approach. The amount that equity holders could reasonably expect is their claim after liabilities have been satisfied. (LOS 33.d)

### Module Quiz 33.2

1. **A** Both strategic and financial buyers will attempt to reduce executive compensation to market levels by \$150,000 (\$800,000 – \$650,000). They will also have to pay a higher lease rate of \$50,000 (\$250,000 – \$200,000). So the initial adjustment for both buyers to generate normalized EBITDA is \$6,700,000 + \$150,000 – \$50,000 = \$6,800,000.  
However, only a strategic buyer will be able to realize additional synergistic savings of \$800,000 (\$8,100,000 – \$7,300,000). So normalized EBITDA for a strategic buyer is \$7,600,000 and for a financial buyer it is \$6,800,000.  
(LOS 33.e)
2. **A** The answer is calculated as follows.

**Pro Forma Income Statement**

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Revenues	\$10,500,000
Cost of goods sold	<u>\$8,400,000</u>
Gross profit	\$2,100,000

SG&A expenses	\$1,600,000
Pro forma EBITDA	\$500,000
Depreciation and amortization	<u>\$105,000</u>
Pro forma EBIT	\$395,000
Pro forma taxes on EBIT	<u>\$158,000</u>
Operating income after tax	\$237,000

*Adjustments to obtain FCFF*

Plus: depreciation and amortization	\$105,000
Minus: capital expenditures	\$125,000
Minus: increase in working capital	\$60,000
FCFF	\$157,000

The following provides a line by line explanation for the previous calculations.

Pro Forma Income Statement	Explanation
Revenues	Current revenues multiplied by the growth rate: $\$10,000,000 \times (1.05)$
Cost of goods sold	Revenues multiplied by one minus the gross profit margin: $\$10,500,000 \times (1 - 0.20)$
Gross profit	Revenues multiplied by the gross profit margin: $\$10,500,000 \times 0.20$
SG&A expenses	Given in the question
Pro forma EBITDA	Gross profit minus SG&A expenses: $\$2,100,000 - \$1,600,000$
Depreciation and amortization	Revenues multiplied by the given depreciation expense: $\$10,500,000 \times 0.01$
Pro forma EBIT	EBITDA minus depreciation and amortization: $\$500,000 -$

	\$105,000
Pro forma taxes on EBIT	EBIT multiplied by tax rate: $\$395,000 \times 0.40$
Operating income after tax	EBIT minus taxes: $\$395,000 - \$158,000$
<i>Adjustments to obtain FCFF</i>	<i>Explanation</i>
Plus: depreciation and amortization	Add back noncash charges from above
Minus: capital expenditures	Capital expenditures equal depreciation plus 4% of the firm's incremental revenues: $(\$10,500,000 \times 1\%) + [4\% \times (\$10,000,000 \times 5\%)] = \$105,000 + \$20,000 = \$125,000$
Minus: increase in working capital	The working capital will increase as revenues increase $0.12 \times (\$10,500,000 - \$10,000,000)$
FCFF	Operating income net of the adjustments above

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(LOS 33.e)

3. **B** To arrive at the value of the equity using the CCM, it can be estimated using the free cash flows to equity and the required return on equity (r):

$$\text{value of equity} = \frac{\text{FCFE}_1}{r-g}$$

$$\text{value of equity} = \frac{\$2,200,000 \times (1.06)}{0.18 - 0.06} = \$19,433,333$$

Note that we grow the FCFE at the growth rate because the *current* year FCFE is provided in the problem (not next year). We use normalized earnings, not reported earnings, given that normalized earnings are most relevant for the acquirers of the firm. The relevant required return for FCFE is the equity discount rate, not the WACC.

An alternative approach to calculate the value of the equity would be to subtract the market value of the firm's debt from total firm value. However, the FCFF are not provided, so a total firm value cannot be calculated. (LOS 33.f)

4. **B** The answer is calculated using the following steps.

*Step 1:* Calculate the required return for working capital and fixed assets.

Given the required returns in percent, the monetary returns are:

working capital:  $\$400,000 \times 4\% = \$16,000$

fixed assets:  $\$1,800,000 \times 12\% = \$216,000$

*Step 2:* Calculate the residual income.

After the monetary returns to assets are calculated, the residual income is that which is left over in the normalized earnings:

residual income =  $\$235,000 - \$16,000 - \$216,000 = \$3,000$

*Step 3:* Value the intangible assets.

Using the formula for a growing perpetuity, the discount rate for intangible assets, and the growth rate for residual income:

value of intangible assets =  $(\$3,000 \times 1.03) / (0.16 - 0.03) = \$23,769$

*Step 4:* Sum the asset values to arrive at the total firm value.

firm value =  $\$400,000 + \$1,800,000 + \$23,769 = \$2,223,769$

(LOS 33.f)

5. **A** The private target's WACC should be used. It may be much different than the acquirer's, given that acquirers are usually larger and more mature than targets. (LOS 33.g)
6. **B** If there are no comparable public firms with which to estimate beta by, then the build-up method can be used where various risk premiums are added to the risk-free rate. (LOS 33.h)
7. **A** The CAPM will be used because the private firm is mature and of similar size and firm-specific risk as the public comparable. The expanded CAPM is not used because premiums for size and firm-specific risk are not needed. The build-up method is not needed because the private firm has a public comparable.  
The CAPM calculation uses the risk-free rate, the beta, and the equity risk premium:  $4.8\% + 1.50(5.5\%) = 13.1\%$ .

The risk-free rate is the Treasury yield, not the returns for bonds in general.  
(LOS 33.h)

8. **B** The build-up method is used when there are no comparable public firms with which to estimate beta. Because the firm is small with a high degree of firm-

specific risk, risk premiums will be used for these. An industry risk premium is used in the build-up method but not beta.

Because the firm is being acquired, we assume the new owners will utilize an optimal capital structure and weights in the WACC calculation. The capital structure for public firms should not be used because public firms have better access to debt financing.

The resulting calculations are as follows.

Using the build-up method: the risk-free rate, the equity risk premium, the small stock premium, a company-specific risk premium, and an industry risk premium are added together:

$$4.8\% + 5.5\% + 3.8\% + 2.5\% + 2.0\% = 18.6\%$$

The WACC using the optimal capital structure factors in the debt to total cap, the cost of debt, the tax rate, and the given cost of equity:

$$\begin{aligned} \text{WACC} &= (w_e \times r_e) + [w_d \times r_d \times (1 - \text{tax rate})] \\ &= (0.85 \times 18.6\%) + [0.15 \times 10\% \times (1 - 35\%)] = 16.8\% \end{aligned}$$

(LOS 33.h)

### Module Quiz 33.3

1. **B** The adjustment to the MVIC/EBITDA multiple for the higher risk of the private firm is:  $9.0 \times (1 - 0.30) = 6.3$ .

The adjusted multiple is applied against the normalized EBITDA:

$$6.3 \times \$27,100,000 = \$170,730,000$$

Subtracting out the debt results in the equity value:

$$\$170,730,000 - \$2,600,000 = \$168,130,000$$

Since the buyer is a strategic buyer, a control premium of 25% is added:

$$168,130,000(1.25) = \$210,162,500$$

(LOS 33.i)

2. **C** It is difficult to find comparable data for individual intangible assets, so the asset-based approach would not be used. Natural resource firms and finance firms where their asset values can be determined by examining market prices would be easier to value using the asset-based approach. (LOS 33.j)

### Module Quiz 33.4

1. **C** An IPO would increase liquidity and decrease the DLOM. Lower asset risk would result in less value uncertainty and a lower DLOM. A longer asset duration

(later, lower payments) would result in reduced liquidity and a higher DLOM.  
(LOS 33.k)

2. A The discount for lack of control (DLOC) can be backed out of the control premium:

$$DLOC = 1 - \left[ \frac{1}{1 + \text{control premium}} \right]$$

$$DLOC = 1 - \left[ \frac{1}{1 + 0.18} \right] = 15.25\%$$

The total discount also uses the discount for lack of marketability (DLOM):

$$\text{total discount} = 1 - [(1 - DLOC)(1 - DLOM)]$$

$$\text{total discount} = 1 - [(1 - 0.1525)(1 - 0.22)] = 33.9\%$$

(LOS 33.k)

3. A Although various organizations provide technical guidance on the use of their valuation standards, it is limited due to the heterogeneity of valuations. It is very difficult for the organizations to ensure compliance to the standards because most valuations are confidential. There is no single mandated valuation standard.  
(LOS 33.l)

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 34.1

1. **B** When the yield curve is *upward* sloping, the forward curves will lie above the spot curve. The opposite is true when the yield curve is downward sloping. (LOS 34.a)
2. **B** The forward *pricing* model values forward contracts by using an arbitrage argument that equates buying a zero-coupon bond to entering into a forward contract to buy a zero-coupon bond that matures at the same time:

$$P_{(j+k)} = P_j F_{(j,k)}$$

The forward *rate* model tells us that the forward rate  $f(j,k)$  should make investors indifferent between buying a long-maturity zero-coupon bond versus buying a shorter-maturity zero-coupon bond and reinvesting the principal. (LOS 34.b)

### Module Quiz 34.2

1. **B** If an investor believes that future spot rates will be lower than the current forward rates, then the investor will perceive an opportunity to purchase bonds at an attractive price, as the market is discounting future cash flows at “too high” a discount rate. The bonds are thus undervalued in the market. (LOS 34.d)
2. **C** Fixed income managers will earn an extra return through riding the yield curve if the spot rate curve is upward sloping and remains unchanged over time. (LOS 34.e)

### Module Quiz 34.3

1. **C** The swap market is not controlled by governments, which makes swap rates more comparable across different countries. The swap rate is the interest rate for the fixed-rate leg of an interest rate swap. *Wholesale* banks frequently use the swap curve to value their assets and liabilities, while *retail* banks with little exposure to the swap market are more likely to use the government spot curve as their benchmark. (LOS 34.f)

### Module Quiz 34.4

1. **C** The swap spread of a default free bond should provide an indication of the bond’s illiquidity—or, alternatively, that the bond is mispriced. Time value is reflected in the government bond yield curve; the swap spread is an additional amount of interest above this benchmark. (LOS 34.g)
2. **C** The Z-spread is the constant spread that must be added to the default-free spot curve to match the valuation of a risky bond to its market price. A higher Z-spread implies a riskier bond. (LOS 34.h)

3. **A** The TED spread (from *T*-bill and *Eurodollar*) is computed as the difference between the three-month LIBOR rate and the three-month *T*-bill rate. The LIBOR–OIS spread is the difference between LIBOR and the overnight indexed swap rate (OIS) rates. (LOS 34.i)

### Module Quiz 34.5

1. **A** The segmented markets theory (and the preferred habitat theory) propose that borrowers and lenders have strong preferences for particular maturities. The liquidity preference theory argues that there are liquidity premiums that increase with maturity; however, the liquidity preference theory does not preclude the existence of other factors that could lead to an overall downward-sloping yield curve. The segmented markets theory—not the preferred habitat theory—proposes that yields at different maturities are determined independently of each other. (LOS 34.j)

### Module Quiz 34.6

1. **C** The Ho-Lee model is calibrated by using market prices to find the time-dependant drift term  $\theta_t$  that generates the current term structure. (One of the drawbacks of the Vasicek and Cox-Ingersoll-Ross models is that the model prices generated by these models generally do not coincide with observed market prices.) (LOS 34.k)
2. **A** Effective duration is an inappropriate measure for identifying and managing shaping risk. Shaping risk refers to risk to portfolio value from changes in the shape of the benchmark yield curve. Effective duration can be used to accurately measure the risk associated with parallel yield curve changes but is not appropriate for measuring the risk from other changes in the yield curve. (LOS 34.l)
3. **B** It is believed that short-term volatility reflects uncertainty regarding monetary policy while long-term volatility is most closely associated with uncertainty regarding the real economy and inflation. Short-term rates in the volatility term structure tend to be more volatile than long-term rates. (LOS 34.m)

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 35.1

1. **B** An arbitrage gain is a risk-free profit and hence requires no net investment. The returns therefore are not simply the risk-free rate. As there is no initial investment, the gains cannot be measured as percentage of initial cost. (LOS 35.a)
2. **B** An up-front arbitrage profit of \$38.70 can be earned by selling 10 FFPQ bonds short and purchasing 1 DALO and 1 NKDS bonds as shown below.

Position	Initial Cash Flow	Year 1 Cash Flow	Year 2 Cash Flow
Short 10 FFPQ	\$ 11,701.20	\$(1,000.00)	\$(11,000.00)
Long 1 DALO	\$ (985.22)	\$ 1,000.00	\$ -
Long 1 NKDS	\$(10,667.28)	\$ -	\$ 11,000.00
Net	\$38.70	0	0

(LOS 35.a)

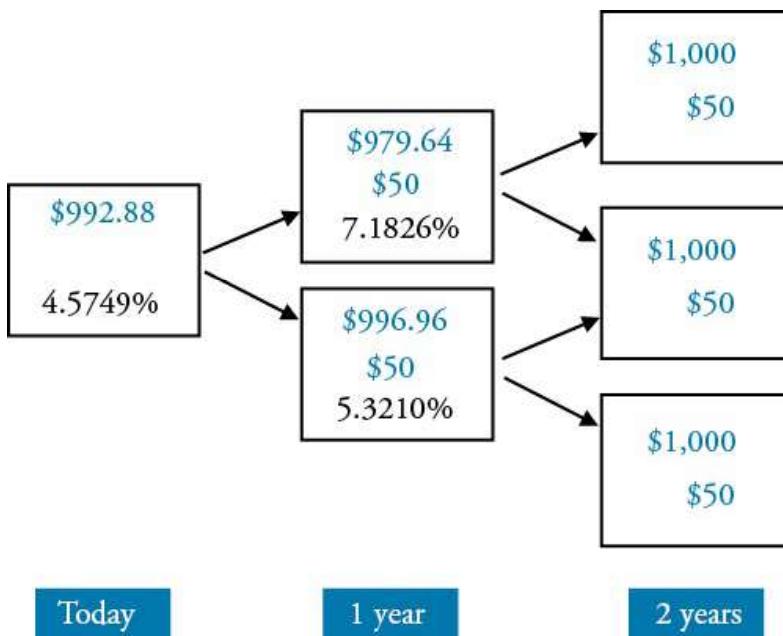
3. **A** FFPQ is overpriced. Based on the 1.5% benchmark yield, the other two bonds are correctly priced.

$$\text{Arbitrage-free price} = (\text{PV Year 1 Cash Flow}) + (\text{PV Year 2 Cash Flow})$$

	PV Year 1 Cash Flow	PV Year 2 Cash Flow	Arbitrage-Free Price
FFPQ	98.52	1,067.73	1,166.25
DALO	985.22	0	985.22
NKDS	0	10,677.28	10,677.28

(LOS 35.a)

4. **A** A lognormal random walk will ensure non-negativity but will lead to higher volatility at higher interest rates. (LOS 35.c)
5. **C** The value of the 5%, two-year annual pay \$1000 par bond is \$992.88.



(LOS 35.d)

6. **B** The stated multiplier is correct but it is important to note that the rates given at each node of the tree are forward rates not spot rates. (LOS 35.d)

## Module Quiz 35.2

1. **A** A correctly calibrated tree will value the bond at the same price as the par and spot curves used to derive it. (Module 35.2, LOS 35.e)
2. **A** DeGrekker purchased the bonds and stripped them into constituent parts before selling them. The strategy involved no initial net investment and yet results in an arbitrage profit. (Module 35.1, LOS 35.a)
3. **A** The two methods are identical and will always give the same result. (Module 35.2, LOS 35.g)
4. **B** This is a tricky question. There are only four possible paths that Dane should have used. The possible paths are UU (Path 1), UD (Path 2), DU (Path 4), and DD (Path 5). Path 3 isn't a valid path.

Path	Year 1	Year 2	Year 3
Path 1	3%	5.7883%	10.7383%
Path 2	3%	5.7883%	7.1981%
Path 4	3%	3.8800%	7.1981%
Path 5	3%	3.8800%	4.8250%

So the value should be the average of the values for paths 1, 2, 4, and 5. The correct average value is \$972.45. (Module 35.2, LOS 35.g)

5. **B** Monte Carlo simulation also requires an assumed level of volatility as an input. (Module 35.2, LOS 35.h)
6. **C** The larger the number of paths, the more accurate the value in a statistical sense. However, whether the value is closer to the true fundamental value depends on the accuracy of the model inputs. (Module 35.2, LOS 35.h)

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 36.1

1. **B** Like ordinary options, the value of an embedded option increases as volatility increases. Furthermore, the arbitrage-free value of an option-free bond ( $V_{\text{option-free}}$ ) is independent of the assumed volatility. This implies that the arbitrage-free value of a callable bond ( $V_{\text{callable}}$ ) decreases as volatility increases the value of the embedded call option ( $V_{\text{call}}$ ). This can be seen from the expression for the value of a callable bond:

$$\downarrow V_{\text{callable}} = V_{\text{option-free}} - \uparrow V_{\text{call}}$$

The value of the putable bond ( $V_{\text{putable}}$ ) increases as the assumed volatility increases the value of the embedded put option ( $V_{\text{put}}$ ).

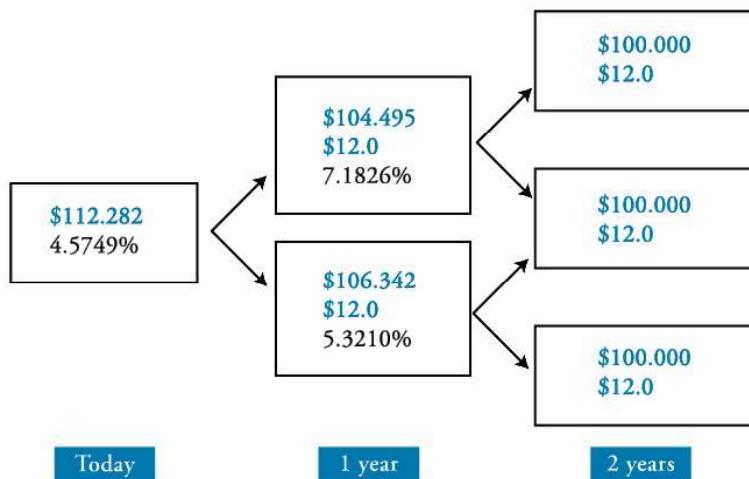
$$\uparrow V_{\text{putable}} = V_{\text{option-free}} + \uparrow V_{\text{put}}$$

(LOS 36.b)

### Module Quiz 36.2

1. **B** The value at any given node in a binomial tree is the average of the present values of the cash flows at the two possible states immediately to the right of the given node, discounted at the one-period rate at the node under examination.  
 (LOS 36.c)

2. **C** The tree should look like this:



Consider the value of the bond at the *upper* node for Period 1,  $V_{1,U}$ :

$$V_{1,U} = \frac{1}{2} \times \left[ \frac{\$100 + \$12}{1.071826} + \frac{\$100 + \$12}{1.071826} \right] = \$104.495$$

Similarly, the value of the bond at the *lower* node for Period 1,  $V_{1,L}$  is:

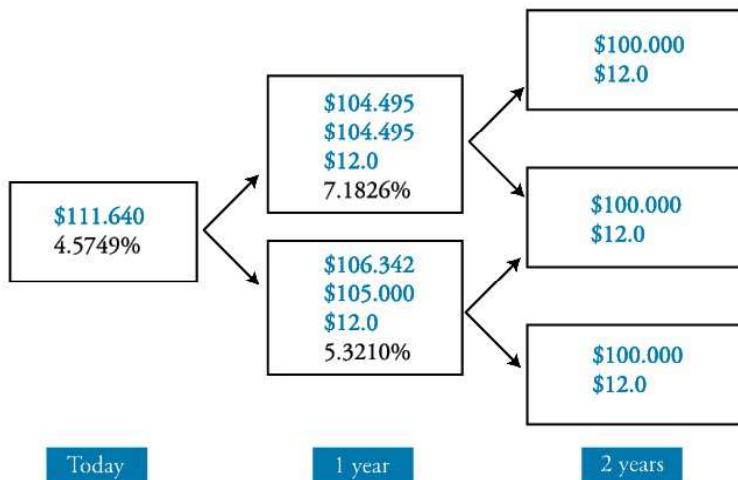
$$V_{1,L} = \frac{1}{2} \times \left[ \frac{\$100 + \$12}{1.053210} + \frac{\$100 + \$12}{1.053210} \right] = \$106.342$$

Now calculate  $V_0$ , the current value of the bond at Node 0:

$$V_0 = \frac{1}{2} \times \left[ \frac{\$104.495 + \$12}{1.045749} + \frac{\$106.342 + \$12}{1.045749} \right] = \$112.282$$

(LOS 36.f)

3. C The tree should look like this:



Consider the value of the bond at the *upper* node for Period 1,  $V_{1,U}$ :

$$V_{1,U} = \frac{1}{2} \times \left[ \frac{\$100 + \$12}{1.071826} + \frac{\$100 + \$12}{1.071826} \right] = \$104.495$$

Similarly, the value of the bond at the *lower* node for Period 1,  $V_{1,L}$  is:

$$V_{1,L} = \frac{1}{2} \times \left[ \frac{\$100 + \$12}{1.053210} + \frac{\$100 + \$12}{1.053210} \right] = \$106.342$$

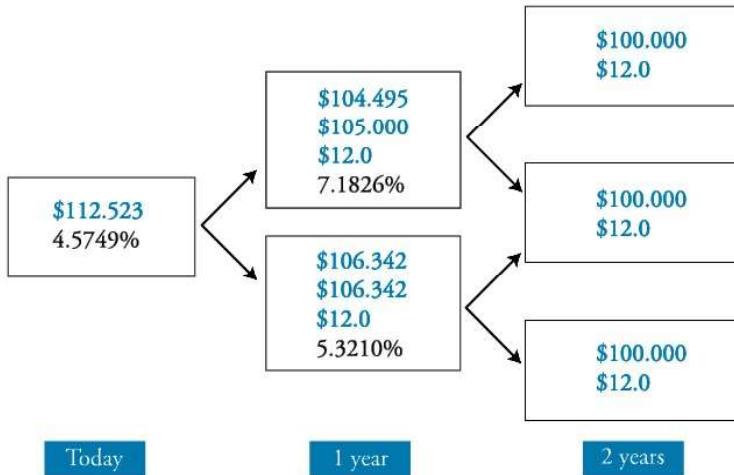
Now calculate  $V_0$ , the current value of the bond at Node 0:

$$V_0 = \frac{1}{2} \times \left[ \frac{\$104.495 + \$12}{1.045749} + \frac{\$105.00 + \$12}{1.045749} \right] = \$111.640$$

The value of the embedded call option is  $\$112.282 - \$111.640 = \$0.642$ .

(LOS 36.f)

4. A The tree should look like this:



Consider the value of the bond at the *upper* node for Period 1,  $V_{1,U}$ :

$$V_{1,U} = \frac{1}{2} \times \left[ \frac{\$100 + \$12}{1.071826} + \frac{\$100 + \$12}{1.071826} \right] = \$104.495$$

Similarly, the value of the bond at the *lower* node for Period 1,  $V_{1,L}$ , is:

$$V_{1,L} = \frac{1}{2} \times \left[ \frac{\$100 + \$12}{1.053210} + \frac{\$100 + \$12}{1.053210} \right] = \$106.342$$

Now calculate  $V_0$ , the current value of the bond at Node 0:

$$V_0 = \frac{1}{2} \times \left[ \frac{\$105.000 + \$12}{1.045749} + \frac{\$106.342 + \$12}{1.045749} \right] = \$112.523$$

The value of the embedded put option is  $\$112.523 - \$112.282 = \$0.241$ .  
(LOS 36.f)

### Module Quiz 36.3, 36.4

1. **C** Let's construct a table of the risk differences between the issuer's callable bond and on-the-run Treasuries to help us answer this question.

Type of Risk	Equal?
Credit	No
Option	Removed by OAS

Therefore, the OAS reflects the credit risk of the corporate callable bond over Treasuries, since option risk has been removed. (Module 36.4, LOS 36.g)

2. **A** A bond that is both callable and convertible contains two embedded options: (1) a call option on the stock and (2) a call option on the bond. The investor has a

*short* position in the call option on the bond (the issuer has the right to call the bond) and a *long* position in the call option on the stock (the investor has the right to convert the bond into shares of stock). Therefore, the difference in value between the callable convertible bond and the value of the comparable option-free bond to the investor is equal to the value of the call option on the stock minus the value of the call option on the bond. (Module 36.4, LOS 36.h)

3. **B** A decrease in interest rate volatility will decrease the value of the embedded short call on the bond (but have no effect on the value of the embedded call on the stock) and increase the value of the convertible bond.

A decrease in stock price volatility will decrease the value of the embedded call on the stock (but have no effect on the embedded call on the bond) and decrease the value of the convertible bond. (Module 36.4, LOS 36.h)

### Module Quiz 36.5

1. **B** The duration formula is presented correctly. The convexity formula is presented incorrectly; the “2” should not appear in the denominator of the convexity formula.

$$\text{effective convexity} = EC = \frac{BV_{-\Delta y} + BV_{+\Delta y} - (2 \times BV_0)}{BV_0 \times \Delta y^2}$$

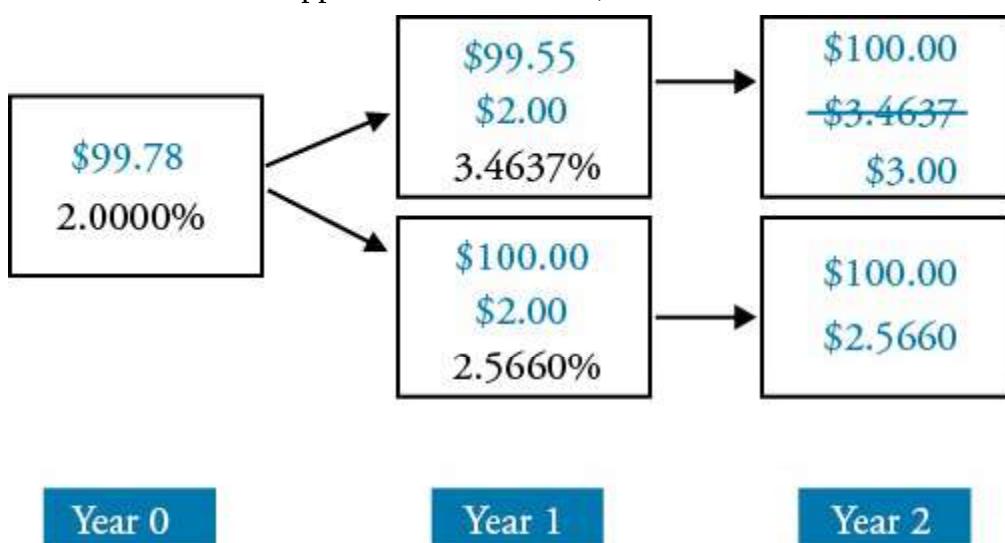
(LOS 36.i)

### Module Quiz 36.6, 36.7

1. **A** When an upward sloping yield curve flattens, call options increase in value while put options decrease in value. (Module 36.3, LOS 36.e)
2. **A** When the assumed volatility in a binomial tree increases, the computed value of OAS will decrease. When an analyst uses a lower-than-actual level of volatility like the 15% volatility assumed here, the computed OAS for a callable bond will be too high. Using the 19% implied volatility instead would have resulted in an estimated OAS lower than 145 bps. (Module 36.4, LOS 36.h)
3. **A** Straight bonds generally have higher effective durations than bonds with embedded options. Both call and put options have the potential to reduce the life of a bond, so the duration of callable and putable bonds will be less than or equal to that of their straight counterparts. (Module 36.5, LOS 36.j)
4. **A** Statement 1 is incorrect. Low-coupon callable bonds are unlikely to be called; hence, their highest key rate duration corresponds to their time-to-maturity. Statement 2 is correct. High coupon putable bonds are unlikely to be put and hence, their highest key rate duration corresponds to their time-to-maturity. (Module 36.6, LOS 36.k)
5. **B** Straight and putable bonds exhibit positive convexity at all interest rate levels. The price appreciation for a callable bond due to decline in interest rate is limited due to the call feature; callables exhibit negative convexity at low rates. Hence a

decline in rates is least likely to result in best price performance for a callable bond. (Module 36.6, LOS 36.l)

6. **B** When interest rates increase, a callable bond becomes less likely to be called (its duration will increase). The put option in a putable bond would be more likely to be exercised in a rising interest rate scenario and hence, the duration of a putable bond would decrease. Duration of an option-free bond would also decrease as interest rate increases (but not as significantly). (Module 36.6, LOS 36.k)
7. **A** Relative to bond A, bond B has lower OAS. Given that the two bonds have similar credit risk, bond B offers a lower OAS for the same level of risk as bond A and thus would be considered overpriced. Alternatively, bond A is more attractive (underpriced) relative to bond B. (Module 36.4, LOS 36.g)
8. **C** The value of the capped floater is \$99.78, as shown below:



The upper node at Year 2 is subject to the 3% cap, and the coupon is adjusted accordingly.

$$V_{1,U} = \$103 / (1.03467) = \$99.55$$

$$V_{1,L} = 100 \text{ (option is not exercised)}$$

$$V_0 = \frac{[(100 + 2) + (99.55 + 2)] / 2}{(1.02)} = 99.78$$

(Module 36.7, LOS 36.m)

### Module Quiz 36.8

1. **C** The market conversion premium per share is the market conversion price per share minus the market price per share. The market conversion price per share is  $\frac{925.00}{30} = \$30.833$ , so the conversion premium per share is  $\$30.833 - \$28.50 = \$2.333$ .

$$\begin{aligned}\text{market conversion premium ratio} &= \frac{\text{market conversion premium per share}}{\text{market price of common stock}} \\ &= \frac{2.33}{28.50} = 8.18\%\end{aligned}$$

(LOS 36.o)

2. **C** Buying convertible bonds in lieu of direct stock investing limits downside risk to that of straight bond investing, at the cost of reduced upside potential due to the conversion premium. (Note that this analysis assumes that interest rates remain stable. Otherwise, the interest rate risk associated with the straight bond investing must be considered.) When stock prices fall, the returns on convertible bonds are likely to exceed those of the stock, because the convertible bond's price has a floor equal to the straight bond value. The main drawback of investing in convertible bonds versus direct stock purchases is that when stock prices rise, the convertible bond is likely to underperform due to the conversion premium. If the stock price remains stable, the return on the bond may exceed the stock's return if the bond's coupon payment exceeds the dividend income of the stock. (LOS 36.q)
3. **B** ABC has a conversion price much less than the current stock price, so the conversion option is deep in the money. Bond ABC effectively trades like equity and is more likely to be influenced by the same factors that affect equity prices, in general, than the factors that affect bond prices.

A busted convertible like XYZ, with a stock price significantly less than the conversion price, trades like a bond (that's why a busted convertible is also called a fixed-income equivalent) and is therefore more likely to be influenced by the factors that affect bond prices. (LOS 36.q)

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 37.1

1. **A** Value of benchmark 5% annual pay, 5-year bond (using benchmark rate of 2%): N = 5, PMT = 5, FV = 100, I/Y = 2, CPT PV = 114.14

Value of Barry Corp. bonds would be lower by its CVA = 114.14 – 12.67  
= \$101.47.

(LOS 37.a)

2. **B** The hazard rate is the probability of default in the first year. The probability of default will be less than the hazard rate in all years after the first. (LOS 37.a)

3. **C** Probability of survival is the probability that the bond does not default. For year 3, the probability of survival is PS = (1 – 0.0125)3 = 96.30%. (LOS 37.a)

4. **B** expected loss = exposure × (1 – recovery rate) × PD  
exposure × (1 – recovery rate) = loss given default (LGD)

Hence, expected loss = LGD × PD. (LOS 37.a)

5. **A** CVA = price of risk-free bond – price of risky bond

CVA is the sum (not the mean) of the present value of expected loss. (LOS 37.a)

6. **A** Risk-neutral probability of default is the probability of default that is priced by the market. If Abramson's estimated hazard rate is less than this, the market has priced-in a higher credit risk in the bond (i.e., the bond is undervalued).  
(LOS 37.a)

7. **A** Given the market price, if the assumed recovery rate is increased, risk-neutral probability of default (that is implied in the current market price) has to be higher to offset the higher recovery rate. As such, the assumed recovery rate is positively correlated with the risk-neutral probability of default. (LOS 37.a)

### Module Quiz 37.2

1. **C** exposure in year 2 = 100 / 1.03 = 97.09

recovery cash flow = exposure × recovery rate = 97.09 × 0.45 = 43.69

PV = -89.49, N = 2, FV = 43.69, CPT I/Y = -30.13%

(LOS 37.a)

2. **B** Bond Q has the lowest expected loss and hence the lowest credit risk.

	Exposure (per Bond \$100 par)	Recovery (per \$100 par)
--	-------------------------------------	-----------------------------

			Probability of Default	LGD (per \$100 par)	Expected Loss
P	98	50	2.50%	48	1.20
Q	94	56	3.00%	38	1.14
R	89	49	4.65%	40	1.86

(LOS 37.a)

3. **C** The value of a comparable risk-free bond (using the benchmark rate of 2.50%) can be calculated to be \$107.41 as follows:

$$N = 3, PMT = 5, FV = 100, I/Y = 2.50, CPT PV = 107.14.$$

The sum of the PV of expected loss column is the CVA = 2.41.

Hence, the risky bond value =  $107.41 - 2.41 = \$104.73$ , which is greater than the market price of \$103. The bond is undervalued. (LOS 37.a)

### Module Quiz 37.3

1. **C** Due to the practice of notching (lower ratings for subordinated debt as compared to senior debt of the same issuer), the loss given default is incorporated into credit ratings along with the probability of default. (LOS 37.b)
2. **A** Credit scores and credit ratings are ordinal measures; a higher rating implies better credit risk, but the difference in scores or ratings is not proportional to the difference in risk. (LOS 37.b)
3. **C** Notching accounts for LGD differences between different classes of debt by the same issuer (higher LGD for issues with lower seniority). (LOS 37.b)
4. **A** The change in spread from A to BBB is  $0.60\% - 0.49\% = +0.11\%$ . The percent change in price =  $-9.20 \times 0.11\% = -1.01\%$ . (LOS 37.c)

### Module Quiz 37.4

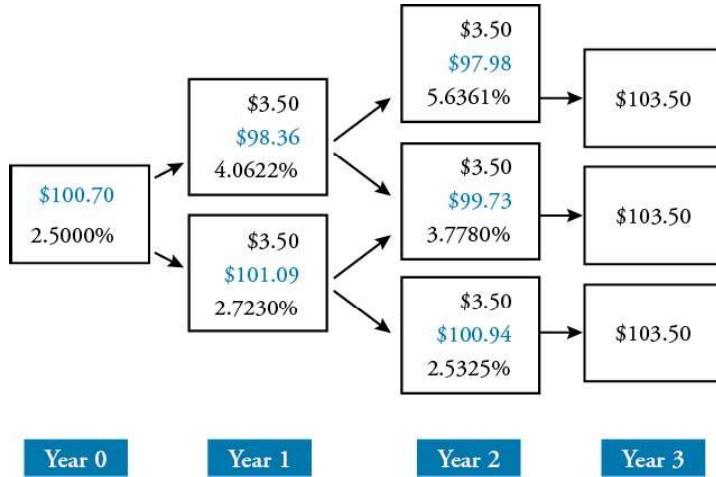
1. **A** Probability of default under the structural model is endogenous and hence is not estimated using a regression model. It is the probability that the uncertain future value of the company assets is below the default barrier. (LOS 37.d)
2. **A** Because of limited liability of equity investors, risky debt investors are effectively short a put option on company assets with a strike price equal to the face value of debt. Hence, a risky debt investment is equivalent to an investment in risk-free debt as well as a short put option on company assets. (LOS 37.d)
3. **C** Disadvantages of structural models include (1) SMs assume that assets of the company trade and (2) SMs are inappropriate when the balance sheet is complex

or there are off-balance sheet liabilities. Structural models explain why default occurs; reduced form models do not. (LOS 37.d)

4. **C** Default intensity is the probability of default over the next time increment. Default intensity varies over the life of the risky bond as company circumstances and the state of the economy change. (LOS 37.d)

### Module Quiz 37.5

1. **B** The completed tree is shown below.



(LOS 37.e)

2. **A** We need to calculate the expected exposure, LGD, expected loss, and PV of expected loss for year 2. The coupon of \$4 and risk-free rate of 2.5% give expected exposure in year 2 =  $(104 / 1.025) + 4 = \$105.46$ .

$$\text{LGD in year 2} = \text{exposure} \times (1 - \text{recovery rate}) = 105.46 \times 0.4 = 42.19$$

$$\text{expected loss} = \text{LGD} \times \text{PD} = 42.19 \times 0.0099 = \$0.418$$

$$\text{PV of expected loss} = \text{expected loss} \times \text{DF} = 0.42 \times 0.9518 = \$0.40$$

$$\text{CVA} = \text{sum of PV of expected loss} = 0.42 + 0.40 + 0.38 = \$1.20$$

(LOS 37.e)

3. **A** Using the 3-year par rate, we can calculate the VND for the corporate bond as:

$$\text{FV} = 100, \text{N} = 3, \text{PMT} = 4, \text{I/Y} = 2.50, \text{CPT PV} = 104.28$$

$$\text{value of the corporate bond} = \text{VND} - \text{CVA} = 104.28 - 1.88 = \$102.40$$

Since the bond is trading at \$103.53, it is overvalued. (LOS 37.e)

### Module Quiz 37.6

1. **B** The coupon rate is given as 4%. The table below shows the results:

Year	1	3	5	10

<b>Par Rate</b>	0.75%	1.25%	1.75%	2.25%
<b>AAA CVA</b>	\$1.79	\$2.12	\$3.24	\$5.84
<b>VND</b>	\$103.23	\$108.05	\$110.68	\$115.52
<b>V (Risky)</b>	\$101.44	\$105.93	\$107.44	\$109.68
<b>Yield (Risky)</b>	2.53%	1.95%	2.40%	2.88%
<b>Credit Spread</b>	1.78%	0.70%	0.65%	0.63%

VND is calculated using the benchmark par rate. For example, VND for 5-year bond: N = 5, FV = 100, PMT = 4, I/Y = 1.75, CPT PV = 110.68

$$\text{value (risky)} = \text{VND} - \text{CVA}$$

Yield (risky) is computed using the value of risky bond as its price.

Yield (risky) for 3-year bond: N=3, PV = -105.93, PMT = 4, FV = 100, CPT I/Y = 1.95%

$$\text{credit spread} = \text{yield (risky)} - \text{par rate}$$

Credit spreads appear to decline with maturity, resulting in a downward sloping credit spread curve. (LOS 37.f)

2. **A** Credit spreads are positively related to probability of default and loss severity. Loss severity = 1 – recovery rate. (LOS 37.g)
3. **B** The highest rated bond sectors tend to have a flat or slightly upward sloping credit spread curve. (LOS 37.g)
4. **C** When expectations about probabilities of default and recovery rates are stable, credit spread curves tend to be flat. (LOS 37.g)
5. **C** The shape of the credit spread curve is determined by sector quality, market demand and supply forces, company-value models, and financial conditions in the economy. (LOS 37.g)

## Module Quiz 37.7

1. **A** Short-term granular and homogenous structured finance vehicles are evaluated using a statistical-based approach. (LOS 37.h)
2. **B** Medium-term granular and homogenous obligations are evaluated using a portfolio-based approach because the portfolio composition varies over time. (LOS 37.h)

3. **C** After origination, investors in a secured debt face operational and counterparty risk of the servicer. (LOS 37.h)
4. **C** Covered bonds are senior, secured bonds issued by a financial institution. Covered bonds are backed by a collateral pool *as well as* by the issuer (i.e., covered bond investors have recourse rights). (LOS 37.h)

## ANSWER KEY FOR MODULE QUIZ

### Module Quiz 38.1, 38.2, 38.3

1. **B** Banaji expects credit spreads to widen in the short-term; therefore, the appropriate strategy is to buy short-term CDS protection. Similarly, long-term credit spreads are expected to revert back to current levels (narrow) and hence Banaji can sell protection in the long-term CDS. Buying protection only would cost more money (the protection buyer premium is not offset by premium income from selling protection) and does not use Banaji's entire information set and, therefore, is not most appropriate. (Module 38.2, LOS 38.c)

2. **A** credit spread on IDG bonds = yield – LIBOR = 6.5% – 2% = 4.5%  
upfront premium (paid by protection buyer)  $\approx$  (CDS spread – CDS coupon)  $\times$  duration  $\times$  notional principal  
 $= (0.045 - 0.05) \times 4 \times \$10\text{ million} = -\$200,000$

Because the computed value is negative, \$200,000 would be received by Banaji as the protection buyer. (Module 38.2, LOS 38.c)

3. **B** The CDS in the question is a senior CDS, hence the reference obligation is a senior unsecured bond. The payoff on the CDS is based on the CTD with same seniority as reference obligation. From the three choices given, the five-year 5% senior unsecured is the cheapest to deliver. Hence, the payoff will be notional principal – market value of the CTD = \$10 million – \$4 million = \$6 million.

Note that physical settlement would not be advantageous to Banaji; the bonds to be surrendered have a market value of \$4.5 million so the implied payoff would be only \$5.5 million (\$10 million – \$4.5 million). (Module 38.2, LOS 38.c)

4. **B** Hazard rate is the conditional probability of default given that default has not occurred in previous periods. The hazard rate affects the protection leg: the higher the hazard rate, the higher the expected value of payoffs made by the protection seller upon default. Hazard rate also affects the premium leg because once default occurs, the CDS ceases to exist and premium income would also cease. Loss given default depends on the recovery rate and not on hazard rate (probability of default). (Module 38.2, LOS 38.c)

5. **A** Due to leveraged recapitalization of Zeta Corp., it can be expected that the credit spread on Zeta bonds would widen leading to increased value for CDS protection buyer. Additionally, the increase in stock buyback would be expected to increase the value of Zeta stock. Banaji should purchase both the stock and CDS protection, both of which will increase in value when the LBO occurs. (Module 38.3, LOS 38.d)

6. **A** Credit spreads are positively related to hazard rates and loss given default, and negatively related to recovery rates. (Module 38.3, LOS 38.d)

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 39.1, 39.2

1. **C** The dividend in 65 days occurs after the contract has matured, so it's not relevant to computing the forward price.

$$\text{PVD} = \frac{\$0.30}{1.05^{20/365}} = \$0.2992$$

$$\text{FP} = (\$30.00 - \$0.2992) \times 1.05^{60/365} = \$29.94$$

(Module 39.2, LOS 39.b)

2. **B**

$$V(\text{long position}) = \$21.00 - \left[ \frac{\$29.94}{1.05^{23/365}} \right] = -\$8.85$$

$$V(\text{short position}) = +\$8.85$$

(Module 39.2, LOS 39.b)

3. **B** Use the dividend rate as a continuously compounded rate to get:

$$\text{FP} = 540 \times e^{(0.07 - 0.018) \times (200 / 365)} = 555.61$$

(Module 39.2, LOS 39.b)

4. **B** The value of the long position in a forward contract on a stock at time  $t$  is:

$$V_t(\text{long position}) = [S_t - PVD_t] - \left[ \frac{FP}{(1 + R_f)^{(T-t)}} \right]$$

If the dividends are ignored, the *long* position will be overvalued by the present value of the dividends; that means the *short* position (which is what the question asks for) will be undervalued by the same amount. (Module 39.2, LOS 39.b)

5. **A** The dividend in 125 days is irrelevant because it occurs after the forward contract matures.

$$\text{PVD} = \frac{\$0.50}{1.04^{35/365}} = \$0.4981$$

$$\text{FP} = (\$35 - \$0.4981) \times 1.04^{120/365} = \$34.95$$

$$V_{45}(\text{short position}) = -\left( \$27.50 - \frac{\$34.95}{1.04^{75/365}} \right) = \$7.17$$

(Module 39.2, LOS 39.b)

### Module Quiz 39.3

1. **B** Remember that U.S. Treasury bonds make semiannual coupon payments, so:

$$C = \frac{\$1,000 \times 0.06}{2} = \$30.00$$

$$PVC = \frac{\$30.00}{1.05^{98/365}} = \$29.61$$

The forward price of the contract is therefore:

$$\begin{aligned} FP \text{ (on a fixed income security)} \\ &= (S_0 - PVC) \times (1 + R_f)^T = (\$1,044 - \$29.61) \times (1.05)^{120/365} \\ &= \$1,030.79 \end{aligned}$$

(LOS 39.b)

### Module Quiz 39.4

1. C The actual (unannualized) rate on the 90-day loan is:

$$R_{90} = 0.05 \times \frac{90}{360} = 0.0125$$

The actual rate on the 150-day loan is:

$$R_{150} = 0.06 \times \frac{150}{360} = 0.025$$

The price of the  $3 \times 5$  FRA (the 60-day forward rate in 90 days) is:

$$\left( \frac{1.025}{1.0125} - 1 \right) \times \frac{360}{60} = 0.074 = 7.4\%$$

(LOS 39.b)

2. C A  $3 \times 6$  FRA expires in 90 days and is based on 90-day LIBOR, so it is the appropriate hedge for 90-day LIBOR 90 days from today. The rate is calculated as:

$$R_{90} = 0.047 \times \frac{90}{360} = 0.0118$$

$$R_{180} = 0.049 \times \frac{180}{360} = 0.0245$$

$$\text{price of } 3 \times 6 \text{ FRA} = \left( \frac{1.0245}{1.0118} - 1 \right) \times \frac{360}{90} = 0.0502 = 5.02\%$$

(LOS 39.b)

### Module Quiz 39.5, 39.6

- B** The U.K. company will be receiving euros in 60 days, so it should short the 60-day forward on the euro as a hedge. The no-arbitrage forward price is:

$$F_T = \text{£}0.923 \times \frac{1.03^{60/365}}{1.04^{60/365}} = 0.9215$$

(Module 39.6, LOS 39.b)

### Module Quiz 39.7

- C** The quarterly fixed rate on the swap is:

$$\frac{1 - 0.95057}{3.88060} = 0.0127 = 1.27\%$$

The fixed rate on the swap in annual terms is:

$$1.27\% \times \frac{360}{90} = 5.08\%$$

(LOS 39.d)

- A** Calculate the swap rate:

$$\text{semi-annual swap rate} = \frac{1 - 0.8772}{0.9756 + 0.9434 + 0.9112 + 0.8772} = 0.0331$$

$$\text{swap rate} = 0.0331 \times \frac{360}{180} = 0.0662 = 6.62\%$$

(LOS 39.d)

- A** Based on new rates,  $\Sigma DDF = 0.9780 + 0.9524 + 0.9174 = 2.8478$ .

$$\text{New SFR} = \frac{1 - 0.9174}{2.8478} \times \frac{360}{180} = 0.0580$$

$$\text{Value (Payer)} = \frac{(0.0580 - 0.0662)}{2} \times 2.8478 = -0.01166 \text{ per } \$1 \text{ notional}$$

Because the value is negative, payer makes the payment. (LOS 39.d)

### Module Quiz 39.8

- C** A receive-fixed C\$ position will hedge the liability risk. That party would receive \$1 million at swap inception (in exchange for  $\frac{1,000,000}{0.7} = \text{C\$}1,428,571$ ) and pay it back at termination. The fixed-rate received will be calculated using the yield curve in Canada at the initiation of the swap. Because this is a fixed-for-floating currency swap, the receive-fixed position will pay a floating rate based on the U.S. yield curve. (LOS 39.d)

2. A coupon on \$ fixed side =  $\$1,000,000 \times (0.042 / 4) = \$10,500$

$$\begin{aligned}\text{value of the \$ fixed side} &= (0.9923 \times \$10,500) + (0.9791 \times \$1,010,500) \\ &= \$999,800\end{aligned}$$

$$\text{coupon on € fixed side} = €800,000 \times (0.05 / 4) = €10,000$$

$$\begin{aligned}\text{value of € fixed side (in €)} &= (0.9900 \times €10,000) + (0.9736 \times €810,000) \\ &= €798,516\end{aligned}$$

$$\text{value of € fixed side (in \$)} = \frac{€798,516}{0.75} = \$1,064,688$$

$$\text{value of swap to bank} = \$999,800 - \$1,064,688 = -\$64,888$$

(LOS 39.d)

### Module Quiz 39.9

1. C The quarterly 4% fixed-rate payment in 60 days will be in the amount of:

$$\$5,000,000 \times (4\% / 4) = \$50,000$$

So the total cash flow at that time is  $\$50,000 + \$5,000,000 = \$5,050,000$ .

$$\text{value of fixed-rate side} = 0.9940 \times \$5,050,000 = \$5,019,700$$

$$\begin{aligned}\text{value of index return side} &= \$5,000,000 \times \frac{3,150}{3,000} \\ &= \$5,250,000\end{aligned}$$

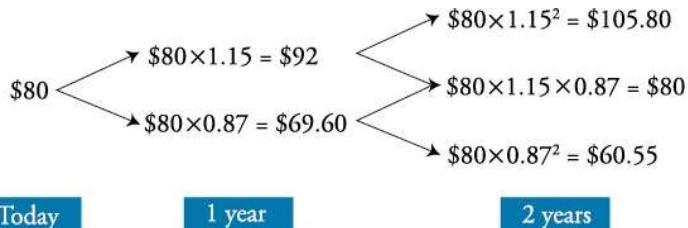
$$\text{value of swap to bank} = \$5,250,000 - \$5,019,700 = \$230,300$$

(LOS 39.d)

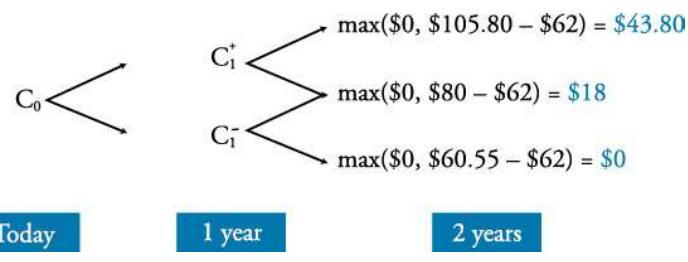
## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 40.1, 40.2

#### 1. B Stock Tree



#### Option Tree



$$U = 1.15$$

$$D = 0.87$$

$$\pi_U = \frac{1.04 - 0.87}{1.15 - 0.87} = 0.61$$

$$\pi_D = 1 - 0.61 = 0.39$$

$$C_2^{++} = \$43.80$$

$$C_2^{+-} = C_2^{-+} = \$18.00$$

$$C_2^{--} = \$0$$

$$C_1^+ = \frac{(0.61 \times \$43.80) + (0.39 \times \$18.00)}{1.04} = \$32.44$$

$$C_1^- = \frac{(0.61 \times \$18.00) + (0.39 \times \$0)}{1.04} = \$10.56$$

$$C_0 = \frac{(0.61 \times \$32.44) + (0.39 \times \$10.56)}{1.04} = \$22.99$$

(Module 40.2, LOS 40.b)

### Module Quiz 40.3

- B** In the upper node at the end of the first year, the European option is worth \$0.29, but the American option can be exercised and a profit of \$0.57 realized (the difference between the bond price of \$100.57 and the exercise price of \$100).

In the lower node at the end of the first year, the European option is worth \$1.35, but the American option can be exercised and a profit of \$3.80 realized (the

difference between the bond price of \$103.80 and the exercise price of \$100).

The value of the American option today is therefore:

$$\text{American option price} = \frac{(\$0.57 \times 0.5) + (\$3.80 \times 0.5)}{1.03} = \$2.12$$

(LOS 40.b)

### Module Quiz 40.4

1. **C** The hedge ratio in a one-period model is equivalent to a delta, the ratio of the call price change to the stock price change. We will sell the 1,000 calls because they are overpriced. Buying 350 shares of stock will produce a riskless hedge. The payoff at expiration will return more than the riskless rate on the net cost of the hedge portfolio. Borrowing to finance the hedge portfolio and earning a higher rate than the borrowing rate produces arbitrage profits. (LOS 40.c)
2. **A** A synthetic European put option is formed by:
  - Buying a European call option.
  - Short-selling the stock.
  - Buying (i.e., investing) the present value of the exercise price worth of a pure-discount riskless bond.

(LOS 40.c)

### Module Quiz 40.5, 40.6

1. **A** The dividend affects option values because if you own the option, you do not have access to the dividend. Hence, if the firm pays a dividend during the life of the option, this must be considered in the valuation formula. Dividends decrease the value of call options, all else equal, and they increase the value of put options. (Module 40.6, LOS 40.h)
2. **B** To derive the BSM model, we need to assume no arbitrage is possible and that:
  - Asset returns (price changes) follow a lognormal distribution.
  - The (continuous) risk-free rate is constant.
  - The volatility of the underlying asset is constant.
  - Markets are “frictionless.”
  - The asset has no cash flows.
  - The options are European (i.e., they can only be exercised at maturity).

(Module 40.6, LOS 40.f)

3. **A** According to put/call parity, the put's value is:

$$P_0 = C_0 - S_0 + \left( X \times e^{-R_f \times T} \right)$$

$$= \$4.09 - \$60.00 + \left[ \$60.00 \times e^{-(0.05 \times 1.0)} \right] = \$1.16$$

(Module 40.6, LOS 40.h)

4. **A** ABC and Chevron stock are identical in all respects except Chevron pays a dividend. Therefore, the call option on Chevron stock must be worth less than the call on ABC (i.e., less than \$4.09). \$3.51 is the only possible answer. (Module 40.6, LOS 40.h)

## Module Quiz 40.7

1. **A** The value of a call and the risk-free rate are positively related, so as the risk-free rate increases, the value of the call will increase. (LOS 40.k)
2. **A** Volatility increases will increase the values of both puts and calls. (LOS 40.k)
3. **A** Implied volatility is the volatility that produces market option prices from the BSM model. Its use for pricing options is limited because it is based on market prices. Past returns are used to calculate historical volatility. (LOS 40.n)
4. **C** The put option will decrease in value as the underlying stock price increases:  $-0.43 \times \$4 = -\$1.72$ . (LOS 40.k)
5. **A** The call option is deep in-the-money and must have a delta close to one. The put option is deep out-of-the-money and will have a delta close to zero. Therefore, the value of the in-the-money call will decrease by close to \$1 (e.g., \$0.94), and the value of the out-of-the-money put will increase by a much smaller amount (e.g., \$0.08). The call price will fall by more than the put price will increase. (LOS 40.k)
6. **C** The put option is currently at-the-money because its exercise price is equal to the stock price of \$45. As stock price increases, the put option's delta (which is less than zero) will increase toward zero, becoming less negative. The put option's gamma, which measures the rate of change in delta as the stock price changes, is at a maximum when the option is at-the-money. Therefore, as the option moves out-of-the-money, its gamma will fall. (LOS 40.k)
7. **A** If  $\Delta S = -\$1.00$ ,  $\Delta C \approx 0.42 \times (-1.00) = -\$0.42$ , and  $\Delta P \approx (0.42 - 1) \times (-1.00) = \$0.58$ , the call will decrease by less (\$0.42) than the increase in the price of the put (\$0.58). (LOS 40.k)

The following is a review of the Derivatives principles designed to address the learning outcome statements set forth by CFA Institute. Cross-Reference to CFA Institute Assigned Reading #41.

# READING 41: DERIVATIVE STRATEGIES

Study Session 14

## EXAM FOCUS

This topic review focuses on uses of derivatives in portfolio management, including hedging, changing risk profiles, and trading based on opinions about market conditions. Make sure to understand the risk and return profiles of each strategy. Also be able to compute key metrics such as maximum profit, maximum loss, and breakeven price for each strategy.

## MODULE 41.1: PORTFOLIO MANAGEMENT USING DERIVATIVES



Video covering this content is available online.

**LOS 41.a: Describe how interest rate, currency, and equity swaps, futures, and forwards can be used to modify portfolio risk and return.**

*CFA® Program Curriculum, Volume 5, page 448*

Swaps can be used by a portfolio manager to modify the risk and return of a portfolio.

### Interest Rate Swaps

Interest rate swaps can be used to modify the **duration** (i.e., interest rate risk) of a fixed-income portfolio. Recall that the value of an interest rate swap is equal to the difference in the value of two bonds.

value of a payer swap = value of a floating rate note – value of a fixed rate bond

Therefore, the duration of a payer swap can be calculated as the difference in duration of the two bonds.

duration of a payer swap = duration of floating rate note – duration of fixed rate bond

And similarly:

duration of a receiver swap = duration of fixed rate bond – duration of floating rate note

Because the duration of a fixed rate bond is greater than the duration of a floating rate note, the duration of a payer swap is negative. Similarly, the duration of a receiver swap is positive. A portfolio manager can increase (decrease) the duration of her portfolio by entering into a receiver (payer) swap.

### Interest Rate Futures

## ANSWER KEY FOR MODULE QUIZ

### Module Quiz 41.1, 41.2, 41.3, 41.4, 41.5

1. **C** The expectation is for long-term rates to rise, and the most appropriate strategy in that case is to reduce the duration of the portfolio. Of the choices provided, only a payer swap has a negative duration. We are also given that the relevant time horizon is one year and hence the swap maturity should be one year. A receiver swap and long position in bond futures would both *increase* the duration of the portfolio. (Module 41.1, LOS 41.a)
2. **A** Since the expectation is for an increase in the price of Adalpia stock, a long position in the stock (or a long call on the stock) would be desirable. A long call and short put can be used to synthetically create a long stock position. A long call and long put would also provide the upside (from the long call position) but is not ideal as the cost would be higher (a long put costs us a premium, while a short put offsets the cost of the long call). (Module 41.1, LOS 41.b)
3. **A** breakeven price on covered call =  $S_0 - C_0 = \$15 - \$1.90 = \$13.10$ . (Module 41.1, LOS 41.c)
4. **B** maximum loss on protective put =  $S_0 - X + P_0 = 15 - 16 + 1.98 = \$0.98$ . (Module 41.2, LOS 41.d)
5. **C** A protective put is analogous to an insurance policy and the put premium is similar to the policy premium. The premium cost acts as a drag on portfolio return. A protective put reduces downside risk and hence reduces return volatility. A protective put has no impact on stock price volatility. (Module 41.2, LOS 41.d)
6. **B** The question is asking for the *least* likely choice. From Figure 41.2, delta of Dec 15 call = +0.50; delta of Dec 15 put = -0.50.

position delta of covered call = delta of stock – delta of call option

$$= 1.0 - 0.50 = 0.50$$

position delta of protective put = delta of stock + delta of put option

$$= 1.0 + (-0.50) = 0.50$$

position delta of short forward on 50 (i.e., 50% of the shares)

$$= \text{delta of stock} - (0.5 \times \text{delta of the forward}) = 1.0 - 0.50 = 0.50$$

Dec 15/17 bull call spread entails buying the Dec 15 call and writing the Dec 17 call.

position delta of Dec 15/17 bull call spread

$$= \text{delta of Dec 15 call} - \text{delta of Dec 17 call} = 0.50 - 0.45 = 0.05$$

Out of the choices provided, only Dec 15/17 bull call spread does not have a delta of 0.50. (Module 41.3, LOS 41.h)

7. **C** The question is asking for the *least* likely choice. All spread strategies have limited upside. A long straddle has unlimited upside (because the long call in the straddle has unlimited upside). (Module 41.5, LOS 41.g)
8. **A** Based on the third observation in Figure 41.1, volatility is expected to increase. A long straddle would benefit the most from an increase in volatility (and a short straddle would lose most). The short option in a bull spread would limit the gain from an increase in volatility. (Module 41.3, LOS 41.g)
9. **A** maximum profit on bull call spread =  $X_H - X_L - C_{L0} + C_{H0}$ 
$$= 17 - 16 - 1.90 + 1.01$$
$$= \$0.11$$
 (Module 41.3, LOS 41.h)
10. **C** The question is asking for the *least* likely choice. A long calendar spread strategy is short the near-dated call and long the longer-dated call on the same stock with the same exercise price. Because the longer-dated call has a higher time value than the near-dated call, a long calendar spread results in an initial cash outflow. (Module 41.5, LOS 41.i)

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 42.1

1. **B** Of the three investment choices, REITs are the most liquid because the shares are actively traded. Also, REITs provide quick and easy diversification across many properties. Neither the direct investment nor the mortgage participation is liquid, and significant capital would be required to diversify the investments. (LOS 42.a)
2. **A** Residential real estate (i.e., an apartment building) purchased with the intent to produce income is usually considered commercial real estate property. Timberland and farmland are unique categories of real estate. (LOS 42.b)
3. **C** An all-cash transaction eliminates financial leverage and lowers risk. Inflation risk is typically lower with a real estate investment, but the risk is not totally eliminated. If interest rates rise, non-leveraged property values are still impacted. Investors require higher returns when rates rise. Resale prices also depend on the cost and availability of debt capital. (LOS 42.c)
4. **C** Demand for multi-family properties depends on population growth, especially in the age demographic that typically rents apartments. (LOS 42.d)
5. **C** Financial leverage magnifies the effect of changing NOI on cash flow because the interest expense owed to lenders is a fixed cost. The use of debt financing does not affect the value of property. Leverage increases (not decreases) risk. (LOS 42.l)

### Module Quiz 42.2

1. **B** The sales comparison approach is likely the best valuation approach because of the number of comparable transactions. The cost approach is not as appropriate because of the difficulty in estimating depreciation and obsolescence of an older property. The income approach is not appropriate because an owner-occupied property does not generate income. (LOS 42.e)
2. **B** The cap rate of the comparable transaction is 8% ( $200,000 \text{ NOI} / 2,500,000 \text{ sales price}$ ). The value of Royal Oaks is \$1,625,000 ( $130,000 \text{ NOI} / 8\% \text{ cap rate}$ ). (LOS 42.f)
3. **A** The terminal value at the end of five years is \$8,750,000 [ $700,000 \text{ year 6 payment} / (10\% \text{ discount rate} - 2\% \text{ growth rate})$ ]. The terminal value is discounted to present and added to the present value of the NOI during the holding period. You can combine both steps using the following keystrokes:  
 $N = 5; I/Y = 10; PMT = 600,000; FV = 8,750,000; CPT \rightarrow PV = \$7,707,534$   
(LOS 42.g)

4. **A** The capitalization rate is the discount rate (required rate of return on equity,  $r$ ) less the constant growth rate in net operating income,  $g$  (i.e., cap rate =  $r - g$ ). (LOS 42.f)

### Module Quiz 42.3, 42.4

1. **B**

Replacement cost	€3,750,000 [50,000 SF × €75 per SF]
Physical deterioration	(2,250,000) [3,750,000 × (12 eff age / 20 life)]
Economic obsolescence	(400,000)
Land value	<u>900,000</u>
Total value	€2,000,000

(Module 42.4, LOS 42.i)

### Module Quiz 42.5

1. **C** The public records should be searched for outstanding liens filed by contractors involved in the renovation. An existing lien can result in legal problems for the purchaser and the lender. A survey will not identify outstanding liens. A survey confirms the property boundaries and identifies any easements. (LOS 42.j)
2. **B** Appraisal-based indices tend to lag transaction-based indices because actual transactions occur before appraisals are performed (appraisals are based on transaction data). Appraisal-based indices, not transaction-based indices, appear to have lower correlations with other asset classes. (LOS 42.k)
3. **B** Using the DSCR, the property will support a debt service payment of \$125,000 ( $200,000 \text{ NOI} / 1.6$ ); thus, the loan amount would be \$1,250,000 ( $\$125,000 \text{ payment} / 10\% \text{ interest rate}$ ). However, using the LTV ratio, the property will only support a loan amount of \$1,200,000 ( $1,500,000 \text{ value} \times 80\% \text{ LTV}$ ). Thus, the maximum loan amount is \$1,200,000, which is the lower of the two amounts. (LOS 42.m)

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 43.1

1. **A** A commingled real estate fund (CREF) is an example of a private real estate investment, not a publicly traded security. The three principal types of publicly traded real estate securities available globally are real estate investment trusts (REITs), real estate operating companies (REOCs), and residential and commercial mortgage-backed securities (MBS). (LOS 43.a)
2. **C** REIT investors have no liability for the REITs in which they invest beyond the original amount invested. REITs and REOCs usually cannot pass on tax losses to their investors as deductions from taxable income. Because REIT prices and returns are determined by the stock market, the value of a REIT is more volatile than its appraised net asset value. (LOS 43.b)
3. **A** After growth in the GDP, the most important factor driving demand for hotel rooms is job creation, because business and leisure travel are closely tied to the size of the workforce. More important to the value of a storage REIT than retail sales growth is population growth. More important to the value of an office REIT than population growth is job creation. (LOS 43.c)
4. **C** When we compare REITs to other kinds of publicly traded shares, REITs offer above-average yields and stable income and returns. Due to their high income-to-payout ratios, REITs have relatively low potential to grow by reinvesting operating cash flows. (LOS 43.c)
5. **A** Most REITs in the United States are structured as UPREITs, not DOWNREITs. The other two statements are true: a DOWNREIT may own properties at both the REIT level and at the partnership level, and may form partnerships for each property acquisition it undertakes. (LOS 43.b)

### Module Quiz 43.2

1. **B** NAVPS is the difference between a REIT's assets and its liabilities, using current market values instead of accounting book values and dividing by the number of shares outstanding. NAVPS is a superior measure of the net worth of a REIT, compared to book value per share which is based on historical cost values. NAV is the largest component of the intrinsic value of a REIT; however, other factors, such as the value of non-asset-based income streams, the value added by management, and the value of any contingent liabilities, also contribute to intrinsic value. (LOS 43.e)

### Module Quiz 43.3

1. **B** To calculate AFFO, we begin with FFO and then deduct non-cash rent, maintenance-type capital expenditures, and leasing commissions. (LOS 43.f)

2. **B** FFO has some shortcomings, but because it is the most standardized method of measuring a REIT's earnings, P/FFO is the most commonly used multiple in analyzing REITs. AFFO is used as a convenient proxy for a "cash flow" multiple because AFFO is an approximation of cash earnings. Dividend discount models are appropriate methods for valuing REITs because REITs return a significant portion of their income to their investors and tend to be high-dividend payers. (LOS 43.g)
3. **A** The value per share for this REIT using net asset value valuation is computed as follows:

Estimated cash NOI	40
Assumed cap rate	<u>8%</u>
Estimated value of operating real estate (40 / .08)	500
Plus: cash + accounts receivable	50
Less: debt and other liabilities	<u>250</u>
Net asset value	300
Shares outstanding	10
NAV / share	\$30

The REIT share value using the net asset value approach is \$30. (LOS 43.h)

4. **B** The value per share for this REIT using price-to-FFO valuation is computed as follows:

Funds from operations (FFO)	\$30
Shares outstanding (millions)	10
FFO / share = \$30 million / 10 million shares	\$3

Applying the office subsector average P/FFO multiple of 12× yields a value per share of:

$$\$3 \times 12 = \$36$$

The REIT share value using the price-to-FFO approach is \$36. (LOS 43.h)

5. **A** The value per share for this REIT using a price-to-AFFO valuation is computed as follows:

Funds from operations (FFO)	\$30
Subtract: non-cash rents	\$5
Subtract: recurring maintenance-type capital expenditures	\$10
Equals: AFFO	\$15
Shares outstanding	10 million
AFFO / share = \$15 million / 10 million shares	\$1.50
Property subsector average P/AFFO multiple	20×

Applying the office subsector average P/AFFO multiple of 20× yields a value per share of  $\$1.50 \times 20 = \$30$ .

The REIT share value using the price-to-AFFO approach is \$30. (LOS 43.h)

6. **C** The value per share for this REIT using a discounted cash flow valuation is computed as follows:

	2014	2015	2016	2017
Dividends per share:	\$3.00	\$3.12	\$3.24	\$3.34

Present value in 2016 of dividends stream beginning in 2017 =  $\$3.34 / (0.11 - 0.03) = \$41.78$

Present value of all dividends, when discounted at a rate of 11%

$$\begin{aligned} &= PV_{2014 \text{ dividend}} + PV_{2015 \text{ dividend}} + PV_{2016 \text{ dividend}} + PV_{(\text{terminal value})} \\ &= \$3.00/(1.11) + \$3.12/(1.11)^2 + \$3.24/(1.11)^3 + \$41.78/(1.11)^3 \\ &= \$38.15 \end{aligned}$$

The REIT share value using the discounted cash flow approach is \$38.15. (LOS 43.h)

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 44.1

1. **B** It is actually the overutilization of cheap *debt* financing in private equity firms that leads to value creation. Private equity firms carry more debt than public firms but have a reputation for paying it back. (LOS 44.a)
2. **B** Earn-outs do not ensure portfolio company manager compensation. Earn-outs tie the acquisition price paid by private equity firms to the portfolio company's future performance. These are used predominantly in venture capital investments. (LOS 44.b)
3. **B** Venture capital investments typically have significant cash burn rates. Discounted cash flow analysis is typically used for companies with substantial operating history and is, therefore, more likely to be associated with a buyout investment rather than a venture capital investment. Full due diligence is conducted for a buyout investment. Due diligence for typical venture capital investment is limited to technological feasibility and commercial potential due to limited operating results history. (LOS 44.c)
4. **B** The pre-money valuation, investment, and potential subsequent equity dilution are issues for venture capital equity return. The key drivers of equity return for buyouts are earnings growth, the increase in multiple upon exit, and the reduction in the debt. (LOS 44.d)

### Module Quiz 44.2

1. **A** Initial public offerings usually result in the highest exit value due to increased liquidity, greater access to capital, and the potential to hire better-quality managers. (LOS 44.e)
2. **A** Competitive environment risk examines risk from the perspective of an investor who is considering an investment in private equity. It refers to the fact that the competition for finding reasonably priced private equity investments may be high. (LOS 44.g)
3. **C** Placement fees are those charged by placement agents who raise funds for private equity firms. They may charge up-front fees as much as 2% or annual trailer fees as a percent of funds raised from limited partners. (LOS 44.g)
4. **B** The most typical organizational structure of a private equity investment is a limited partnership. In a limited partnership, the limited partners provide funding and have limited liability. The general partner manages the investment fund. (LOS 44.f)
5. **A** The clause in the private equity prospectus that the general partner has likely violated is the co-investment clause. The co-investment clause prevents the GP

from using capital from different funds to invest in the same portfolio company. A conflict of interest arises here because portfolio Company A may be a poor use of the funds from Fund B investors. (LOS 44.f)

6. **A** Firm A likely has the best corporate governance system. A large amount of the GP's compensation comes in the form of incentive-based compensation as the carried interest and hurdle rate necessary to obtain carried interest is the highest, but the compensation unrelated to performance (the management and transactions fees are the lowest). The clawback provision also incentivizes the GP because they have to return previously received profits.

Furthermore, the key man clause and the removal for cause clause give the LPs the right to dismiss an underperforming GP. The total return distribution waterfall method is used instead of the deal-by-deal method, in which the GP can receive carried interest even in cases when the LPs have not earned a net positive return. (LOS 44.f)

7. **B** There is no straightforward method for calculating the value of the commitments, which are essentially liabilities for the LP. The value of the commitments depends on the cash flows generated from them, but these are quite uncertain. (LOS 44.f)

### Module Quiz 44.3

1. **B** The RVPI (residual value to paid-in capital) measures the limited partner's unrealized return in a private equity fund. It is the value of the LP's holdings in the fund divided by the cumulative invested capital. It is net of management fees and carried interest. The DPI (distributed to paid-in capital) measures the LP's realized return, and the TVPI (total value to paid-in capital) measures both the LP's realized and unrealized return. (LOS 44.i)
2. **C** This is the cumulative sum of the capital called down, and in 2016 is: \$135 + \$10 = \$145. (LOS 44.i)
3. **B** These are calculated as the percentage fee of 2% times the paid-in capital:  $2\% \times \$145 = \$2.9$ . (LOS 44.i)
4. **B** Carried interest is not paid until the NAV before distributions exceeds the committed capital of \$200 million, which is the year 2015. (LOS 44.i)
5. **B** NAV before distributions is calculated as:  
= NAV after distributions in prior year + capital called down – management fees + operating results

For 2016, NAV before distributions is:  $\$158.4 + \$10 - \$2.9 + \$120 = \$285.50$ . (LOS 44.i)

6. **B** It is calculated as the percentage carried interest times the increase in the NAV before distributions. In 2016, it is:  $20\% \times (\$285.50 - \$210.50) = \$15.00$ . (LOS 44.i)

7. **A** NAV after distributions is calculated as:

$$= \text{NAV before distributions} - \text{carried interest} - \text{distributions}$$

In 2016, NAV after distributions is:  $\$285.50 - \$15.00 - \$90 = \$180.50$ . (LOS 44.i)

8. **C** The DPI multiple is calculated as the cumulative distributions divided by the paid-in capital:  $(\$30 + \$50 + \$90) / \$145 = 1.17$ . The GP has distributed more than the paid-in capital. (LOS 44.i)
9. **A** The RVPI multiple is calculated as the NAV after distributions divided by the paid-in capital:  $(\$180.50) / \$145 = 1.24$ . The net unrealized returns are more than the paid-in capital. (LOS 44.i)
10. **B** The TVPI multiple is the sum of the DPI and RVPI:  $1.17 + 1.24 = 2.41$ . (LOS 44.i)

#### Module Quiz 44.4

1. **B** The post-money valuation is the present value of the expected exit value:

$$\text{POST} = \frac{50,000,000}{(1 + 0.45)^4} = 11,310,922$$

(Module 44.3, LOS 44.i)

2. **A** The pre-money valuation is what the company is worth before the investment:

$$\text{PRE} = 11,310,922 - 7,000,000 = 4,310,922$$

(Module 44.3, LOS 44.i)

3. **C** To put up \$7 million in a company worth \$11.3 million, the venture capital firm must own 61.89% of the company:

$$f = \frac{7,000,000}{11,310,922} = 61.89\%$$

(Module 44.4, LOS 44.j)

4. **B** If the entrepreneurs want 1 million shares, the venture capital firm must receive 1.6 million shares to get 61.89% ownership:

$$\text{Shares}_{\text{VC}} = 1,000,000 \left[ \frac{0.6189}{(1 - 0.6189)} \right] = 1,623,983$$

(Module 44.4, LOS 44.j)

5. **B** Given a \$7 million investment and 1.6 million shares, the stock price per share must be:

$$P = \frac{7,000,000}{1,623,983} = \$4.31 \text{ per share}$$

(Module 44.4, LOS 44.j)

6. **C** First, calculate the investor's expected future wealth (W):

$$W = 9,000,000 \times (1 + 0.35)^5 = 40,356,301$$

Given this expected wealth, we determine the required fractional ownership ( $f$ ) by calculating how much of the terminal value should be the investor's:

$$f = \frac{40,356,301}{70,000,000} = 57.65\%$$

(Module 44.4, LOS 44.j)

7. **B** First, determine the number of shares the venture capital firm (Shares<sub>VC</sub>) requires for its fractional ownership:

$$\text{Shares}_{\text{VC}} = 1,000,000 \left[ \frac{0.5765}{(1 - 0.5765)} \right] = 1,361,275$$

Next, determine the stock price per share (P):

$$P = \frac{9,000,000}{1,361,275} = \$6.61$$

(Module 44.4, LOS 44.j)

8. **B** Divide the investment by the fractional ownership to obtain the post-money (POST) valuation:

$$\text{POST} = \frac{9,000,000}{0.5765} = 15.61\text{million}$$

(Module 44.4, LOS 44.j)

9. **A** Determine the pre-money (PRE) valuation by netting the investment (INV) from the post-money (POST) valuation:

$$\text{PRE} = 15.61 \text{ million} - 9 \text{ million} = 6.61 \text{ million}$$

(Module 44.4, LOS 44.j)

## Module Quiz 44.5

1. **B** Discount the terminal value of the company at exit back to the time of second round financing to obtain the post-money (POST<sub>2</sub>) valuation:

$$\text{POST}_2 = \frac{60,000,000}{(1 + 0.5000)} = \$40,000,000$$

(LOS 44.j)

2. **C** First, calculate the second-round pre-money ( $\text{PRE}_2$ ) valuation by netting the second-round investment ( $\text{INV}_2$ ) from the post-money ( $\text{POST}_2$ ) valuation:

$$\text{PRE}_2 = 40,000,000 - 3,000,000 = \$37,000,000$$

Next, discount the second-round pre-money valuation back to the time of the first-round financing to obtain the post-money ( $\text{POST}_1$ ) valuation:

$$\text{POST}_1 = \frac{37,000,000}{(1 + 0.50)^3} = \$10,962,963$$

(LOS 44.j)

3. **B** The required fractional ownership for the second-round investors is:

$$f_2 = \frac{3,000,000}{40,000,000} = 7.50\%$$

(LOS 44.j)

4. **A** The required fractional ownership for the first-round investors is:

$$f_1 = \frac{6,000,000}{10,962,963} = 54.73\%$$

The first round investors will be later diluted by the second round investors to an ownership of:  $54.73\% \times (1 - 0.0750) = 50.63\%$ .

(LOS 44.j)

5. **A** First determine the number of shares the first-round venture capital investors ( $\text{Shares}_{VC1}$ ) need to obtain their fractional ownership:

$$\text{Share}_{VC1} = 1,000,000 \left[ \frac{0.5473}{(1 - 0.5473)} \right] = 1,208,968$$

To obtain a 54.73% share of the company, the first-round investors must receive 1,208,968 shares.

Next, determine the stock price per share after the first round of financing ( $P_1$ ):

$$P_1 = \frac{6,000,000}{1,208,968} = \$4.96$$

(LOS 44.j)

6. **B** First determine the number of shares the second-round venture capital investors (SharesVC2) need to obtain their fractional ownership:

$$\begin{aligned} \text{Shares}_{\text{VC2}} \\ = (1,000,000 + 1,208,968) \left[ \frac{0.0750}{(1 - 0.0750)} \right] = 179,106 \end{aligned}$$

To obtain a 7.50% share of the company, the second-round investors must receive 179,106 shares.

Next, determine the stock price per share after the second round of financing (P2):

$$P_2 = \frac{3,000,000}{179,106} = \$16.75$$

(LOS 44.j)

7. **B** The discount rate that factors in the company's probability of failure is calculated as:

$$r^* = \frac{1+r}{1-q} - 1$$

$$r^* = \frac{1+0.30}{1-0.20} - 1 = 62.5\%$$

(LOS 44.k)

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 45.1

1. **B** Precious metals mining and smelting are less susceptible to changing weather. Weather is an important factor in grain production with both droughts and flooding affecting crop yields. Oil refineries are concentrated in coastal areas where hurricanes and other extreme weather cause periodic refinery shutdowns. (LOS 45.a)
2. **B** Coffee has a long production cycle but is grown at warm latitudes and harvested throughout the year. Livestock production is strongly influenced by seasonality. Natural gas demand has a seasonal component due to its uses for heating and electricity generation for cooling. (LOS 45.b)
3. **A** While a commodity or a nondividend-paying equity security can be valued in terms of the present value of its future sale price, a commodity may have holding costs, such as storage, that can result in a forward price that is higher than the spot price. (LOS 45.c)
4. **C** Arbitrageurs may store a physical inventory of a commodity to exploit differences between spot and futures prices relative to the costs of storing the commodity. (LOS 45.d)
5. **A** In backwardation, longer-dated futures contracts are priced lower than shorter-dated contracts or spot prices, resulting in positive basis and calendar spreads. (LOS 45.e)
6. **A** According to Insurance Theory, backwardation is normal because futures contract buyers should earn a positive return for protecting commodity producers (short hedgers) from price risk. The Hedging Pressure Hypothesis and the Theory of Storage can explain either backwardation or contango. (LOS 45.f)

### Module Quiz 45.2

1. **C** The price return is zero because the spot price is unchanged over the life of the position. The roll return is positive because the market is in backwardation. Therefore the total return (price return + roll return + collateral return) is greater than the collateral return. (LOS 45.g)
2. **B** In a total return swap, the variable payment is based on the price of a commodity. In an excess return swap, the variable payment is based on the amount by which a commodity price is greater than a benchmark, and the payment is zero if the price is less than the benchmark. The variable payment of a basis swap depends on the difference between two commodity prices. (LOS 45.i)

## TOPIC ASSESSMENT: ALTERNATIVE INVESTMENTS

You have now finished the Alternative Investments topic section. The following topic assessment will provide immediate feedback on how effective your study of this material has been. The test is best taken timed; allow 3 minutes per subquestion (18 minutes per item set). This topic assessment is more exam-like than typical module quizzes or QBank questions. A score less than 70% suggests that additional review of this topic is needed.

### Use the following information for Questions 1 through 6.

Eva Williams is an investment manager for Straughn Capital Management (SCM). Williams believes that it would be beneficial to add some alternative investments to SCM's existing portfolio. She has asked Steven Riley, an analyst with the firm, to present some investment ideas to her. Riley is not certain which type of alternative investment might be most suitable for SCM, so he has prepared information regarding three different types of investments. The first investment is a hedge fund. The second investment is an office building in the downtown district of a major city. The third investment is a venture capital fund.

While describing each of the properties, Riley makes the following observations:

*Observation 1:* Commodity investments, such as an investment in precious metals, are a good inflation hedge. Commodities as an asset class are receiving a lot of attention from hedge funds.

*Observation 2:* The value of an office building is heavily influenced by its location. Demand for office space is positively correlated with job growth. Also, the average length of lease terms varies globally. Furthermore, leases can be gross or net leases. In a net lease, the owner is responsible for the operating expense of a real estate property.

*Observation 3:* Similar to hedge funds, venture capital funds tend to be very illiquid. In evaluating venture capital funds, one needs to be careful about the economic terms. For example, the ratchet arrangement specifies the allocation of equity between the general partner and limited partners of the fund. Additionally, carried interest specifies the general partner's share of the fund profits. One should also consider the general partner's ability to raise capital as indicated by the difference between target fund size and funds actually raised.

Riley also provides information for the office building. The building under consideration is 200,000 square feet and has several structural issues that cannot be repaired. The effective age of the building is 12 years. The economic life of the building is 50 years. The elevators in the property need to be replaced at a cost of \$1,200,000, but this replacement will increase the value of the building by \$1,400,000. The design of the building is inferior to that of newer buildings and hence the rental income is lower by \$375,000 per year. Cost of new construction including builder profit is \$400 per square foot and the value of the land is estimated at \$6,000,000. The applicable cap rate is 7.5%.

Finally, Riley provides information on a specific venture capital deal under consideration by Greenleaf Partners, a venture capital fund. Greenleaf is considering

investing \$2 million in a startup that is expected to be worth \$40 million in seven years. Greenleaf considers 30% an appropriate rate of return given the risk of this investment.

1. Compared to an investment in REOCs, one disadvantage of investing in REITs is:
  - A. limited potential for income growth.
  - B. greater taxation.
  - C. lack of control.
2. Hedge fund managers who believe in the Insurance Theory are *most likely* to take what kind of positions in commodity futures contracts?
  - A. Long only.
  - B. Short only.
  - C. Long or short positions.
3. With respect to observation 2, Riley's assertions regarding office buildings, which statement would be *least accurate*? The statement about:
  - A. the length of the lease.
  - B. correlation with job growth.
  - C. net lease characteristics.
4. With respect to observation 3, Riley's assertions regarding venture capital funds, which statement is *least accurate*? The statement about:
  - A. the liquidity of venture capital funds.
  - B. ratchet.
  - C. the general partner's ability to raise capital.
5. Using the cost approach, the value of the office building is *closest* to:
  - A. \$54 million.
  - B. \$55 million.
  - C. \$61 million.
6. Based on the information provided, the maximum fractional equity ownership allocated to the founders after Greenleaf's \$2 million investment is *closest* to:
  - A. 30%.
  - B. 46%.
  - C. 69%.

## TOPIC ASSESSMENT ANSWERS: ALTERNATIVE INVESTMENTS

1. **A** Due to high dividend payout (and low retention rates), REITs have limited potential for income growth. Exemption from taxation is an advantage that REITs enjoy compared to REOCs. Investors in both REITs and REOCs suffer from lack of control. (Study Session 15, Module 43.1, LOS 43.b)
2. **A** The Insurance Theory holds that commodity producers will hedge their commodity price risk. Under the Insurance Theory, the cost of this risk reduction is a premium paid to speculators to entice them to take the long position in futures contracts. Consequently, futures prices should be less than expected spot prices, and a long-only position should result in positive excess returns. (Study Session 15, Module 45.1, LOS 45.f)
3. **C** Net lease entails that the tenant (and not the owner) incurs the operating expense for the property. (Study Session 15, Module 43.1, LOS 43.d)
4. **B** Ratchet determines the allocation of equity between management of the investee company and the stockholders and not the allocation between the general and limited partners of the private equity fund. (Study Session 15, Module 44.2, LOS 44.f)
5. **C**

Replacement cost (200,000 sq. ft. @ \$400)	\$80 million
(-) Curable depreciation [elevators]	<u>\$1.2 million</u>
Replacement cost after curable dep.	\$78.8 million
(-) Incurable physical deterioration [structural issues]	\$18.9 million
(12 / 50 × 78.8 million)	
(-) Incurable functional obsolescence (design)	\$5 million
(375,000 lower rent/0.075 cap rate)	
(+) Market value of land	<u>\$6 million</u>
(=) Value of property	\$60.9 million

(Study Session 15, Module 42.4, LOS 42.i)

6. **C** POST =  $6.375$  (PV of \$40 million in 7 years @ 30%)  
Greenleaf's fractional equity ownership =  $2 / 6.375 = 31.37\%$ .

Maximum equity allocated to founders =  $100 - 31.37 = 68.63\%$ .

(Study Session 15, Module 44.4, LOS 44.j)

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 46.1

1. **C** Smith states that she needs \$250,000 annually to maintain her standard of living. This amount of annual expenditures represents 5% ( $\$250,000 / \$5,000,000$ ) of the current portfolio. Accounting for an expected increase in expenses at the anticipated level of inflation indicates a return objective around 7%. (LOS 46.e)
2. **B** Although her stated willingness to take risk is below average, the size of her portfolio, her good health, and relative long time horizon indicate an ability to take average risk. As a retiree, sensitivity to substantial declines in portfolio value is probably a concern. (LOS 46.d)
3. **C** Barring any unexpected health-related costs, the inflation-adjusted income needed will probably not change dramatically. Smith's concern for liquidity primarily relates to unusual cash outflows (e.g., health care costs, emergency spending) that might take place during her retirement years and hence, she has no significant liquidity constraints. Smith has essentially a long-term time horizon for her portfolio: until the end of her life, which could be another 20 years. (LOS 46.d)
4. **C** Farmingham appears to have the ability and willingness to take risk. He frequently enjoys risk-seeking activities, such as skydiving. His relatively young age indicates a somewhat long time horizon for his investment portfolio. These facts couple ability and willingness to take an above-average level of risk. (LOS 46.e)
5. **A** Farmingham indicates that he follows the financial press and has spotted what he considered to be undervalued securities. This activity indicates that Farmingham pays attention to security valuation issues and that he probably will do so in the future. His portfolio, therefore, should follow an active investment strategy. (LOS 46.d)
6. **A** The statement of "20% standard deviation in any given year" is an absolute risk measure because it quantitatively states a specified level of total risk not to be exceeded. Conversely, the statement "performance differences from the Wilshire 5000 of more than 5% over any 3-year period" is a relative risk measure. Comparing measures of portfolio risk to another investment vehicle is an indication of relative risk.  
Institutional investors tend to be more quantitative in their assessments of risk, but the statement that the fund "is relatively conservative in its investment approach" also specifies a qualitative component to the risk objective. (LOS 46.e)
7. **A** Because of their long time horizon and their situational profile, the Elams have the ability to tolerate an above-average level of risk. Based on the interview with William, the Elams have stated a willingness to tolerate an above-average level of

risk. Therefore, the portfolio can be constructed based on an above-average level of risk.

Based upon their lack of investing experience and rather aggressive attitude toward portfolio risk management, however, the financial services professional should be certain that the Elam's have a clear understanding of the concepts of risk and return. (LOS 46.e)

8. **B** The Elams' time horizon is long term and is comprised of at least two stages: the time until retirement and their retirement years. It is possible that a third time horizon could develop should the Elams decide to support their children through post-secondary education. Should they decide to retire at age 60, their pre-retirement time horizon would be 30 years. (LOS 46.f)
9. **C** The main liquidity constraint presented in the case is immediate and significant (the \$60,000 in credit card debt). Schneider should recommend that the Elams eliminate this liability with the inheritance funds immediately. No special legal or regulatory problems are apparent. Prudent investor rules apply if William is interested in creating a trust fund. (LOS 46.e)

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 47.1

1. **C** The assumptions of APT include (1) unsystematic risk can be diversified away in a portfolio, (2) returns can be explained by a factor model, and (3) no arbitrage opportunities exist. However, arbitrage does not cause the risk premium for systematic risk to be zero. (LOS 47.a)
2. **C** An arbitrage portfolio comprises long and short positions such that the net return is positive yet the net factor sensitivity is zero. In this question, the low expected return of portfolio C per unit of factor sensitivity indicates that portfolio C should be shorted. Suppose that we arbitrarily assign portfolio C a 100% short weighting and, furthermore, we assign a weighting of  $w$  to portfolio A and a weighting of  $(1 - w)$  to portfolio B. Because the weighted sum of long and short factor sensitivities must be equal, we develop the following equation:  $w \times 1.20 + (1 - w) \times 2.00 = 1.00 \times 1.76$ . Solving algebraically for  $w$  gives a 30% long weight on portfolio A, a 70% long weight on portfolio B, and a 100% short weight on portfolio C. The factor sensitivity of this portfolio will be  $(0.3)(1.20) + (0.7)(2.0) - (1)(1.76) = 0$ . The expected return on this zero risk, zero investment portfolio will be  $(0.3)(10) + (0.7)(20) - (1)(13) = 4\%$ . (LOS 47.b)
3. **B** Using the two-factor APT model, the expected return for stock A equals:  
$$E(R_{IF}) = 0.05 + (0.88) \times (0.03) + (1.10) \times (0.01) = 0.0874 = 8.74\%$$
  
(LOS 47.c)

### Module Quiz 47.2

1. **A** The two-factor model for AG is  $R_{AG} = 0.10 + 2(-0.02) - 0.50(0.02) - 0.04 = 0.01 = 1\%$   
The AG return was less than originally expected because AG was hurt by lower-than-expected economic growth (GDP), higher-than-expected inflation, and a negative company-specific surprise event. (LOS 47.d)

### Module Quiz 47.3

1. **B** Style (e.g., value versus growth) can be evaluated based on company-specific fundamental variables such as P/E or P/B ratio. Size is generally proxied by market capitalization. A fundamental factor model is appropriate when the underlying variables are company-specific. (LOS 47.f)
2. **B** A *tracking portfolio* is a portfolio with a specific set of factor sensitivities. Tracking portfolios are often designed to replicate the factor exposures of a benchmark index like the S&P 500—in fact, a factor portfolio is just a special case of a tracking portfolio. One use of tracking portfolios is to attempt to

outperform the S&P 500 by using the same factor exposures as the S&P 500 but with a different set of securities than the S&P 500. (LOS 47.f)

3. **A** A *factor portfolio* is a portfolio with a factor sensitivity of 1 to a particular factor and zero to all other factors. It represents a *pure bet* on that factor. For example, a portfolio manager who believes GDP growth will be greater than expected, but has no view of future interest rates and wants to hedge away the interest rate risk in her portfolio, could create a *factor portfolio* that is only exposed to the GDP factor and not exposed to the interest rate factor. (LOS 47.f)
4. **C** A tracking portfolio is deliberately constructed to have the same set of factor exposures to match (track) a predetermined benchmark. The strategy involved in constructing a tracking portfolio is usually an active bet on asset selection (the manager claims to beat the S&P 500). The manager constructs the portfolio to have the same factor exposures as the benchmark, but then selects superior securities (subject to the factor sensitivities constraint), thus outperforming the benchmark without taking on more systematic risk than the benchmark. Therefore, a tracking portfolio, with active asset selection but with factor sensitivities that match those of the benchmark, will have little or no active factor risk, but will have high active specific risk. (LOS 47.f)
5. **B** Multifactor models enable investors to zero in on risks that the investor has a comparative advantage in bearing and avoid the risks that the investor is unable to take on. Multifactor models are preferred over single factor models like CAPM in cases where the underlying asset returns are better described by multifactor models. Allocation of an investor's portfolio between the market portfolio and the risk-free asset is part of CAPM, not multifactor models. (LOS 47.g)

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 48.1

1. **C** Weekly 5% VaR of £1 million indicates that there is a 5% probability that a loss during any given week will be greater than £1 million. (LOS 48.a)
2. **C** Monte Carlo simulation uses estimated statistical properties for each of its risk factors. The parametric method and historical simulation both use a lookback period. (LOS 48.b)
3. **C** % VaR =  $0.065 - 1.65(0.09) = -0.0835$   
\$ VaR =  $(0.0835) \times (\$6,400,000) = \$534,400$   
(LOS 48.c)

### Module Quiz 48.2

1. **A** Because VaR focuses on negative (left-tail) outcomes, it does not provide a complete view of the trade-off between risk and return. Advantages of VaR include its acceptance by global banking regulators and its usefulness in comparing risk across different asset classes. (LOS 48.d)
2. **B** Conditional VaR is the expected amount of a loss, given that it is equal to or greater than the VaR. Marginal VaR is the slope of a curve of VaR as a function of a security's weight in a portfolio. Incremental VaR is the change in VaR resulting from changing the portfolio weight of a security. (LOS 48.e)
3. **B** Vega is a measure of the sensitivity of an option value to changes in volatility of the underlying asset price. (LOS 48.f)

### Module Quiz 48.3, 48.4

1. **A** Active share is the difference between the weight of a security in an asset manager's portfolio and its weight in a benchmark index. Maximum drawdown is a risk measure often used by hedge funds. Surplus at risk is a risk measure used by defined benefit pension plans. (Module 48.4, LOS 48.j)
2. **B** Pension fund managers are concerned with any mismatch between assets and liabilities as well as with the volatility of the surplus (assets minus liabilities). (Module 48.4, LOS 48.j)

### Module Quiz 48.5

1. **A** Limiting the allocation to an asset class is an example of a position limit. (LOS 48.k)

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 49.1

1. **C** If the real risk-free rate had increased or expected inflation had been higher, the discount rate would have been higher and would have lowered both Carrier's stock price and industry index. Given the divergence between Carrier's stock price and the industry index, a higher risk premium for Carrier's stock is the only valid reason from the choices provided. (LOS 49.a)
2. **B** Market prices embed current expectations. If the market reaction to earnings growth of 12% was negative, it would mean that the market prices were based on a higher earnings growth rate expectation. (LOS 49.b)
3. **A** A higher GDP growth rate would mean higher incomes in the future. Due to the principle of diminishing marginal utility, the utility of future consumption would, therefore, be lower. Lower future utility relative to the utility of current consumption lowers the inter-temporal rate of substitution. (LOS 49.c)
4. **B** BEI = expected inflation + risk premium for uncertainty in inflation. (LOS 49.e)
5. **C** An economy just getting out of recession is more likely to have low short-term rates, as the central bank policy rate would be low. Higher future GDP growth prospects would mean higher real rates and higher expected inflation over the longer term, so long-term rates would be high, leading to an upward sloping yield curve. (LOS 49.d)
6. **B** Yield on risky corporate debt = real risk-free rate + expected inflation + risk premium for inflation uncertainty + credit spread. 2.50% = risk premium for inflation uncertainty + credit spread. Given that the bond is long term, the risk premium for inflation uncertainty must be positive and credit spread must be less than 2.50%. (LOS 49.f)

### Module Quiz 49.2

1. **A** Credit spreads on consumer cyclical issuers widen during economic downturns and narrow during economic expansions. (LOS 49.g)
2. **B** Earnings of consumer staples companies tend to be relatively stable over the entire business cycle. (LOS 49.h)
3. **B** Stocks in general tend to perform well during economic expansions and, therefore, pay off during good economic times. The property of performing poorly during bad economic times implies that equities are a poor consumption hedge. Because they are a poor consumption hedge, investors demand a positive risk premium for investing in equities. (LOS 49.i)

4. **C** Price multiples tend to expand during economic expansions, suggesting that the equity risk premium declines during expansions. This is because investors become less risk averse during economic expansions and demand a lower premium for taking risk. (LOS 49.j)
5. **A** Growth stocks tend to have a low dividend yields, high price multiples, and high expected earnings growth rates. (LOS 49.k)
6. **A** Two risk premia that are unique to real estate as an asset class are the risk premium for illiquidity and the risk premium for uncertainty in terminal value (similar to the equity risk premium). (LOS 49.m)

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 49.1

1. **C** If the real risk-free rate had increased or expected inflation had been higher, the discount rate would have been higher and would have lowered both Carrier's stock price and industry index. Given the divergence between Carrier's stock price and the industry index, a higher risk premium for Carrier's stock is the only valid reason from the choices provided. (LOS 49.a)
2. **B** Market prices embed current expectations. If the market reaction to earnings growth of 12% was negative, it would mean that the market prices were based on a higher earnings growth rate expectation. (LOS 49.b)
3. **A** A higher GDP growth rate would mean higher incomes in the future. Due to the principle of diminishing marginal utility, the utility of future consumption would, therefore, be lower. Lower future utility relative to the utility of current consumption lowers the inter-temporal rate of substitution. (LOS 49.c)
4. **B** BEI = expected inflation + risk premium for uncertainty in inflation. (LOS 49.e)
5. **C** An economy just getting out of recession is more likely to have low short-term rates, as the central bank policy rate would be low. Higher future GDP growth prospects would mean higher real rates and higher expected inflation over the longer term, so long-term rates would be high, leading to an upward sloping yield curve. (LOS 49.d)
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### Module Quiz 49.2

1. **A** Credit spreads on consumer cyclical issuers widen during economic downturns and narrow during economic expansions. (LOS 49.g)
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6. **A** Two risk premia that are unique to real estate as an asset class are the risk premium for illiquidity and the risk premium for uncertainty in terminal value (similar to the equity risk premium). (LOS 49.m)

## ANSWER KEY FOR MODULE QUIZZES

### Module Quiz 51.1

1. **C** Algorithmic trading simply refers to using a computer to automate trading strategies. Generally, trading algorithms analyze the same information and make the same decisions as a human trader, but in a much shorter period of time. Some trading algorithms operate almost completely autonomously of a human; however, others trade on behalf of a trader. (LOS 51.a)
2. **A** Execution algorithms break down large orders into several smaller orders in order to lessen the market impact. High-frequency trading algorithms continuously monitor market data in search of patterns that can be traded profitably. (LOS 51.b)
3. **C** High-frequency trading algorithms continuously monitor market data in search of profitable trade opportunities. Execution algorithms break down large orders into several smaller orders in order to lessen the market impact of the order. (LOS 51.b)
4. **B** Implementation shortfall algorithms dynamically adjust the trade schedule in reaction to market conditions in order to minimize the difference between the decision price and the final execution price. An implementation shortfall algorithm attempts to balance the negative impact of executing an order too quickly against the market drift that will occur when an order takes too long to execute. VWAP algorithms divide an order into slices proportional to historical daily trading volume. Market participation algorithms cut an order into slices that are used throughout the execution period to participate with volume on a pro rata basis. (LOS 51.c)
5. **C** Market fragmentation refers to a situation where the same financial security is traded in multiple markets. Algorithms can mitigate the problem of market fragmentation through the use of intelligent smart order routing capabilities, and by liquidity aggregation capabilities. Liquidity aggregation means compiling a comprehensive record of a security's availability in the various global markets in which it trades. Smart order routing means dynamically sending each order to a market based on price and quantity. (LOS 51.d)
6. **C** Wash trading refers to an individual or firm repeatedly buying and selling the same security to make it appear that there is more trading volume in that security than there actually is. Front running is when a trader learns of a large order that a firm is planning to place, and the trader trades ahead of the firm in order to benefit from the market movement that the large trade causes. "Painting the tape" is when a trader makes small trades in one direction to move the market price, and then a larger trade in the other direction in order to benefit from the altered price. (LOS 51.e)

7. **C** Research has shown that high-frequency trading has resulted in tighter (rather than wider) bid–ask spreads. In fact, algorithmic trading has been found to have had a positive impact on markets overall. Other benefits attributed to high-frequency trading are increased liquidity, lower transaction costs, and more efficient pricing. Two of the major concerns that have been raised regarding high-frequency trading are increased difficulty of implementing regulatory oversight and the potential impact of unequal access to information. Other possible downsides of high-frequency trading include algorithms' potential for magnifying market swings, the possibility of algorithms going out-of-control, and the ability of traders to manipulate markets through fictitious orders. (LOS 51.f)