2021 年 05 月 CFA 二级百题预测

1. Ethics

1.1. Key Points

1.2. Key Practice

Case 1: Sobhani（考点：Code and standards）

1. Solution: C.

The information disclosed about the exams by either Sobhani or Miyagawa is not confidential CFA Program information, so they are not in violation of Standard VII. Sobhani's information was based upon his analysis of the readings and is his opinion, and Miyagawa referenced the practice exam, which does not reflect content in the actual CFA exam.

2. Solution: C.

The market environment forecast is stated as an opinion, not fact, and as such is not a violation of Standard V (B)-Communication with Clients and Prospective Clients. But, Sobhani's asset allocation recommendation, a 60% equity allocation is risky and does not relate to the long-term objectives and circumstances of Poundston, so, is in violation of Standard III(C)-Suitability. A high equity allocation for a sick and elderly client who plans to retire soon is not a suitable recommendation, especially to a client who is risk averse and seeking preservation of capital. Finally, Sobhani has violated Standard V (A)-Diligence and Reasonable Basis because his recommendation that Poundston invest a large percentage of her assets in equities in an already highly priced market does not appear to be based on any evidence or analysis.

3. Solution: A.

Standard IV(C)-Responsibilities of Supervisors has been violated. As to it requires members and candidates with supervisory responsibility to understand what constitutes an adequate compliance system for their firms and to make reasonable efforts to see that appropriate compliance procedures are established, documented, communicated to covered personnel, and followed. "Adequate" procedures are those designed to meet industry standards, regulatory requirements, the requirements of the Code and Standards, and the circumstances of the firm. Once compliance procedures are established, the supervisor must also make reasonable efforts to ensure that the procedures are monitored and enforced. By not updating his compliance policies and procedures since founding his company, Sobhani has violated this standard.

4. Solution: A.

Sobhani has only stated historical returns for these types of investments based on research of other similar investments. In addition, he has not promised a specific return. Thus, Sobhani is not

in violation of Standard III(D)-Performance Presentation. But Sobhani is in violation of Standard III (A)-Loyalty, Prudence, and Care because he is required to identify the actual client, which in this case would be Purce and the trust beneficiaries, the twins. From the information provided, there is no evidence that Sobhani knows or has considered the twin's investment objectives and constraints and thus is also in violation of Standard III(C)-Suitability.

5. Solution: B.

Standard VI(C)-Referral Fees requires Members and Candidates to disclose to their employer, clients, and prospective clients, as appropriate, any compensation, consideration, or benefit received from or paid to others for the recommendation of products or services before entry into any formal agreement for services. In this case, Sobhani advises clients of the referral fee arrangement after the fact, thus violating Standard VI(C).

6. Solution: C.

Sobhani has not violated Standard VI(A)-Disclosure of Conflicts because disclosure of his relationship with Wilder is not required because it would not impair Sobhani's independence and objectivity nor interfere with his respective duties to clients.

But, by not following local law and reporting his cousin's malfeasance, Sobhani violated Standard I(A)-Knowledge of the Law and as a result also violated Standard I(D)-Misconduct because his actions reflect adversely on his professional reputation and integrity.

Case 2: Kostecka（考点：Code and standards）

1. Solution: B.

The account should be managed according to the client's investment goal of capital preservation and a low risk tolerance. Under Standard III (A) Loyalty, Prudence, and Care, the first step for members and candidates in fulfilling their duty of loyalty to clients is to determine the identity of the "client" to whom the duty of loyalty is owed. Only when the daughter is granted legal responsibility over her father's affairs by the court does she become the client.

2. Solution: A.

Kostecka has not violated Standard III (A) Loyalty, Prudence, and Care as he has put his client's interests first. However, by not dissociating himself from the illegally embezzled funds, Kostecka has violated Standard I Knowledge of the Law. By managing these funds, Kostecka benefits directly via management fees and could be associating him with suspicious financial transactions and potentially violating anti money laundering regulations. In addition, by not dissociating himself from the embezzled funds, Kostecka has also placed his firm in a position where it may suffer reputational harm so has violated Standard IV (A) Duties to Employers (Loyalty).

3. Solution: B.

Kostecka's board service creates the opportunity to receive material nonpublic information involving Jabbertalk and is a basic conflict of interest.

As a result, according to Standard VI (A) Conflicts of Interest, the directorship should be disclosed. Members and candidates must make full and fair disclosure of all matters that could reasonably be expected to impair their independence and objectivity or interfere with respective duties to their clients, prospective clients, and their employer. Because the member has not made any disclosure concerning his board membership, he is in violation of Standard VI (A).

Kostecka has also ignored his client's mandate of low risk tolerance and capital preservation and is in violation of Standard III (C) Suitability. In addition, Nathoo has violated her fiduciary duty as a "trustee" of the account as she failed to manage her fathers' portfolio in accordance with his wishes.

4. Solution: C.

Standard III (B) Fair Dealing requires members and candidates to deal fairly and objectively with all clients when providing investment analysis, making investment recommendations, taking investment action, or engaging in other professional activities. When Kostecka informs clients of the upcoming investment recommendation by Forkson, he has treated all clients fairly because

this disclosure is provided to all of his current clients.

5. Solution: B.

Statements overstating the competency of an individual or imply, either directly or indirectly, that superior performance can be expected from someone with the CFA designation are not allowed under Standard VII (B) Reference to CFA Institute, the CFA Designation, and the CFA Program. The Standard specifically states when referring to the CFA Institute, CFA Institute membership, the CFA designation, or candidacy in the CFA Program, members and candidates must not misrepresent or exaggerate the meaning or implications of membership in the CFA Institute, holding the CFA designation, or candidacy in the CFA Program.

6. Solution: A.

Kostecka's performance presentation of his firm's composite performance is in compliance with Standard III (D) Performance Presentation.

Case 3: KingFisher（考点：Code and standards）

1. Solution: A.

It is a violation of Standard VII (B): Reference to CFA Institute, the CFA Designation, and the CFA Program to imply that the competencies of a CFA charter holder are superior to those of others not holding the designation. It is not a violation, however, to factually state that charter holders must annually renew their commitment to abide by the Code and Standards or that each of the team members passed all three CFA exams on their first attempt.

2. Solution: A.

Standard III (B): Fair Dealing accommodates the differentiation of services to clients as long as such services are not offered selectively. The different service levels should be disclosed to clients and prospective clients and should be available to everyone. A requirement to disclose all conflicts of interest would not violate Standard VI (A): Disclosure of Conflicts, nor would the outline of all compensation arrangements violate Standard IV (B): Additional Compensation Arrangements.

3. Solution: B.

Kingfisher's proposed general principles related to Capital Market Integrity properly address in principle Standard II (A): Material Nonpublic Information and Standard II (B): Market Manipulation. Standard II (A) does not disallow the possession of insider information but does disallow using the information to take unfair advantage of the general investing public. Standard II (B) requires the prohibition of market manipulation—that is, dissemination of false or misleading information and transactions that deceives or would be likely to mislead market participants by distorting the price-setting mechanism of financial instruments.

4. Solution: A.

Standard III (A): Loyalty, Prudence, and Care require a client's portfolio to be managed by investment guidelines agreed on with the client. Some clients' investment objectives may not allow for a diversified portfolio across all asset classes available. Therefore, it may violate Standard III (A) to include all asset classes available.

5. Solution: C.

It is recommended that firms develop and use measurable criteria for assessing the quality of research to help comply with Standard V (A): Diligence and Reasonable Basis. Therefore, the research recommendations need to be assessed to determine their validity over time. Did the

process and the analyst's view lead to the right recommendation? If over time recommendations consistently prove to be wrong, perhaps the research processes need to be changed-or the analysts themselves.

6. Solution: C.

Task 1 is insufficient in that Standard IV(C): Responsibilities of Supervisors requires supervisors to enforce non-investment-related policies as well as investment-related policies.

Case 4: Lindsey Carlyle（考点：Code and standards）

1. Solution: C.

Woodstock's previous business relationships needs to be disclosed in Carlyle's initial research report in order to maintain independence and objectivity. Although no officers are currently serving on the board and a Chinese wall exists, it does not eliminate the need for the client to assess the potential conflict of interest between Woodstock and Paladin and the reason behind Carlyle's investment recommendation. Standard VI(A)–Disclosure of Conflicts requires charterholders and candidates to disclose all matters that could reasonably be expected to impair their objectivity and ability to judge motives and possible biases. Therefore, Carlyle violated Standard VI(A).

2. Solution: C.

Robinson relied solely on Carlyle's "Strong Buy" recommendation to make the investment decision to purchase Paladin's stock and thus did not comply with Standard V(A)–Diligence and Reasonable Basis. Even though he is familiar with Carlyle and Woodstock's investment methodology, Standard V(A) requires that he make a reasonable and diligent effort to determine whether her research is sound, her assumptions are reasonable, the analysis is timely, and her recommendation is objective.

3. Solution: A.

There is no violation. Standard III(B)–Fair Dealing states that members must deal fairly and objectively with all clients regardless of whether they are discretionary or non-discretionary accounts. Marietta's trade allocation policy treats all clients fairly in terms of both trade execution order and price.

4. Solution: C.

No violation has taken place. Standard III(A)–Loyalty, Prudence, and Care states that investment decisions may be judged in the context of the total portfolio rather than by individual investments within the portfolio. Robinson has satisfied his duty by thoroughly considering Paladin's place in the overall portfolio.

5. Solution: B.

Standard III(C)–Suitability requires members in an advisory relationship to regularly update the client's investment policy statement to reflect any changes in the client's circumstances. Updating the investment policy statement should be repeated at least annually. Without efforts to update information concerning client factors, one or more factors could change without the investment manager's knowledge.

6. Solution: B.

Neither Carlyle nor Robinson has violated the CFA Institute Standards of Professional Conduct during the meeting with Robinson's potential clients. By asking Carlyle to meet with several potential new clients Robinson is simply attempting to grow his client base. By merely discussing her research approach Carlyle has not given preferential treatment to these potential clients. Carlyle has not violated the standards as she has only discussed the research process and did not disclose her most current research.

Case 5: Brian Patrick（考点：Code and Standards）

1. Solution: A.

A is correct. Northside's interest would be of least importance relative to capital markets and Northside's clients and should be reflected in any whistle-blowing policy. Under CFA Institute Standard IV(A): Loyalty, an employee's personal interest and an employer's interest are secondary to protecting the integrity of capital markets and the interests of clients. If Northside becomes involved in illegal or unethical activities, an employee will need to act against Northside's interest to comply with his obligations to uphold Standard II: Integrity of Capital Markets and Standard III: Duties to Clients.

B and C are incorrect because employees have an obligation under Standard IV: Duties to Employers to protect the integrity of the capital markets and the firm's clients before either Northside's interest or employees' personal interest.

2. Solution: A.

A is correct. Recommendation 1 is insufficient to comply with Standard IV(C): Responsibilities of Supervisors, because it does not meet the requirement to perform periodic reviews. Under Standard IV(C), once a compliance program is in place, supervisors should perform periodic updates of their procedures to ensure the measures are adequate under the law. They should also review and revise their procedures as necessary as new laws and regulations are put in place to ensure the measures are adequate.

B and C are incorrect because those recommendations are sufficient under Standard IV(C): Responsibilities of Supervisors and could be incorporated into Northside's Policies and Procedures as recommended.

3. Solution: C.

C is correct. Standard V(A): Diligence and Reasonable Basis recommends Patrick should most likely label the proposals as follows:

Proposal 1 = Compensation. Patrick should have the firm develop measurable criteria for assessing the quality and contribution of research received and the accuracy of the recommendations over time.

Proposal 2 = Distribution. A supervisory analyst should be appointed to review and approve items prior to external circulation to determine whether the criteria established in the policy have been met.

Proposal 3 = Reasonable Basis. Develop detailed, written guidance for supervisory analysts that establishes the due diligence procedures for judging whether a particular recommendation has a reasonable and adequate basis.

4. Solution: A.

A is correct. CFA Institute Standard III(C): Suitability has most likely been violated with the purchase of PT Matias since it was purchased for all client portfolios. The standard requires Members and Candidates responsible for managing a portfolio with a specific mandate, strategy, or style to take only investment actions that are consistent with the stated objectives and constraints of the portfolio. Northside manages individual accounts with conservative mandates for a variety of retirements funds. PT Matias most likely was not appropriate for those client accounts since it would be considered high risk because it has gone through a reorganization and is in a turnaround situation.

B is incorrect because there is no violation of CFA Institute Standard III(B): Fair Dealing, which requires Members and Candidates to deal fairly and objectively with all clients when providing investment analysis, making investment recommendations, taking investment action, or engaging in other professional activities. In this instance, all the clients were treated fairly because the stock was purchased in block trade.

C is incorrect because Burt has not violated CFA Institute Standard I(C): Misrepresentation, which requires that Members and Candidates not knowingly make any misrepresentations relating to investment analysis, recommendations, or actions or other professional activities. Burt sited management's guidance alongside her own; therefore, there is no evidence of plagiarism.

5. Solution: A.

A is correct. Burt has most likely not violated any CFA Institute Standards of Professional Conduct during the new business presentations. She did not violate Standard VI(A): Disclosure of Conflicts, because there are no evident conflicts to disclose, even when she presented to the company under her coverage. At the time of the presentation, she had a sell rating on the stock, and there is no evidence of cross-departmental conflicts from the marketing department trying to influence her rating. She most likely did not violate Standard III: Duties to Clients either, because she has only reviewed the methodology used to research companies and determine a recommendation.

B and C are incorrect because Burt has not violated any CFA Institute Standards of Professional Conduct during the new business presentations.

6. Solution: B.

B is correct. Northside's policy of keeping its employee trading policies confidential is not consistent with the CFA Institute recommended procedure for Standard VI(B): Priority of Transactions. The Standard states that upon request, Members and Candidates should fully disclose to investors their firm's policies regarding personal investing. Northside's policies restricting participation in IPOs and maintaining a blackout period, although narrow, are

consistent with recommendations under Standard VI(B).

A is incorrect because Northside's policy regarding IPOs is consistent with the recommendation under Standard VI(B) that states purchase of IPOs by investment personnel create conflicts of interest in two principal ways: First, participation in an IPO may have the appearance of taking away an attractive investment opportunity from clients for personal gain—a clear breach of the duty of loyalty to clients. Second, personal purchases in IPOs may have the appearance that the investment opportunity is being bestowed as an incentive to make future investment decisions for the benefit of the party providing the opportunity. Members and Candidates can avoid these conflicts or appearances of conflicts of interest by not participating in IPOs.

C is incorrect because Northside's policy regarding a blackout period is consistent with the recommendation under Standard VI(B). The Standard states that investment personnel involved in the investment decision-making process should establish blackout periods prior to trades for clients so that managers cannot take advantage of their knowledge of client activity by "front-running" client trades.

Case 6: Ruth McDougal（考点：Code and Standards）

1. Solution: A.

McDougal's decision to change the recommendation on a stock based on overhead conversations is not a reasonable course of action for a professional analyst, even though the content of the conversations turned out to be true. The standard violated is Standard V(A)--Diligence and Reasonable Basis.

2. Solution: A.

Under Standard I(B) Independence and Objectivity, the best course of action for McDougal to avoid any conflict is to decline the offer and to proceed on her own budget as planned to attend the seminar and write objective research.

3. Solution: C.

This involves Standard IV(B) Additional Compensation Arrangements. McDougal is required to disclose any fee arrangements to her employer. This allows Cratter Finance to consider the outside arrangement when considering the actions and motivations of McDougal.

4. Solution: A.

Standard III(B) Fair Dealing requires that the portfolio managers treat all accounts fairly when taking investment action. In this case they are giving trading priority to specific accounts, knowing that the report has been circulated for review and is not yet available to all clients. They are not in violation of Priority of Transactions as they are not trading their own account in conflict with any of Cratter Finance's client accounts. They are not in violation of Diligence and Reasonable Basis since they are basing their actions on research recommendations by their firm.

5. Solution: C.

Standard VI(C) Referral Fees deals with the disclosure of referral fees. It explicitly states that the purpose of disclosure is (1) to evaluate any partiality shown in any recommendations of services and (2) to evaluate the full cost of services.

6. Solution: C.

This question deals with the CFA Institute's professional conduct program (PCP) as stated in the CFA Institute bylaws and rules of proceedings related to professional conduct. The CFA Institute cannot impose a monetary fine.

Case 7: JR and Associates（考点：Code and Standards）

1. Solution: A.

A is correct. Jacobs is not in violation of the CFA Institute Code and Standards. According to Standard III (B): Duties to Clients – Fair Dealing, members and candidates may provide more personal, specialized, or in-depth service to clients who are willing to pay for premium services through higher management fees or higher levels of brokerage. The term "fair" implies that the member or candidate must take care not to discriminate against any clients when disseminating investment recommendations or taking investment action.

B is incorrect. JRA is not misrepresenting its fees, because some of its clients are paying the fees that are disclosed in its marketing brochure. In addition, the advertised fees represent the highest fees that clients would pay.

C is incorrect. Standard III(B)—Fair Dealing focuses on investment recommendations and taking investment action. The case provides no evidence that non-referred clients are being discriminated against or that referred clients are receiving preferential treatment, with respect to the dissemination of investment recommendations or the taking of investment action. Referred clients are simply receiving discounted fees.

2. Solution: A.

A is correct. Jacobs is in violation of Standard VI (C): Conflicts of Interest–Referral Fees, which states, "Members and candidates must disclose to their employers, clients, and prospective clients, as appropriate, any compensation, consideration, or benefit received from or paid to others for the recommendation of products or services…. Appropriate disclosure means that members and candidates must advise the client or prospective client, before entry into any formal agreement for services, of any benefit given or received from the recommendation of any services provided by the member or candidate." In this case, the disclosure does not occur until the time the individual signs the investment management agreement, which is too late.

B is incorrect. The case facts state that BP lawyers disclose the fee-sharing arrangement to the clients they refer to JRA. The case facts do not state whether the lawyers disclose the discount offered by JRA. The behavior of the BP lawyers, however, is not covered by the Code and Standards. Disclosures, or lack thereof, by BP lawyers do nothing to mitigate JRA's duties and responsibilities.

C is incorrect. The discount is disclosed to JRA clients at the time they sign the investment management agreement. According to the Standard VI (C), disclosure must occur before the client enters into a formal agreement.

3. Solution: A.

A is correct. By not disclosing the referral arrangement to clients who were referred to her by

Frontline Group, Parker has violated Standard VI (C): Conflicts of Interest–Referral Fees, which states, "Members and candidates must disclose to their employers, clients, and prospective clients, as appropriate, any compensation, consideration, or benefit received from or paid to others for the recommendation of products or services…. Appropriate disclosure means that members and candidates must advise the client or prospective client, before entry into any formal agreement for services, of any benefit given or received from the recommendation of any services provided by the member or candidate." In this case, there is no evidence to suggest Parker disclosed her referral arrangement with Frontline Group to prospective clients. By not doing so, Parker violated Standard VI (C).

B is incorrect. Regardless of whether Frontline provides "best price" and "best execution" or whether the execution of client trades remains unchanged by Frontline, Parker must still disclose the referral arrangement to her clients.

C is incorrect. Parker must still disclose the referral arrangement to her clients, regardless of the fact that all client trades continue to be executed by Frontline.

4. Solution: B.

B is correct. The donations made by Jacobs and Riccio give Carroll an incentive to refer potential clients to JRA and at the very least give the perception that Carroll's objectivity and independence have been compromised. Jacobs and Riccio are in violation of Standard I(B): Professionalism–Independence and Objectivity, which states, "Members and candidates must use reasonable care and judgement to achieve and maintain independence and objectivity in their professional activities. Members and candidates must not offer, solicit, or accept any gift, benefit, compensation, or consideration that reasonably could be expected to compromise their own or another's independence and objectivity."

A is incorrect. As already noted, donations made by Jacobs and Riccio give Carroll an incentive to refer potential clients to JRA. This at the very least gives the perception that Carroll's objectivity and independence have been compromised, and so Jacobs and Riccio are in violation of the Code and Standards, specifically Standard I(B): Professionalism–Independence and Objectivity.

C is incorrect. The donations were made to Carroll's charity and do not represent additional compensation to Carroll. Additional compensation is defined in Standard IV(B): Duties to Employers–Additional Compensation Arrangements as "gifts, benefits, or compensation, or consideration that competes with or might reasonably be expected to create a conflict of interest with their employer's interest." An additional compensation arrangement is one that creates a conflict of interest between the member or candidate and her employer.

5. Solution: B.

B is correct. Ode's comment 2 violated Standard VII(A): Responsibilities as a CFA Institute

Member or CFA Candidate–Conduct as Participants in the CFA Institute Programs: "CFA Institute program rules, regulations, and policies prohibit candidates from disclosing confidential material gained during the exam process." Examples of information that cannot be disclosed by candidates sitting for an exam include but are not limited to the following:

- Specific detail of questions appearing on the exam (contango–backwardation).
- Broad topical areas and formulas tested or not tested on the exam (derivatives).

In this case, Ode disclosed specific details of questions appearing on the exam.

A is incorrect. In saying that the ethics questions were super hard, Ode did not disclose confidential information gained during the exam process.

C is incorrect. In saying that the graders must have been quite lenient in grading her answers to the constructed response questions, Ode did not disclose confidential information gained during the exam process.

6. Solution: A.

A is correct. Othan is in violation of the CFA Institute Code and Standards. Ode is not yet a CFA charterholder, and in referencing her as the firm's "newest CFA," Othan is misrepresenting Ode. Standard VII(B): Responsibilities as a CFA Institute Member or CFA Candidate–Reference to CFA Institute, the CFA Designation, and the CFA Program states that "'CFA Charterholders' are those individuals who have earned the right to use the CFA designation granted by CFA Institute. These people have satisfied certain requirements, including completion of the CFA Program, and required years of acceptable work experience." The recommended procedures for Ode's compliance with Standard VII(B) include educating others in the firm, including re-educating Othan, about her status.

B is incorrect. To be a CFA charterholder, Ode needs to have completed the required four years of work experience.

C is incorrect. The fact that she has completed all three levels of the CFA Program does not make Ode a CFA charterholder. To be a CFA charterholder, she must also have the required four years of work experience.

Case 8: Jane Pierce（考点：Code and Standards）

1. Solution: A.

A is correct. The firm's compliance officer cleared Pierce. When Pierce was first hired, she would be responsible only for abiding by her firm's policies and procedures because she is not yet a CFA candidate or CFA charterholder. Any violation would therefore only be investigated, and any determination of wrongdoing would only involve her firm's compliance officer. The firm's claim of compliance with the Code and Standards does not dictate that CFA Institute will become involved with any violation of a firm's policies. The Code of Ethics and Standards of Professional Conduct are applicable only to members of CFA Institute and CFA candidates. At the time of her hiring, Pierce was not a candidate in the CFA Program. Therefore, she was not directly responsible for abiding by the CFA Institute Standards of Professional Conduct. Consequently, any violation at that time, regardless of severity, would not be investigated by the CFA Institute Professional Conduct Program. Once accepted into the CFA Program, however, any violations by Pierce would be subject to investigation by the CFA Institute Professional Conduct Program.

2. Solution: B.

B is correct. To prevent a violation of Standard I(B)--Independence and Objectivity, the charterholders in attendance should donate the gift to charity. The charterholders who attended the meeting with the smartphone distributor received as a gift a new-generation smartphone with a retail value of approximately $900. If they were to keep the phones, they would most likely be in violation of Standard I(B): Independence and Objectivity, which requires that members and candidates use reasonable care and judgement to achieve and maintain independence and objectivity in their professional activities. They must not offer, solicit, or accept any gift, benefit, compensation, or consideration that reasonably could be expected to compromise their own or another's independence and objectivity. It is recommended that members and candidates limit the acceptance of gratuities and/or gifts to token items. A high-end smartphone with a retail value of approximately $900 is clearly not a token item. The charterholders would directly benefit from selling the phone and indirectly benefit by giving it to a family member.

A and C are incorrect. Selling the smartphone or giving it to a family member would not prevent the charterholders from being in violation of Standard I(B): Independence and Objectivity. The charterholders would directly benefit from selling the phone and indirectly benefit by giving it to a family member. To prevent being in violation of Standard I(B), the charterholders in attendance should donate the gift to charity. It is recommended that members and candidates limit the acceptance of gratuities and/or gifts to token items. A high-end smartphone with a retail value of approximately $900 is clearly not a token item.

3. Solution: C.

C is correct. Standard V: Investment Analysis, Recommendations, and Actions would least likely be violated if Pierce distributed the email. Specifically, Standard V(B): Communication with Clients and Prospective Clients requires members and candidates to (1) disclose to clients and prospective clients the basic format and general principles of the investment processes, (2) disclose to clients and prospective client's limitations and risks, (3) identify which factors are important to their investment analysis, and (4) distinguish between fact and opinion. The email outlined the analyst's earnings model for a company under his coverage and included his assumptions, the important factors surrounding his analysis, and the risk associated with those earnings. If the email had been distributed, it would have been a violation of Standard III: Duties to Clients—specifically, Standard III(B): Fair Dealings, which requires that members and candidates deal fairly and objectively with all clients when providing investment analysis, making investment recommendations, taking investment action, or engaging in other professional activities. Emailing the change in earnings expectations to a subset of asset management clients failed to deal fairly with all clients. It would also have been a violation of Standard IV: Duties to Employers—specifically, Standard IV(C): Responsibilities of Supervisors, which requires that members and candidates make reasonable efforts to ensure anyone subject to their supervision or authority complies with applicable laws, rules, regulations, and the Code and Standards. Company policy requires reports being emailed to come through Pierce's supervisor. In this case, the report came directly from the analyst. If it had been emailed, it would have clearly been a violation of company policy and a failure to supervise would have occurred somewhere in the chain of command. However, it is unclear whether this failure occurred with the analyst, the analyst's supervisor, or Pierce's supervisor.

4. Solution: A.

A is correct. Recommendation 1 ("The firm will limit the number of employees who have knowledge of the pending dissemination of recommendations or earnings outlooks") addresses Standard III: Duties to Clients, specifically Standard III(B): Fair Dealing. Recommendation 2 ("When a suspected violation occurs, place appropriate limitations on the wrongdoer pending the outcome of an investigation") addresses Standard IV: Duties to Employers—specifically, Standard IV(C): Responsibilities of Supervisors. Recommendation 3 ("The firm's analysts are required to maintain records to support their investment recommendations") addresses Standard V: Investment Analysis, Recommendations, and Actions—specifically, Standard V(B): Communication with Clients and Prospective Clients.

5. Solution: B.

B is correct. The statement by Research Assistant 1 ("One of the senior analysts I work with heard from an accountant at one of the companies she follows that they are about to retire a large

group of assets. She's afraid she may lose her job.") indicates the senior analyst is in possession of insider information, which, if acted on, could lead to a violation of Standard II: Integrity of Capital Markets. The retirement of a large group of assets would be considered material. Additionally, the insider is an accountant, which would indicate he or she would be considered reliable. Information is material if its disclosure would probably have an impact on the price of a security or if reasonable investors would want to know the information before making an investment decision. The source or relative reliability of the information is also a determining factor in materiality. The standard recommendation is for the analyst to work with the company to publicly release the material inside information. The statement by Research Assistant 2 is "One of the senior analysts I work with heard from the receptionist at an independent research firm about the potential purchase of a large block of stock of a company under his coverage. I can't wait to find out who it involves." While the sale of a large block of stock would be considered material, in this case, the analyst is not given a specific company name and therefore would be unable to verify the information or act on it. The analyst therefore could not violate Standard II: Integrity of Capital Markets. The specificity of the information is a key factor in determining whether a particular piece of information fits the definition of material.

6. Solution: C.

C is correct. Comment 3 ("I hate accounting; it must have been 25% of the exam.") is a violation of Standard VII: Responsibilities as a CFA Candidate. Specifically, Standard VII(A): Conduct as Participants in CFA Institute Programs states that members and candidates must not engage in any conduct that compromises the reputation or integrity of CFA Institute or the CFA designation or the integrity, validity, or security of CFA Institute programs. All aspects of the exam, including broad topical areas, such as accounting, and its relative importance on the exam are considered confidential until such time as CFA Institute elects to release it publicly. Statement 1 ("Boy, the ethics questions were amazingly tough.") and Statement 2 ("Those Learning Outcome Statements were helpful.") are not violations of Standard VII(A): Conduct as Participants in CFA Institute Programs. Both statements reflect a candidate's opinion either about a topic they found tough or about the preparation objectives provided by the CFA Program.

2. Quantitative

2.1. Key Points

2.2. Key Practice

Case 1: Paul Charlent（考点：Regression）

1. Solution: B.

The coefficient of determination (R^2) is 0.0263. Such a low R^2 indicates that the regression has little explanatory power—that is, less than 3% of the variation in the SET Index is explained by the variation in LIBOR. The insignificance of the F-test in Exhibit 2 confirms this lack of explanatory power. The slope coefficient is not significant (p-value = 0.1285), again confirming that this regression has little explanatory power.

2. Solution: C.

The intercept coefficient of the regression line is 0.031. The p-value indicates that the probability of having a sample result of 0.031 when the underlying population coefficient is zero is about 4.89%. As this p-value is less than 5%, we reject the null hypothesis for the intercept. The slope coefficient is –0.732. The p-value indicates that the probability of having a sample result of –0.732 when the underlying population coefficient is zero is about 12.85%. As the p-value exceeds the 5% level of significance, we fail to reject the null hypothesis for the slope coefficient. Note that you can also answer the question by examining the reported confidence intervals. The 95% confidence interval for the intercept does not contain zero (we reject the null). The 95% confidence interval for the slope does contain zero (we accept the null).

3. Solution: C.

The regression equation is ln(1 + SET Index return) = 0.031 – 0.732 × ln(1 + LIBOR).
If LIBOR is 3%, then ln(1 + SET Index return) = 0.031 – 0.732 × 0.02956 = 0.00936.
Continuing, exp[ln(1 + SET Index return)] = exp(0.00936) and therefore,
1 + SET Index return = 1.00941.
The estimate of the SET Index return is 0.941%.

4. Solution: A.

The value of the Durbin Watson statistic exceeds the upper critical value (1.9566 > 1.73). We fail to reject the null hypothesis of no positive serial correlation. The value of the DW statistic is less than the value (4 – 1.59) = 2.41. Thus, we also fail to reject the null hypothesis regarding negative serial correlation.

5. Solution: C.

The high pair wise correlations of Exhibit 5, especially the correlation between LIBOR and Fed funds, suggest a multicollinearity problem. In the presence of multicollinearity, R^2 values and F-statistics are overstated and estimates of the coefficients become extremely imprecise and unreliable.

Case 2: Leysen Tesiro（考点：Regression）

1. Solution: A.

Cost of finished jewelry = 11.06 + 2.897 * (cost of gold)

$2,000 = 11.06 + 2.897 * (cost of gold)

Price of gold = ($2,000 - 11.06) / 2.897 = $686.55

2. Solution: A.

Singh is correct that a change in the relationship between gold prices and jewelry costs would be an example of parameter instability.

Hara is correct to fail to reject the null hypothesis that the value of the slope coefficient is equal to 4.0 at the 5% level of significance.

The critical t-value for the slope coefficient with 31 - 2 = 29 df at the 5% level for a two-tailed test is 2.045. The test statistic is (2.897 - 4.000)/0.615 = -1.79. The absolute value (1.79) is less than 2.045, and the correct decision is to fail to reject the null hypothesis that the slope coefficient is equal to 4.0.

3. Solution: B.

Biscayne is incorrect in the specification of the formula because the appropriate R^2 to use in calculating a Breusch-Pagan chi-square statistic is not the R^2 of the regression of jewelry prices on gold prices but rather the R^2 of the regression of squared residuals from the original regression on the independent variable(s).

4. Solution: C.

Singh is incorrect because the most frequent source of misspecifying a regression equation that use time series from two or more different variables is nonstationarity (not stationarity).

Biscayne is incorrect because the effect of omitting an important variable in a regression is that the regression coefficients are often biased (not unbiased) and inconsistent.

5. Solution: C.

While Hara is correct about the remedy for multicollinearity (i.e., remove one or more of the highly correlated independent variables), he is incorrect about the effect of reducing the number of independent variables on the coefficient of determination R^2. R^2 never increases when independent variables are dropped.

6. Solution: B.

Biscayne is incorrect because a serial correlation problem can be corrected by using the Hansen method to adjust the coefficient standard errors, not the R^2.

Case 3: Eduardo DeMolay（考点：Time series）

1. Solution: A.

If a time series is a random walk, "the best forecast of x_t that can be made in period t – 1 is x_{t-1}". So the best forecast of the next period's trailing P/E is the current period's trailing P/E.

2. Solution: B.

We can test whether a time series is ARCH by regressing the squared residuals from a previously estimated time series model on a constant and one lag of the squared residuals (as in Exhibit 2). If the estimate of the slope (c_1 in Exhibit 2) of the regression of the squared residuals on the lagged one period squared residuals is statistically significantly different from zero, the time series is ARCH(1).

3. Solution: C.

Select and justify the choice of a particular time series model from a group of models. "First, if ARCH exists, the standard errors for the regression parameters will not be correct. In case ARCH exists, we will need to use generalized least squares to modify the model.

4. Solution: A.

When working with two time series in a regression analysis, both of the series must be tested for the presence of a unit root. If neither series has a unit root, we can safely use linear regression.

5. Solution: C.

If the two series each have a unit root, regression results will be consistent provided that the two series are cointegrated.

Case 4: William Shears（考点：Time series）

1. Solution: B.

A logarithmic transformation of the dependent variable is the most appropriate transformation to apply when the variable grows at a constant rate over time:

In(sales) = a* + b*t + e

The slope of this equation equals the nominal constant rate. The effective rate equals $e^{b^*} - 1$.

2. Solution: C.

Quarter 1 of 2009 is the 61st quarter (starting with Quarter 1 of 1994): sales = 10 + 16(61) = $986 million.

3. Solution: A.

The mean reverting value equals the intercept divided by 1 minus slope = 20/ (1—0.10)
= 20 / 0.90 = $22.22 million. The last change was $50 million as shown in Exhibit 5 (1000 - 950). Therefore, the AR(1) model predicts that the series will fall anytime the current value (the last quarter in 2008) is above the mean reverting value. The change in sales for the last quarter in 2008 was $50 million, which exceeds the mean reverting value. We could also have computed the forecasted change in sales for Quarter 1, 2009 as 20 + (0.1) x 50 = 25 (which is lower than the previous change of 50).

4. Solution: C.

Seasonality refers to repeating patterns each year. Using quarterly data, tests of seasonality focus on the 4th lag (i.e., "same time last year"). The autocorrelation for the 4th lag is statistically significant. This can be observed by comparing the reported p-value (0.02), which is less than the level of significance (0.05).

5. Solution: B.

Autoregressive conditional heteroskedasticity refers to an autoregressive equation in which the variance of the errors terms is heteroskedastic (i.e., error variance is not constant). The presence of ARCH is tested with the following regression:

$$e_t^2 = \beta_1 + \beta_2 e_{t-1}^2 + v_t$$

which serves as a proxy for:

$$\text{var}(e_t) = \beta_1 + \beta_2 \text{var}(e_{t-1}) + v_t$$

Exhibit 4 indicates that the slope estimate in the ARCH equation is not significant (the t-statistic

for the slope estimate of the ARCH equation is not significant). Therefore, the squared error does not depend on its lagged value (i.e., if the slope equals zero, then the error variance equals the constant β_1 which indicates no conditional heteroskedasticity in the AR model). ARCH is not present.

6. Solution: B.

The most recent change in sales reported in Exhibit 5 was $50 million (i.e., an increase from $950 million to $1,000 million). Therefore, the one-step-ahead forecast is 20 + 0.1(50) = $25 million and the two-step-ahead forecast is 20 + 0.1(25) = $22.5 million.

Case 5: Jorge Reyes（考点：Regression, Time series）

1. Solution: B.

B is correct. A two-tailed t-test is appropriate to test whether the coefficient is significantly different from zero. The test statistic is the estimate of the coefficient (–0.5789) divided by its standard error (0.2221), –0.5789/0.2221 = –2.61. Because –2.61 is less than –2.00 (the negative critical value for the two-tailed test), the coefficient is significantly different from zero at the 5% level of significance.

A is incorrect. The coefficient is significantly different from zero based on a t-test. C is incorrect. The coefficient is significantly different from zero based on a t-test.

2. Solution: B.

B is correct. Adjusted R^2 adjusts for the loss of degrees of freedom when additional independent variables are added to a regression. It does not adjust for the effects of serial correlation in the data, nor does it adjust for heteroskedasticity.

A is incorrect. Adjusted R^2 does not compensate for serial correlation in the data.

C is incorrect. Adjusted R^2 does not compensate for heteroskedasticity in the data.

3. Solution: A.

A is correct. The presence of heteroskedasticity is indicated when there is a systematic relationship between the residuals and the independent variable. The graph in Exhibit 2 displays no systematic relationship. Therefore, heteroskedasticity does not appear to be a problem in this regression.

B is incorrect. The slope of the regression line is irrelevant to the issue of heteroskedasticity.

C is incorrect. It states that the lack of a systematic relationship suggests heteroskedasticity.

4. Solution: C.

C is correct. Significantly large values of the Durbin–Watson statistic point to negative serial correlation. Specifically, if the DW statistic exceeds 4 – dl, where dl is the lower critical value of the Durbin–Watson test, there is significant negative serial correlation. In this case, Durbin–Watson = 3.97 and dl = 1.65. Because 3.97 > [4 – 1.65], the test indicates that there is significant negative serial correlation.

A is incorrect. The DW statistic is greater than 4 – dl, indicating statistically significant negative correlation.

B is incorrect. The DW statistic is greater than 4 – dl, indicating statistically significant negative correlation.

5. Solution: C.

C is correct. For an AR(1) model, $x_{t+1} = b_0 + b_1 x_t + \varepsilon_{t+1}$ At the mean reverting level where xt+1 = xt:

$$x_t = \frac{b_0}{1 - b_1}$$

In this case, $x_t = \frac{0002381}{1-0235546} = 0.00311.$

B is incorrect. It erroneously uses b0 in both the numerator and in the denominator.

A is incorrect. It erroneously uses b1 in both the numerator and in the denominator.

6. Solution: B.

B is correct. Because the unit root test statistic (–18.7402) is smaller than the critical value (–2.89), the AR(1) model does not exhibit a unit root. The test for heteroskedasticity, however, suggests that the error term variances are heteroskedastic. The heteroskedasticity test statistic (2.016733) is greater than the critical value (1.96). A more sophisticated approach, such as generalized least squares, is needed.

A is incorrect. The significantly negative test statistic strongly suggests the absence of a unit root.

C is incorrect. When a model exhibits ARCH, the standard errors for the regression parameters will not be correct.

Case 6: Jordan Garfield（考点：Regression）

1. Solution: C.

Calculate and interpret the standard error of estimate, the coefficient of determination, and a confidence interval for a regression coefficient.

C is correct.

$$SEE = \sqrt{\frac{SSE}{n-2}} = \sqrt{\frac{0.1802}{58}} = \sqrt{0.0031} = 0.0557$$

2. Solution: A.

Calculate and interpret the standard error of estimate, the coefficient of determination, and a confidence interval for a regression coefficient.

Formulate a null and alternative hypothesis about a population value of a regression coefficient and determine the appropriate test statistic and whether the null hypothesis is rejected at a given level of significance.

A is correct. The p-value of 0.80 for the intercept implies that there is about an 80% chance that the true value of the intercept is not significantly different from zero. Therefore, conclusion 1 is incorrect.

3. Solution: C.

Calculate a predicted value for the dependent variable, given an estimated regression model and a value for the independent variable.

Calculate and interpret a confidence interval for the predicted value of a dependent variable.

C is correct. The predicted value equals the intercept plus the coefficient times the value of the independent variable: 0.001795 + (1.08601 x 0.05633) = 0.06297.

4. Solution: B.

Calculate and interpret the F-statistic, and describe how it is used in regression analysis. B is correct. The F-statistic is calculated as follows: (Reading 10, equation 4) RSS 0.2244

$$F = \frac{MSR}{MSE} = \frac{\frac{RSS}{k}}{\frac{SEE}{n-k-1}} = \frac{\frac{0.2244}{2}}{\frac{0.1705}{57}} = \frac{0.1122}{0.0030} = 37.51$$

where

MSR = Mean regression sum of squares MSE = Mean squared error, SSE/[n - (k + 1)]

RSS = regression sum of squares; the amount of variation in Y explained by the model.

SSE = sum of squared error from the regression model

k = the number of regressors in the model

n = the number of observations.

5. Solution: C.

Formulate a multiple regression equation to describe the relation between a dependent variable and several independent variables, determine the statistical significance of each independent variable.

Interpret estimated regression coefficients and their p-values.

C is correct. The p-value is the smallest level of significance at which the null hypothesis can be rejected. The null hypothesis here is that the JPY/USD test statistic is not related to the return on HighTech. In this case the p-value 0.33 is high; therefore, we fail to reject the null hypothesis.

6. Solution: C.

Explain the types of heteroskedasticity and the effects of heteroskedasticity and serial correlation on statistical inference.

Describe multicollinearity and explain its causes and effects in regression analysis.

C is correct. The significant t-statistic (8.617) on the NASDAQ return suggests that multicollinearity is not a problem. The Durbin-Watson statistic close to 2 indicates there is no serial correlation.

Case 7: Mihir Kotak（考点：Machine Learning, Big Data）

1. Solution: A.

Statement 1 is correct. Data exploration includes exploratory data analysis, feature selection, and feature engineering. Statement 2 is incorrect. Feature selection in preprocessing step needs clarification only from data administrators and basic intuition.

2. Solution: C.

Kotak wants to minimize false positives (i.e., classifying companies that are not takeover targets as takeover targets), and hence, wants to minimize type I errors. An increase in a model's precision reduces its type I errors. A model's accuracy score generally minimizes overall type I and type II errors, and hence, is not the best answer choice.

3. Solution: C.

Precision (Model A) = 14 / (14 + 9) = 0.61

Precision (Model B) = 13 / (13 + 4) = 0.76

Accuracy (Model A) = (14 + 246) / (14 + 246 + 5 + 9) = 0.95

Accuracy (Model B) = (13 + 253) / (13 + 253 + 4 + 4) = 0.97

4. Solution: B.

The hyperparameter *k* in the k-means clustering algorithm refers to the number of buckets (50, in this case) used to create heterogeneous clusters of companies for analysis

5. Solution: A.

Supervised learning is appropriate when a target variable is specified. This target variable is categorical (i.e., *takeover target* or *not a takeover target*).

Case 8: James Johnson（考点：Regression）

1. Solution: B.

Johnson explains the short interest ratio using the debt ratio.

2. Solution: B.

The calculation for the confidence interval is -4.1589±(2.011×1.8718). The upper bound is -0.3947.

3. Solution: C.

The assumptions of the linear regression model are that the 1) the relationship between the dependent variable and the independent variable is linear in the parameters b_0 and b_1; 2) the independent variable is not random; 3) the expected value of the error term is 0; 4) the variance of the error term is the same for all observations; 5) the error term is uncorrelated across observations; and 6) the error term is normally distributed. Assumption 3 is incorrect because the expected value of the error term is assumed to be zero, not equal to the mean of the dependent variable.

4. Solution: B.

The estimated coefficients for the dummy variables show the estimated difference between the returns on different types of funds. The medium dummy takes the value of 1 for medium cap funds and 0 for the large cap fund. Exhibit 2 shows a medium dummy coefficient of 3.4368. The estimated difference between the return of medium funds and large funds is thus 3.4368%.

Case 9: Alex Scofield（考点：Machine Learning, Big Data）

1. Solution: B.

To predict which stocks are likely to become acquisition targets, the ML model would need to be trained on categorical labelled data having the following two categories: "0" for "not acquisition target", and "1" for "acquisition target".

A is incorrect, because the target variable is categorical, not continuous.

C is incorrect, because the target variable is categorical, not ordinal (i.e., 1st, 2nd, 3rd, etc.).

2. Solution: B.

NNs and DL are well-suited for addressing highly complex machine learning tasks, such as image classification, face recognition, speech recognition and natural language processing. These complicated tasks are characterized by non-linearities and complex interactions between large numbers of feature inputs. The description of backward propagation is also correct.

A is incorrect, because NNs and DL are well-suited for addressing highly complex machine learning tasks, not simple single variable OLS regression models.

C is incorrect, because NNs and DL are not suited for simple single variable OLS regression models.

3. Solution: A.

During the data preprocessing step, Scofield created a new "Age" variable based on the firm's IPO date and then deleted the "IPO Date" variable from the dataset. He also created a new "Interest Coverage Ratio" variable equal to EBIT divided by interest expense. Extraction refers to a data transformation where a new variable is extracted from a current variable for ease of analyzing and using for training an ML model, such as creating an age variable from a date variable or a ratio variable. Scofield also performed a selection transformation by deleting the IPO Date variable, which refers to deleting the data columns that are not needed for the project.

4. Solution: A.

"bedroom" and "kind" are tokens unaffected by lowercasing, stemming, and lemmatization and are not stop words, so they would both be added to the BOW.

B is incorrect. Stemming of "needing" would occur, resulting in the token "need" (which would have already been added from the first part of the applicant's statement); "really" would likely appear as a token. Note that access to the Porter stemming algorithm indicates it would be reduced to the stem "realli."

C is incorrect. Since fully capitalized words and spelling mistakes are considered red flags in this ML application, the preprocessing must take this into account and preserve these types of words. A similar situation is indicated in the reading whereby numbers are normally reduced to the

symbol “/number/” unless there is some need to preserve the actual value, and then annotation can be used. For both of these situations then, the word by itself would not be included but some means of identifying these flagged values would be substituted—for example, /AllCaps/ or /AllCaps/_HELP and /spellError/ or /spellError/_daughtter. Even without this important preprocessing, “HELP” would be lowercased and would be added to the BOW as “help.”

5. Solution: A.

Punctuation, HTML tags, numbers, and white space are removed in the text preparation (or cleansing) stage. In the case of numbers, they should be replaced with an annotation, such as “/number/,” to indicate the presence of a number without being concerned about its actual value. Stop words and lowercasing are part of the text wrangling (preprocessing stage).

B is incorrect. Stop words are removed in the text wrangling (preprocessing) stage.

C is incorrect. Lowercasing is carried out in the text wrangling (preprocessing) stage.

6. Solution: B.

The threshold p-value for Class 1 (default) is 0.60, which has not been met (p = 0.41); thus, the final ML model predicts that the applicant would be a non-defaulter (Class 0). The loan has been misclassified as not being likely to default when it defaulted. This is a Type II error (a false negative).

A is incorrect. A Type I error is a false positive: It would have arisen if the loan did not default but was predicted to do so.

C is incorrect. A misclassification has occurred, resulting in a Type II error.

3. Economics

3.1. Key Points

3.2. Key Practices

Case 1: Tremblay（考点：Currency Exchange Rates, Economic Growth）

1. Solution: B.

The mid-market for CAD/USD is (1.2138 + 1.2259)/2 = 1.21985. The mid-market forward premium (discount) is calculated as:

$$F_{P/B} - S_{P/B} = S_{P/B}\left[\frac{\frac{Actual}{360}}{1+i_B\frac{Actual}{360}}\right](i_P - i_B)$$

In this problem, we have:

$$F_{P/B} - S_{P/B} = 1.21985\left[\frac{\frac{90}{360}}{1+0.048\frac{90}{360}}\right](0.041-0.048) = 1.21985\times 0.2470356\times(-0.007) = -0.0021094$$

2. Solution: B.

The relative version of PPP states that the percentage change in the spot exchange rate will be completely determined by the difference between the foreign and domestic inflation rates. In this case, the difference in the inflation rates is 1.90%–2.30% =–0.4%. Subtracting 0.4% from the current bid gives the answer 1.2089. The calculation is 1.2138 – (0.004 × 1.2138) = 1.2089.

3. Solution: C.

It is cheaper to buy Canadian dollars indirectly through Brazilian reals than directly with U.S. dollars. This creates a triangular arbitrage opportunity:

US$1,000,000 × 2.3844 = BRL2,384,400

2,384,400 × 0.5250 = C$1,251,810

C$1,251,810/1.2259 = US$1,021,135

US$1,021,135 – US$1,000,000 = US$21,135 profit

4. Solution: B.

Baroque's comments describe the international Fisher effect. The international Fisher effect states that the foreign-domestic nominal yield spread will be solely determined by the foreign-domestic expected inflation differential.

5. Solution: A.

Tremblay's first justification describes "club convergence." Her second justification describes a second source of convergence–imitating or adopting technology already widely used in the advanced countries. Convergence is consistent with the neoclassical growth model.

6. Solution: C.

The possibility for permanent higher growth in per capita output exists within endogenous growth theories but not in neoclassical growth theory nor in classical growth theory.

Case 2: AnaKonda（考点：Economic Growth）

1. Solution: C.

Medeva's comment is most accurate. The percentage change in stock market value equals the percentage change in GDP plus the percentage change in the share of earnings (profit) in GDP plus the percentage change in the price-to-earnings multiple. Over short to immediate horizons, all three of these factors contribute to appreciation or depreciation of the stock market. In the long run, however, the growth rate of GDP must dominate. As noted, the ratio of earnings to GDP cannot rise forever.

2. Solution: B.

Steady state of growth = $\Delta Y/Y = \theta/(1-\alpha) + n$,

Where

θ = growth rate of TFP (in this case, 2.25).

$(1-\alpha)$ = labor cost in total factor cost (in this case, 0.689).

n = labor force growth (in this case, 2%).

For Country X: $\Delta Y/Y = 2.25/0.689 + 2 = 5.27\%$.

3. Solution: B.

Using the labor productivity growth accounting equation, Country Z indicates the highest growth rate in potential GDP.

Growth rate in potential GDP = Long-term growth rate of labor force + Long-term growth rate in labor productivity.

Country	Long-Term Labor Force Growth (%)	Long-Term Growth Rate in Labor Productivity (%)	Growth Rate in Potential GDP (%)
X	2.00	0.80	2.80
Y	0.50	2.40	2.90
Z	1.25	1.75	3.00

4. Solution: B.

Rajan's conclusions pertaining to Country Y are most consistent with the neoclassical model. Because of diminishing marginal returns to capital, the only way to sustain growth in potential GDP per capita is through technological change or growth in total factor productivity. This change

results in an upward shift in the production function—the economy produces more goods and services for any given mix of labor and capital inputs.

5. Solution: A.

Country Z has the highest real interest rate according to the International Fisher effect. The Fisher effect breaks down the nominal interest rate (I) in a given country into two parts: (1) the real interest rate in that particular country (r) and (2) the expected inflation rate (π) in that country.

I = r + π, where r = Current nominal interest rate and π = Expected inflation rate.

	r = I + π	Real Interest Rate
Country X	6.85 – 3.95 =	2.90%
Country Y	8.00 – 5.25 =	2.75%
Country Z	5.67 – 2.67 =	3.00%

Case 3: Anderson Brothers（考点：Currency Exchange Rates, Economic Growth, Regulation）

1. Solution: B.

While ability of the self-regulating organizations (SROs) and their enforcement powers are important, the most important element is being properly supervised by formal government authorities.

2. Solution: B.

Given low capital mobility, a restrictive monetary and fiscal policy should lead to domestic currency appreciation under the Mundell-Fleming model.

3. Solution: B.

Under the neoclassical growth theory, capital deepening affects the level of output but not the growth rate in the long run. Once an economy reaches steady-state growth, only further technological progress will increase the growth rate.

4. Solution: A.

GBP/SFr = GBP/USD*USD/SFr.

We are given USD/GBP, so we convert the provided quotes:

$$(\frac{GBP}{USD})_{bid} = \frac{1}{(\frac{USD}{GBP})_{offer}} = \frac{1}{2.0020} = 0.4995$$

And

$$(\frac{GBP}{USD})_{offer} = \frac{1}{(\frac{USD}{GBP})_{bid}} = \frac{1}{2.0010} = 0.4998$$

Now,

$$(\frac{GBP}{SFr})_{bid} = (\frac{GBP}{USD})_{bid} \times (\frac{USD}{SFr})_{bid} = 0.4995 \times 0.8550 = 0.4271$$

And

$$(\frac{GBP}{SFr})_{offer} = (\frac{GBP}{USD})_{offer} \times (\frac{USD}{SFr})_{offer} = 0.4998 \times 0.8560 = 0.4278$$

The GBP/SFr quote should be: GBP/SFr= 0.4271 – 78.

5. Solution: A.

The original 60-day forward contract calls for long GBP. So the all-in forward price FP= 2.0085. After 30 days, the contract would still have 30 days remaining to expiration. The new 30-day

all-in forward price to sell GBP is 2.0086 + (7.6/10,000) = 2.00936. The relevant 30-day USD interest rate is 4%.

$$V_t = \frac{(FP_t - FP)(\text{contract size})}{1 + R(\frac{days}{360})} = \frac{(2.00936 - 2.0085)(1,000,000)}{1 + 0.04(\frac{30}{360})} = \text{USD } 857.14$$

6. Solution: B.

Covered interest rate parity requires that

$$\frac{F}{S} = \frac{1 + R_{\$}}{1 + R_{BU}}$$

$$\frac{F}{S} = \frac{2.10}{2.00} = 1.05$$

$$\frac{1 + R_{\$}}{1 + R_{BU}} = \frac{1 + 0.05}{1 + 0.03} = 1.019$$

The BUN should appreciate by 1.9% per year. However, in the forward market, the BUN is trading at a premium of 5%. Therefore, the appropriate arbitrage strategy is to sell BUN in the forward market as below:

1. Borrow $1,000 at 5%. At the end of one year, Williams will be obligated to repay $1,000(1.05) = $1,050.
2. Convert the $1,000 to BUN at the spot rate, which yields $1,000 / ($2/BUN) = BUN 500.
3. Simultaneously enter into a 1-year forward contract to convert BUN to USD at the forward rate of $2.1000/BUN.
4. Invest BUN 500 at 3%. In one year, Williams will receive proceeds of BUN 500 (1.03) = BUN 515.
5. Convert the BUN 515 back to USD at the forward rate, which was locked in at the beginning of the year and yields BUN 515 ($2.1/BUN) = $1,081.50.
6. Arbitrage profits = $1,081.50 – $1,050 = $31.50.

Case 4: Teresa Young（考点：Currency Exchange Rates, Economic Growth, Regulation）

1. Solution: B.

Relative PPP hypothesizes that changes in nominal exchange rates over time are equal to national inflation rate differentials.

The equation for relative PPP is:

%ΔS(A/B) = inflation(A) – inflation(B)

Since the ¥ has the higher inflation rate, the ¥ should depreciate by 4% per year or 2% over 6 months. Therefore, E(S1) = ¥95 × 1.02 = ¥96.90.

2. Solution: C.

The real interest rate parity condition is the theory that real interest rates will converge to the same level across different markets. If real interest rate parity holds, then the level of real interest rates in one country will be identical to the level of real interest rates in a second country.

3. Solution: A.

Under the Mundell-Fleming model, a restrictive monetary/expansionary fiscal policy in the presence of high capital mobility would lead to a capital account surplus (due to inflow of capital) and domestic currency appreciation. Note that the question is asking for the ''least likely'' result.

4. Solution: C.

Regulations are needed in the presence of externalities and informational frictions. One example of a friction is asymmetrical information, which allows one market participant to have an advantage over another.

5. **Solution: A.**

Allocation of education spending among primary, secondary, and post-secondary education can be an important determinant of growth. In developed countries like the United States and Japan, incremental spending on post-secondary education will encourage innovation and growth to a greater degree than will spending on primary and secondary education.

6. Solution: A.

Growth rate of output = (rate of technological change) + α(growth rate of capital) + (1 – α)(growth rate of labor)

(1 – α) = labor cost / total factor cost = 0.36 (given)

$\alpha = 1 - 0.36 = 0.64$

Plugging the data given and solving for rate of technological change gives:

1.8% = (rate of technological change) + (0.64)(1.67%) + (0.36)(1.2%)

rate of technological change = 0.3%

Going forward, E(rate of technological change) = 0.3% - 0.1% = 0.2%.

E(growth in capital) = 1.67% + 0.1% = 1.77%

Growth in labor is expected to be unchanged at 1.2%.

Growth in potential GDP = E(GDP growth rate)

= E(technology growth) + α[E(growth in capital)] + (1-α) [E(growth in labor)]

= 0.2% + (0.64)(1.77%) + (0.36)(1.2%)

= 1.76%

Case 5: Summit Consulting（考点：Currency Exchange Rates）

1. Solution: C.

We want to convert ¥ to NT$ (via USD). Since we are not given the starting ¥ position, we start with a hypothetical ¥1,000 contract size. The quotes given are $/¥ and $/NT$. To convert ¥ to $ (i.e., going "up the quote") use the bid price (and multiply). To convert from $ to NT$ we use the offer price (and divide).

Step 1: Convert 1,000 yen to USD at $0.008852 to obtain 1,000 × 0.008852 = $8.852.

Step 2: Convert $8.852 to NT$ at $0.02876 to get 8.852 / 0.02876 = NT$ 307.7886.

Now, we want NT$ 10 million or 10,000,000 / 307.7886 = 32,489.8323 ¥ contracts or ¥32,489,832.

Alternatively, we can calculate the NT$/Yen cross rate as 0.307789-0.308142.

To convert Yen to NT$ (going up the quote, use bid price and multiply):

Yen × 0.307789 = NT$ 10,000,000

Yen = 10,000,000 / 0.307789 = 32,489,790.

2. Solution: A.

Surratt is correct. Market conditions affect currency spreads such that the bid-ask spread on foreign currency quotations increases as exchange rate volatility (uncertainty) increases. In this example, an economic crisis in the Asian markets would create uncertainty, thereby impacting the $/¥ and $/NT$ exchange rates and increasing the bid-ask spread.

Castillo is incorrect. Bank and other currency dealer positions are not considered to directly impact the size of foreign currency spreads.

In this example, it is true that the dealer would likely reduce her yen ask (selling price) if she wanted to unload an excess inventory of yen. However, the dealer would also probably reduce her bid (buying price) so that she did not buy any additional yen. The result would be that the spread would remain relatively unchanged.

3. Solution: A.

Surratt is correct. Under the Mundell-Fleming model, restrictive monetary policy reduces the growth rate of the money supply and will lead to appreciation of a country's currency. Restrictive monetary policy will increase the interest rate and, consequently, the demand for domestic physical and financial assets. This increase in financial inflows (increase in the financial account) increases the demand for the domestic currency for investment purposes leading to its appreciation.

Choice C is incorrect because we are given in the vignette that the foreign interest rates remain constant.

4. Solution: B.

Castillo is incorrect with respect to the impact of unanticipated restrictive fiscal policies on the value of the Canadian dollar.

A reduction in the budget deficit means that government borrowing will decline, which reduces interest rates and causes investment funds to flow out of the country. As a result, the value of the Canadian dollar tends to decline.

5. Solution: C.

The 90-day USD and SF interest rates are 18% / 4 = 4.5% and 12% / 4 = 3% respectively.

Using CIRP, F = S (1+R) / (1+R) = 0.85 (1.045) / (1.03) = $0.8624 / SF, which is greater than the market forward price of $0.80/SF. This implies that SF is trading at a bargain price in the forward market—buy it!

At t=0	Cash Flow
Buy (i.e., long position in) SF in forward market at $0.80/SF	$0
Sell 1,176,471 SF in the spot at $0.85/SF	$1,000,000
	(1,176,471 SF)
Borrow 1,176,471 SF for 90 days @ 12% annual rate	1,176,471 SF
Invest $1 million for 90 days @ 18% annual rate	($1,000,000)
Total cash flows at t = 0	0

At t=90	Cash Flow
Receive USD with interest	$1,045,000
Convert USD 969,412* into SF at previously locked-in forward rate of $0.80/SF	($ 969,412)
	SF 1,211,765
Repay the SF loan taken at t = 0	(1,211,765)
Total cash flows at t =90	$75,588

**This is the amount needed to repay the SF loan (with interest) after conversion.*

6. Solution: A.

Only factor 3 is correct. Factor 1 incorrectly specifies the size of expected future deficits rather than size of initial current account deficit. Factor 2 incorrectly specifies influence on domestic prices in general rather than domestic prices of traded goods (i.e., imports/exports).

Case 6: Angela Bobo（考点：Currency Exchange Rates，Economic growth）

1. Solution: A.

Roberts prefers the debt sustainability channel as a means to assess the long-run equilibrium value of exchange rates. According to this mechanism, there should be some upper limit on the ability of countries to run persistently large current account deficits. If a country runs a large and persistent current account deficit over time, eventually it will experience an untenable rise in debt owed to foreign investors. If such investors believe that the deficit country's external debt is rising to unsustainable levels, they are likely to reason that a major depreciation of the deficit country's currency will be required at some point to ensure that the current account deficit narrows significantly, and that the external debt stabilizes at a level deemed sustainable.

B is incorrect. The flow supply/demand channel mechanism focuses on the fact that purchases and sales of internationally traded goods and services require the exchange of domestic and foreign currencies in order to arrange payment for those goods and services. Such shifts in currency demand should exert upward pressure on the value of the surplus nation's currency and downward pressure on the value of the deficit nation's currency.

C is incorrect. The portfolio balance channel assumes that current account imbalances shift financial wealth from deficit nations to surplus nations. Countries with trade deficits will finance their trade with increased borrowing. This behavior may lead to shifts in global asset preferences, which in turn could influence the path of exchange rates.

2. Solution: A.

Statement 3 is the most accurate. Inflation tends to be significantly higher in pre-crisis periods compared with tranquil periods.

C is incorrect. Statement 1 is inaccurate. The terms of trade often deteriorates before a crisis.

B is incorrect. Statement 2 is inaccurate. Real economic activity does not display a distinctive pattern ahead of a crisis but falls sharply in the aftermath of a crisis.

3. Solution: C.

The Dornbusch modified monetary model relaxes the assumption that purchasing power parity holds in both the short and long term. Hence the Canadian government's action to loosen monetary policy will have differing implications on the CAD in the short and the long run. Because of relatively inflexible domestic prices in the short term, the overall price level increases less than the money supply, any increase in the nominal money supply would push down domestic interest rates, resulting in depreciation of the CAD and the exchange rate will even be

lower than its eventual equilibrium level. But in the long run, the CAD will appreciate back to its equilibrium value.

4. Solution: C.

Heightened immigration is a possible solution to the slowing labor force growth being experienced by many developed countries with low birth rates within the native polulation. With tightened immigration policy, the economic growth might be restricted due to the inadequate labor force.

Case 7: Vincent Lin（考点：Economics of Regulation）

1. Solution: B.

Battley is correct in her classification of FINRA as a SRO and the definition of regulatory capture theory – that regulation often arises to enhance the interests of the regulated.

2. Solution: B.

U.S. firms were most likely to be concerned due to early timing of the application of new more rigorous regulations in U.S. than in other G-20 countries. With more stringent regulations, some business may have flown to less stringent regulatory environments or jurisdictions.

3. Solution: C.

Globalization is likely to result in increased concerns about contagion and regulatory competition. It is easier for a financial shock to spread. Governments may use their regulatory environment to attract entities from around the world.

4. Solution: A.

Regulators view some costs associated with regulation as "unintended"; two types of such costs are implementation costs that were unanticipated, and indirect costs because of unintended consequences.

4. Financial Reporting and Analysis

4.1. Key Point

4.2. Key Practices

Case 1: AdOre (考点：Inter-corporate Investment)

1. Solution: B.

In 2011, although Glace had less than 20% ownership interest in AdOre, it was considered to have significant influence, which required the equity method.

2. Solution: A.

In 2011, Strawberry Mines used the equity method because it exercised significant influence and owned 32% of AdOre. Under the equity method, it should recognize its percentage share (32% × 18,182 = 5,818.2) of AdOre's net income.

3. Solution: C.

In 2011, Strawberry Mines owned 32% of AdOre's stock and had significant influence; therefore, it should have used the equity method. It will not report any dividends received from AdOre as income but would have deducted the dividends received from the carrying value of the investment in AdOre.

4. Solution: B.

In 2011, Cupernico had a controlling interest in AdOre and would have used the consolidation method. In consolidation, companies combine all of the assets, liabilities, revenues, and expenses of subsidiaries with the parent. Therefore, Cupernico would have included $40,000 (100%) of AdOre's long-term debt.

5. Solution: C.

In 2012, Cupernico and Glace shared joint control. Cupernico must use the equity method under US GAAP; if the ownership structure had not changed, Cupernico would have continued to use the consolidation method.

	Equity Method (Joint Control)	Consolidation (Control)	Comparison
Net income (NI)	Includes 50% of AdOre's net income as investment income	Once non-controlling interest is deducted, the net effect is that 50% of AdOre's net income is included	Same

Revenues	Includes only Cupernico's	Includes 100% of AdOre's plus Cupernico's	Lower under equity
Net profit margin = NI/Revenues			Higher under equity method because of lower revenues (after the change)
Equity	Includes only Cupernico's	Includes Cupernico's plus the non-controlling interest of AdOre	Lower under equity
ROE = NI/Equity			Higher under equity method because of lower equity
Total assets	Includes 50% of net assets of AdOre as Investment	Includes 100% of AdOre's assets added to Cupernico's	Lower under equity
ROA = NI/Assets			Higher under equity method because of lower assets

6. Solution: A.

Fair value of consideration for 80%	$54,400	
Minus 80% of fair value of identifiable net assets	52,000	80% × $65,000
Goodwill, under partial goodwill method	$2,400	

Case 2: Engineered Packaging, Inc. (考点：Inter-corporate Investment)

1. Solution: C.

Total assets, liabilities, revenues, and expenses are higher under proportionate consolidation as compared to the equity method. However, net income and stockholders' equity are the same under either method. Accordingly, profit margin and return on assets are typically lower under proportionate consolidation than under the equity method. Return on equity will be same under either method.

The following financial statements are provided for informational purposes only. The numbers in the acquisition method are derived as EPI + EP/BM LLC, except for the equity items.

In Millions, Year-End 2018	EPI	EP/BM LLC	Acquisition Method
Revenue	$3,115	$421	$3,536
Cost of goods sold	$2,580	$295	$2,875
SG&A	$316	$50	$366
EBIT	$219	$76	$295
Interest expense	$47	$8	$55
Equity in earnings of EP/BM	$22		-
Pretax income	$194	$68	$240
Income tax	$60	$24	$84
(-)Noncontrolling interest			$22 *
Net income	$134	$44	$134
In Millions, December 31, 2018			
Assets			
Cash	$118	$13	$131
Accounts receivable	$390	$50	$440
Inventory	$314	$41	$355
Property	$1,007	$131	$1,138
Investment	$38		-
Total	$1,867	$235	$2,064
Liabilities and Equity			
Accounts payable	$274	$35	$309
Long-term debt	$719	$125	$844
Equity	$874	$75	$911 **
Total	$1,867	$235	$2,064

*50% of EP/BM LLC's net income of $44

**$874 + noncontrolling interest (50% of EP/LLC's equity of $75)

2. Solution: C.

Current ratio = current assets / current liabilities; (131 + 440 + 355) / 309 = 3.0.

3. Solution: C.

Interest coverage = EBIT / interest expense; 295 / 55 = 5.36.

4. Solution: A.

Under Equity Method:

Long-term debt to equity ratio = 719 / 874 = 0.82

Under Acquisition Method:

Long-term debt to equity ratio = 844 / 911 = 0.93

5. Solution: B.

Regardless of the upstream/downstream sale, the net income would be identical under equity method and under acquisition method. All assets (including inventory) would be higher under acquisition method, regardless of upstream/downstream sale.

6. Solution: C.

Net income will be the same under the acquisition method (partial or full goodwill) and proportionate consolidation. Stockholders' equity will be higher under the acquisition method due to minority interest; thus, ROE will be higher under proportionate consolidation relative to the acquisition method.

Case 3: Jim Loris (考点：Employee Compensation)

1. Solution: B.

Loris's response about the past service costs is most accurate. Past service costs arise because of the enrichment of the pension benefit to be received under the plan. Under US GAAP, any past service costs will be reported in other comprehensive income and are amortized on the profit and loss statement over the average service lives of the employees. Under IFRS, the past service costs are recognized as an expense in the income statement.

2. Solution: C.

Determination of annual unit credit (benefit)

Estimated final salary (Exhibit 1): $71,261

Estimated annual (end of year) payment in retirement (six years of service, 2014–2019): $71,261 × 1.75% × 6 = $7,482.41

Present value of estimated future payments as of the start of retirement (keystrokes using a financial calculator): PV of 7,482.41 for 25 years at 7.5% (N = 25, I = 7.5, PMT = 7,482.41, Mode: End; PV =?) = $83,406

Annual unit credit at time of retirement per service year: 83,406/6 = $13,901

Determination of build-up of pension obligation for the employee

	Calculation for 2014	2014	Calculation for 2015	2015
Opening obligation		0	From close of 2014	$9,683
Interest cost at 7.5%		0	$9,683 × 0.075	$726
Current service cost (PV of the unit credit)	$13,901/[(1+0.075)^5]	$9,683	$13,901/[(1 + 0.075)^4]	$10,409
Closing obligation		$9,683		$20,818

3. Solution: B.

The yield on high quality corporate bonds is the appropriate discount rate that should be used to calculate the present value of the future benefits because it represents the rate at which the defined-benefit obligation could be effectively settled.

4. Solution: C.

The current service cost will decrease, not increase. A higher discount rate means that the present value of the future benefits earned in retirement will be lower and thus the annual unit credit will be lower. Therefore, the current service cost will decrease.

5. Solution: C.

Under US GAAP, the periodic pension cost is calculated as follows:

$ thousands	
Current service cost	1,151
Interest cost on the obligation	5,441
Less expected return on plan assets	–4,597
Plus amortization of past service costs	272
Periodic pension cost	2,267

6. Solution: B.

The total periodic pension cost is the change in the net pension asset or liability excluding the effect of the employer's periodic contribution to the plan.

(thousands)	Pension Obligations	Pension Assets	Net Liability [a]
End of year	74,077	61,812	12,265
Less start of year	72,544	60,096	–12,448
Net change in funded status (decrease in net liability)			183
Employer's contributions (cost)			887
Less decrease in liability			–183
Total periodic pension cost [b]			704
Alternative Calculation:			
Service cost			1,151
Interest cost			5,441
Less actual return on plan assets			–5,888
Total periodic pension cost			704

a A net pension liability is a negative funded status.

b Total periodic pension cost represents the decrease in the net pension liability by $183 thousand and the employer's contribution of $887 thousand: $887 – $183 = $704 thousand.

Case 4: Stanley Bostwick (考点：Employee Compensation)

1. Solution: A.

In a defined contribution plan, pension expense is equal to the amount contributed by the firm. The plan participants bear the shortfall risk. There is no pension obligation in a defined contribution plan.

2. Solution: C.

Under U.S. GAAP and under IFRS, Global Oilfield would report the funded status in its balance sheet.

3. Solution: C.

The assumed discount rate increased from 6.25% in 20X7 to 6.75% in 20X8 (Exhibit 4). There is an inverse relationship between the discount rate and the present value of a future sum. Thus, the increase in the discount rate resulted in an actuarial gain (lower PBO). An increase in life expectancy would result in an actuarial loss. Decrease in expected rate of return would increase reported pension expense but would not affect PBO.

4. Solution: C.

A decrease in the compensation growth rate will reduce service cost. Lower service cost will result in lower pension expense and, thus, higher net income. Lowering the compensation growth rate will also reduce the PBO. A lower PBO will increase the funded status of the plan (make the plan appear more funded). The compensation growth rate assumption has no effect on the plan assets.

5. Solution: B.

For the year-ended 20X8, Global Oilfield's reported pension expense was €8,028 (Exhibit 3), and its total periodic pension cost was €3,410. Total periodic pension cost can be calculated as plan contributions minus the change in funded status [€5,000 — (€2,524 funded status for 20X8 — €934 funded status for 20X7)].

6. Solution: A.

Total periodic pension cost represents the true cost of the pension. If the firm's contributions exceed its true pension expense, the difference can be viewed as a reduction in the overall pension obligation similar to an excess principal payment on a loan. Pension contributions are reported as operating activities in the cash flow statement while principal payments are reported as financing activities. Thus, the adjustment involves increasing operating cash flow by €750 (€5,000 employer contributions — €4,250 total periodic pension cost) and decreasing financing

cash flow by the same amount.

Case 5: Lauren Jacobs (考点：Employee Compensation)

1. Solution: B.

Funded status equals fair value of plan assets minus PBO (395 - 635 = —240). Because the funded status is negative, Iron Parts would report a liability of $240 million.

2. Solution: A.

Discount rate increased from 5.5% to 6.0%. An increase in the discount rate will result in lower service cost. Lower service cost will result in a lower PBO. A lower PBO will result in a higher funded status (more funded). Lower service cost will result in lower pension expense and higher retained earnings. The impact on interest cost cannot be determined without more information.

3. Solution: C.

$327 beginning balance plan assets + $37 actual return + contributions - $22 benefits paid = $395 ending balance plan assets. Solving for the contributions, we get $53.

4. Solution: C.

The higher expected return reduces pension expense. Lower pension expense results in higher net income. Higher net income results in higher retained earnings. Neither the PBO nor the funded status is affected by the expected return on plan assets.

5. Solution: C.

Amount reported under IFRS:

Service cost	$37
Interest cost[1]	$10.4
Past service cost	$80
Pension cost on P&L	$127.4 million

Interest cost = discount rate x beginning funded status = 0.06 x (500 — 327)

6. Solution: B.

Total periodic pension cost can be calculated by summing the changes in the PBO for the period (excluding benefits paid) and then subtracting the actual return on assets. The change in the PBO (excluding benefits) is $157 (635 reported 20X8 PBO + 22 benefits paid - 500 reported 20X7 PBO). Subtract the actual return to get economic pension expense of $120 (157 change in PBO excluding benefits paid - 37 actual return).

Alternatively, total periodic pension cost is equal to contributions minus change in funded status. 20X8 funded status was -240 (395 plan assets — 635 PBO) and the funded status for 20X7 was -173 (327 plan assets - 500 PBO). Contributions were $53 (calculated in Question 21). Thus, total

periodic pension cost is $120 [53 - (-67)].

Case 6: WMC (考点：Multinational Operations)

1. Solution: C.

Because YTC operates independently and makes its own financing decisions, the local currency (AUD) should be the functional currency. Current rate method should be used. Under the current rate method, all of the income statement items are translated using the average rate for the year.

2015 translated net income = 25 / 1.30 = 19.23

2016 translated net income = 12 / 1.45 = 8.28

Growth in net income = (8.28 / 19-23) - 1 = -56.94%

2. Solution: B.

Under the temporal method, the nonmonetary assets and liabilities are remeasured at historical rates. Thus, only the monetary assets and liabilities are exposed to changing exchange rates.

Since YTC has net monetary liability, WMC exposed to loss when the foreign currency (AUD) is appreciating.

3. Solution: B.

Total asset turnover = revenue / total assets

Revenues are translated using the same average exchange rate in the temporal and current rate methods. Under the current rate method, assets are translated using the current rate. Under the temporal method, monetary assets are translated using the current rate, and nonmonetary assets are translated using the historical rate. Because the historical rate is lower than the current rate, the nonmonetary assets (and therefore total assets) will have a higher value under the temporal method. A higher asset value means a lower total asset turnover ratio under the temporal method.

The calculation of the total asset turnover ratio using both methods is provided for reference below:

	Temporal		*Current Rate*	
Cash	20 / 1.50 =	13.33	20 / 1.50 =	13.33
Accounts receivable	460 / 1.50 =	306.67	460 / 1.50 =	306.67
Inventories	30 / 1.20 =	25.00	30 / 1.50 =	20.00
Prepaid expenses	25 / 1.20 =	20.83	25 / 1.50 =	16.67
Fixed assets	400 / 1.20 =	333.33	400 / 1.50 =	266.67
Total assets		699.16		623.34
Revenues	870 / 1.45 =	600.00	870 / 1.45 =	600.00
Total asset turnover	600.00 / 699.16 =	0.86	600.00 / 623.34 =	0.96

4. Solution: A.

AUD revenue growth rate = (870 / 765)1/2 - 1 = 6.64%

Revenues are translated at average rate:

2014 USD revenues = 765 / 1.40 = 546.43; 2016 USD revenues = 870 / 1.45 = 600 USD revenue growth rate = (600 / 546.43)1/2 — 1 = 4.79%

The USD revenue growth rate is 1.85% lower than the local currency (AUD) revenue growth rate.

5. Solution: C.

Under both the current rate and temporal methods, the revenues for the Ukrainian subsidiary would be translated using the average rate. Cost of goods sold (COGS) would be translated using the historical rate for the temporal method and the average rate for the current rate method. When a currency is depreciating, the COGS based on historical cost (temporal method) will be higher than COGS translated at the average rate (current rate method) since the average rate will incorporate the historical exchange rate and the most recent (depreciated) exchange rate, decreasing the COGS. Since translated sales are the same under both methods, gross profit and the gross profit margin will be higher under the current rate method.

6. Solution: C.

U.S. accounting standards define a hyperinflationary economy as one in which the 3-year cumulative inflation rate exceeds 100%. The Indian economy can be characterized as hyperinflationary. The inflation rate over the past three years can be calculated as follows:

Year 1 inflation= [(1+ 0.3464) / (1 + 0.020)] -1= 32%

Year 2 inflation= [(1+ 0.2915) / (1 + 0.025)] -1= 26%

Year 3 inflation= [(1+ 0.2566) / (1 + 0.030)] - 1= 22%

Cumulative 3-year inflation = (1.32) (1.26) (1.22) - 1= 103%

U.S. accounting standards allow the use of the temporal method, with the functional currency being the parent's reporting currency, when a foreign subsidiary is operating in a hyperinflationary environment. IFRS accounting standards allow the parent to translate an inflation-adjusted value of the nonmonetary assets and liabilities of the foreign subsidiary at the current inflation rate, removing most of the effects of high inflation on the value of the nonmonetary assets and liabilities in the reporting currency. In a hyperinflationary environment, the parent company can reduce translation losses by reducing its net monetary assets or increasing its net monetary liabilities. In order to do this, the parent should issue debt denominated in the subsidiary's local currency and invest the proceeds in fixed assets for the subsidiary to use in its operations.

Case 7: Ota L' Abbe (考点：Multinational Operations)

1. Solution: C.

Subsidiaries whose operations are well integrated with the parent will use the parent's currency as the functional currency. When the functional currency is the same as the parent's presentation currency (reporting currency), as it is in this case, the temporal method is used. Therefore, Statement 1 is incorrect.

Self-contained, independent subsidiaries whose operating, investing, and financing activities are primarily located in the local market will use the local currency as the functional currency. When the functional currency is not the same as the parent's presentation currency (reporting currency), as in this case, the current rate method is used. Therefore, Statement 2 is incorrect.

2. Solution: A.

Sales will be lower after translation because of the depreciating U.S. dollar

3. Solution: B.

Depreciation expense and COGS are remeasured at the historical rate under the temporal method. Under the current rate method, depreciation and COGS are translated at the average rate. Because the U.S. dollar is depreciating, depreciation expense and COGS are lower under the current rate method.

4. Solution: B.

The Canadian dollar is the functional currency because the subsidiary is highly integrated with the parent. Therefore, the temporal method applies.

Step 1: Remeasure the balance sheet using the temporal method.

	2008 (USD)	Rate	2008 (CAD)
Cash and account receivables	775,000	1.32	1,023,000
Inventory (given in Item 9)	600,000	Given	810,000
PP&E (net)	730,000	1.50	1,095,000
Total assets	2,105,000		2,928,000
Accounts payable	125,000	1.32	165,000
Long-term debt	400,000	1.32	528,000
Common stock	535,000	1.50	802,500
Retained earnings	1,045,000	(a)	1,432,500
Total liabilities and shareholders'	2,105,000		2,928,000
(a) Retained earnings is a plug figure that makes the accounting equation balance CAD 2,928,000 assets - CAD 165,000 accounts payable - CAD 528,000 long-term debt - CAD 802,500 common stock = CAD 1,432,500.			

Step 2: Derive net income from the beginning and ending balances of retained earnings and dividends paid as follows:			
	CAD		
Beginning retained earnings	1,550,000 Given Item 6		
Net income	(83,250) Calculate		
Dividends paid in the year	(34,250)	(25,000 x 1.37 historical rate)	
Ending retained earnings	1,432,500 From Step 1		
Remeasure the income statement using the temporal method.			
最新资料加V：zyz786468331	2008 (USD)	Rate	2008 (CAD)
Sales	1,352,000	1.35	1,825,200
Cost of goods sold (given Item 11)	(1,205,000)	Given	(1,667,250)
Depreciation expense	(140,000)	1.50	(210,000)
Remeasurement loss		(b)	(31,200)
Net income	7,000 From Step 2		(83,250)

The remeasurement loss is a plug that is equal to the difference in net income of- CAD 83,250 and income before remeasurement of-CAD 52,050 (CAD 1,825,200 sales — CAD 1,667,250 COGS - CAD 210,000 depreciation).

5. Solution: A.

The local currency (the USD) is depreciating, so the historical rate will be higher than the current rate. Fixed asset turnover (sales divided by net PP&E) will be higher under the current rate method. Net PP&E will be translated at the lower current rate, and because sales are the same under both methods, the ratio will be higher.

If you want to do the calculations, net PP&E under the current rate method is USD730, 000 x 1.32CAD/USD = CAD 963,600, and fixed asset turnover is CAD 1,825,200/CAD 963,600 = 1.9 times. Fixed asset turnover under the temporal method is CAD 1,825,200/CAD 1,095,000 = 1.7 times.

6. Solution: C.

Return on assets prior to translation will be different from the ratio after translation because the numerator (net income) is translated at the average rate, and the denominator (assets) is translated at the current rate using the current rate method.

Net profit margin will be the same because both the numerator (net income) and the denominator (sales) are translated at the average rate using the current rate method.

Case 8: Ali Saminder (考点：Financial institutions)

1. Solution: C.

Rule 1 is incorrect because riskier assets are assigned a higher weighting. Risk-free assets such as cash are typically assigned a weighting of zero, because their risk-free nature means that they do not need to be supported by capital. Riskier assets require more capital funding, hence the higher weighting and risk adjust value.

Rule 2 is also incorrect because off-balance sheet assets also require capital funding and hence should be included using the same risk weighting approach.

2. Solution: A.

Risk-weighted assets	601,312
Common equity tier I capital	87,390
Additional tier I capital	16,401
Tier 1 capital	103,791
Tier 2 capital	25,447
Total regulatory capital	129,238

Tier 1 ratio=$\frac{103,791}{601,312} = 17.3\%$

Total capital ratio=$\frac{129,238}{601,312} = 21.5\%$

3. Solution: C.

The internal document states that tier 1 capital is calculated in accordance with global standards, meaning that a deferred tax asset resulting from tax losses would already be excluded from tier 1 capital. A writedown would therefore not alter common tier 1 capital or the ratio

4. Solution: B.

Per Exhibit 1, convertible bonds are currently part of tier 2 capital. On conversion, they would become common stock and part of common tier 1 capital, hence tier 2 capital would decrease and common tier 1 capital would increase.

5. Solution: C.

Although client assets are client-owned and separate from the bank, and they do not require capital funding, the fees generated may be material to the earnings of the bank. Hence a significant decrease should impact the stability of the bank.

6. Solution: A.

	2015	2016	2017
High quality liquid assets	111,432	127,352	198,393
Net outflows	100,483	112,482	196,429
Liquidity coverage ratio=$\frac{high\ quality\ liquid\ assets}{net\ outflows}$	111%	113%	101%

The liquidity coverage ratio actually increased from 2015 to 2016, hence choice B is incorrect.

The net cash outflows are given for 30 days. An LCR ratio of 100% would mean JJK could withstand 30 days of stress-level outflows. To calculate the number of days JJK can withstand, multiply the LCR by 30.

	2015	2016	2017
Number of days of stress volume of cash outflows	30×1.11 33.3	30×1.13 34.0	30×1.01 30.3

Hence A is correct, the number of days decreased by 3 days from 33.3 to 30.3.

Available net stable funding excludes highly liquid assets, hence C is incorrect.

Case 9: Galaxy Electronics Case Scenario (考点：Evaluating Quality of Financial Reporting, Employee compensation)

1. Solution: C.

The change in revenue recognition to an earlier point, before the product has been produced or delivered, is an aggressive accounting policy that would lower the company's quality of earnings.

A is incorrect. The change in the warranty expense reflects updated information, and failure to act on it would underestimate earnings.

B is incorrect. The stock grants are expensed over the estimated service life of the employees, in this case the 3 years until it vests, and does not distort the quality of earnings.

2. Solution: C.

Deposits received	$3 million
Deposit as percentage of order	25%
Revenue recognized on receipt of order	$3 million/0.25 = $12 million
Gross profit margin	Gross profit/Sales = $53,000/$100,000 = 53%
Increment to gross profit from early recognition policy	53% × $12 million = $6.36 million

A is incorrect. It calculates the change in gross profit based on the difference between the actual amount of revenue and the amount of the deposit: 0.53 × (12 – 3) = $4.77.

B is incorrect. It calculates the change in gross profit based on the deposit: 0.53 × $3 = $1.59.

3. Solution: A.

The classification of warranty expense as a non-operating item reduces Galaxy's earnings quality. High-quality earnings allow investors to identify core or recurring earnings, and Galaxy's core earnings are overstated when an operating cost, like warranties, are classified as non-operating. The company disclosed the change in classification in both the MD&A and notes to the financial statements, thereby exhibiting high financial reporting quality.

B is incorrect. Galaxy has explained the change—the change may not be GAAP, but they did disclose it, exhibiting a reasonable level of reporting quality because it is still possible to assess a company's results

C is incorrect. The reclassification of an expense between operating and non-operating or non-recurring does not affect net income (and hence return on sales) but would affect the operating margin and the interpretation of core earnings.

4. Solution: B.

A DSRI (days sales in receivable index) greater than 1 indicates an inappropriate relationship

between accounts receivable and revenue recognition and is a potential signal of earnings manipulation. For Galaxy, it is the largest positive contributor (DSRI = 1.619) that would increase the M score. Larger values for the M-score (and contributors) are more indicative of earnings manipulation. Increasing leverage could predispose a company to manipulate earnings, but here the leverage index is negative indicating that leverage has decreased.

A is incorrect. Higher M-scores (less negative) indicate an increased probability of earnings manipulation. Here the lower (more negative score) would indicate that the company is less likely to be manipulating earnings.

C is incorrect. Increasing leverage could predispose a company to manipulate earnings, but here the leverage index is negative, indicating that leverage has decreased.

5. Solution: A.

The compensation expense for restricted stock grants is the fair market value of the shares on the grant date, and this amount is allocated over the three-year service period because of the three-year vesting period: $4.2 million/3 = $1.4 million.

B is incorrect. It expenses the entire amount on the grant date.

C is incorrect. It assumes that nothing is expensed until the vesting period is over.

6. Solution: A.

Only the executive stock option plan is affected by volatility of the company's stock. The volatility affects the initial valuation of the stock options granted, for example using the Black–Scholes model to determine the fair value of the options.

The initial valuation of the options determines the expense recognized. Compensation expense for stock grants is based on the fair market value of the stock on the day of the grant and is not affected by the stock's volatility.

B is incorrect. Stock options are directly affected by volatility, but stock grants are not.

C is incorrect. Stock options are directly affected by volatility, but stock grants are not.

Case 10: Robert (考点：Intercorporate Investments, Employee Compensation)

1. Solution: B.

Under IFRS 9, FVPL and FVOCI securities are carried at market value, whereas amortized cost securities are carried at historical cost. 56+74+100=230.

2. Solution: C.

If C had been classified as a FVPL security, its carrying value would have been the 110 fair value rather than the 100 historical cost.

3. Solution: A.

LA's cost of borrowing through the SPE is likely to decrease, because the SPE is bankruptcy remote from LA, and the lenders will have a direct claim on the receivables, thus allowing the SPE to borrow at preferred rates.

B is incorrect. LA's accounts receivable will decrease by €75M, while its cash will increase by €70M (€75M cash from the sale of receivables less €5M to set up the SPE). After consolidation, those changes are reversed and the consolidated balance sheet will be identical to the balance sheet under receivables borrowing.

C is incorrect because both IFRS and US GAAP will require the SPE to be consolidated into LA's balance sheet. The result is that the consolidated balance sheet will be identical to the balance sheet under receivables borrowing, and there will be no change in the ratios.

4. Solution: B.

Plan B is a defined contribution (DC) pension plan because the amount of future benefit is not defined and SKI has an obligation to make only agreed-upon contributions. The actual future benefits depend on the invest- ment performance of the individual's plan assets, and the employee bears the investment risk.

5. Solution: B.

A higher volatility assumption increases the value of the stock option and thus the compensation expense, which, in turn, reduces net income. There is no associated liability for stock options.

6. Solution: C.

A higher dividend yield reduces the value of the option and thus option expense. The lower expense results in higher earnings. Higher risk-free rates and expected lives result in higher call option values.

Case 11: John Wesley (考点：Multinational Operations , Financial Institutions)

1. Solution: A.

On SA's balance sheet, the cost included in the inventory account is the translation of ₣B27,000/ton into Norvoltian krone on the purchase date. SA could have paid this amount on the purchase date but chose to wait 45 days to settle the account. The inventory cost is determined using the ₣B/NVK exchange rate of 4.1779 on the purchase date of 1 June 2017.

₣B27,000/₣B4.1779/NVK = NVK6,462.58/ton.

The cash outflow is the amount exchanged from the Norvoltian krone to the Bindiar franc to pay the ₣B27,000/ton owed for the inventory 45 days after the transaction date. This payment uses the ₣B/NVK exchange rate of 4.1790 on the settlement date of 15 July 2017.

₣B 27,000/₣B4.1790 per NVK = NVK6,460.88/ton

Foreign exchange gain = Inventory cost – Cash payment

= NVK6,462.58 – NVK6,460.88

= NVK1.70/ton

Thus, SA's cash outflow is less than the cost included in the inventory account, and NVK1.70/ton is the realized foreign exchange gain relating to this transaction. By deferring payment for 45 days, and because the Bindiar franc decreased in value during this period, SA pays NVK1.70/ton less than the inventory cost on the purchase date of 1 June 2017. Thus, SA will report a foreign exchange gain in its 2017 net income.

2. Solution: B.

The consolidated income tax rate is calculated as income tax expense divided by profit before tax. Note 2 shows that SA's consolidated income tax rate decreases by 2.29%, from 34.94% (=94/269) in 2016 to 32.65% (=96/294) in 2017. The largest component of the decrease stems from the 1.42% change in the effect of tax rates in non-domestic jurisdictions, which lowers SA's consolidated income tax rate in 2016 by 3.34% (=9/269) and in 2017 by 4.76% (=14/294). The decrease in 2017 could indicate that SA's business mix shifted to countries with lower marginal tax rates, resulting in a lower consolidated income tax rate and more profit. (The change could also indicate that the marginal tax rates decreased in the countries in which SA earns profits.)

3. Solution: B.

The average return on fixed-income assets is calculated as follows: Investment income from fixed income ÷ Average fixed-income assets.

Investment income = Interest income + Gains/losses from fixed-income investments = $6,610 + $300 = $6,910.

Average fixed-income assets including debt securities + Loan and deposits = (½)($8,800 + $141,000) + (½)($9,000 + $130,800) = $144,800.

Average return = 6,910 ÷ 144,800 = 4.8%.

A is incorrect. It does not include the gains and losses on fixed-income investments:

6,610 ÷ 144,800 = 4.6%.

C is incorrect. It does not include the loans and deposits as fixed-income investments:

Average debt securities = ($141,000 + $130,800) × ½ = $135,900.
6,910 ÷ 135,900 = 5.1%.

4. Solution: C.

When the investment portfolio is examined using a common-size format, the proportion of the portfolio invested in equity securities has increased from 19.0% to 20.6% (see table below) whereas the proportion allocated to loans and deposits and debt securities has decreased. Equity investments are normally riskier than fixed-income investments, which would indicate that the investment portfolio's asset allocation is riskier in 2018 than in 2017.

A is incorrect. The total financial investments have not changed materially (97.4% to 97.5%), but that is not the best measure of the risk of the investment portfolio. The allocation of the portfolio between fixed-income and equity securities is a better measure of portfolio risk.

B is incorrect. The proportion allocated to loans and deposits and debt securities has decreased, but this would decrease the overall risk of the investment portfolio because fixed-income investments are less risky than equity investments. The higher proportion allocated to equity would increase the portfolio risk.

5. Solution: B.

Freddie is incorrect about the duration of the claims of ZA. ZA is a life and health insurance (L&H) company. L&H companies' claims are more predictable than those of property and casualty (P&C) companies, and their claims also have a longer duration than P&C those of companies. It is the combination of both of these factors that allows L&H companies to hold a greater proportion of equity investments than P&C companies.

A and C are incorrect. The products of a P&C company are usually shorter duration than those of an L&H company; thus, that part of Wesley's answer is incorrect.

6. Solution: A.

Wesley's comments about the regulatory requirements for US-based insurance companies are all correct. The insurance industry does not have a set of global regulatory standards like Basel III, but capital standards do exist in various jurisdictions, including the United States. In the United States, the NAIC (National Association of Insurance Commissioners) has established minimum capital adequacy standards. Also in the United States, insurance companies prepare financial reports according to statutory accounting rules, which differ from US GAAP and IFRS.

B is incorrect. Wesley's comments with respect to accounting rules are correct. In the United States, insurance companies prepare financial reports according to statutory accounting rules, which differ from US GAAP and IFRS.

C is incorrect. Wesley's comments with respect to capital adequacy are correct. The insurance

industry does not have a set of global regulatory standards as the banking industry has with its Basel III regulations, but capital standards do exist in various jurisdictions, including the United States. In the United States, the NAIC has established minimum capital adequacy standards.

Case 12: Hannah Treadway (考点：Evaluating Quality of Financial Reporting)

1. Solution: A.

In the past, revenue from service contracts had been recognized on a straight-line basis over the (typical) three-year period of the contract (Note 1 g in Exhibit 3). Under the new policy, most of the revenue is recognized in the first year and all of it within the two-year time frame. This represents a much more aggressive revenue recognition policy.

An increase in DSO could be an indicator of early revenue recognition but for CCCL the ratio did not change significantly (18.1 days in 2015 to 18.3 days in 2016 using year-end receivables).

Deferred tax assets (Exhibit 2) can arise from differences in revenue recognition for taxes and financial statement purposes (they would rise with increases in unearned revenue), but there is no indication here that revenue is the reason for the increase in deferred tax assets DTA (in fact, unearned revenue decreased). The deferred tax assets most likely arise from the loss carry forwards generated from earlier losses.

B is incorrect. Deferred tax assets can arise from differences in revenue recognition for taxes and financial statement purposes (they rise with increases in unearned revenue), but there is no indication here that revenue is the reason for the increase in DTA (in fact, unearned revenue decreased). They most likely arise from the loss carry forwards arising from earlier losses.

C is incorrect. An increase in DSO could be an indicator of early revenue recognition but for CCCL the ratio did not change substantially (18.1 days to 18.3 days using yearend receivables).

2016: 711,200/35,700 = 19.9× ≥ 18.3 days

2015: 674,600/33,500 = 20.1× ≥ 18.1 days

2. Solution: B.

In 2016, CCCL started capitalizing the discount offered (from selling the mobile devices at a lower price) instead of recording it in the period it is incurred. This change in the policy would increase net income (by lowering expenses) and cash from operations. The amounts capitalized would be recorded as cash outflows for investing activities, compared to cash from operations if they were expensed.

C is incorrect. The total assets would increase by the amount capitalized (as opposed to expensed) (be higher) hence the D/A ratio would decrease.

A is incorrect. Capitalizing decreases the quality of earnings because it would be more conservative and closer to cash flow to expense the losses in the period. The future benefit and the ability to match these costs to revenues are uncertain, particularly given CCCL's new policy to accelerate the recognition of revenue on long-term contracts.

3. Solution: B.

The broadcast licenses were written down in 2014, but the write-down was reversed in 2016.

Therefore, during 2015 the intangible assets were understated, which would have understated amortization expense for the year and increased profit. Thus in 2015, net profit margin was overstated.

C is incorrect. In 2015 the intangible assets were understated and net profit was overstated (due to the lower amortization expense), so ROA would have been overstated in 2015, not understated.

A is incorrect. In 2015 the intangible assets were understated, which would have increased asset turnover (Sales/Average total assets), so it would have been overstated during the year.

4. Solution: A.

Altman scores in excess of 3.0 indicate low probability of bankruptcy; those below 1.81 indicate a high probability of bankruptcy. Scores within the 1.81 to 3.0 range do not provide a clear indication of bankruptcy.

B is incorrect. The Altman score has increased, which might suggest less bankruptcy risk, but it is still in that zone of uncertainty.

C is incorrect. The Altman score has increased, which might suggest less bankruptcy risk, but it is still in that zone of uncertainty.

5. Corporate Finance

5.1. Key points

5.2. Key practice

Case 1: GigaTech (考点：Capital Budgeting)

1. Solution: B.

the final period cash flow indude the project cash flows, the return of net working capital， and the after-tax sale of fixed capital used in the project. Because Tera is a replacement project, the incremental cash flows must be calculated. In other words, we are concerned with the additional sales and costs derived from new equipment.

- incremental sales = 708,000 – 523,000 = $185,000
- incremental cash expenses = 440,000 – 352,000 = $88,000
- incremental depreciation = 110,667 – 40,000 = $70,667
- incremental project cash flows = (185,000 – 88,000 – 70,667)×(1– 0.40) + 70,667 = $86,467
- return of incremental net working capital = $110,000

In the final year, the book value of old machine (if not replaced) = 120,000 – 3×40,000 = 0.

Similarly, the book value of the new machine (if replaced) 332,000 – 3×110,667 = 0

- Incremental cash flow from after-tax sale of equipment

$$=(113,000-90,000)-0.40\left[(113,000-90,000)-(0-0)\right]=\$13,800$$

- total cash flow in final period = 86,467 + 110,000 + 13,800 = $210,267

2. Solution: C.

In scenario analysis, the analyst simultaneously changes several key variables to generate several different scenarios. Generally, three scenarios are created: (1) worst case, (2) most likely, and (3) optimistic. For the worst case scenario, for example, the analyst will use the slowest growth in sales, highest growth in expenses, and highest discount rate to derive an NPV under the worst of all possible situations. A similar approach is used to generate the optimistic scenario, but the best possible growth in each of the variables is used. The most likely is simply what the analyst thinks are the most reasonable assumptions for the discounted cash flow forecast under normal conditions. Using the different cases, the analyst can assess the risk of the project.

3. Solution: A.

Once the Tera Project is begun, the project will be necessary for continuing operations. This is likely a result of the replacement nature of the project. If the equipment necessary for GigaTech's operations is replaced with newer equipment, abandoning the project is not really an option. Management does have the option of scaling up the project after initiation, which is known as an expansion option. Management can also wait up to nine months to make a decision on the Tera

Project, giving them a timing option (note that this is not one of the answer choices). Finally, the equipment used in the Tera Project can support additional shifts if demand for GigaTech's products temporarily exceeds supply, giving them a flexibility option (specifically a production-flexibility option).

4. Solution: B.

The least common multiple of lives approach requires estimating the least common denominator between two mutually exclusive projects with unequal lives. Since the Zeta and Sigma projects have lives of 3 and 2, the least common multiple is 6. The cash flows must be stated over a 6-year period, repeating the cash flow pattern as often as necessaty (two times for Zeta and three times for Sigma). The cash flows are then discounted to find the net present value (NPV). The project with the highest NPV is selected. The cash flows are as follows:

Year							
	0	**1**	**2**	**3**	**4**	**5**	**6**
Zeta Project	-360,000	250,000	220,000	190,000			
				-360,000	250,000	220,000	190,000
Total	-360,000	250,000	220,000	-170,000	250,000	220,000	190,000
Sigma Project	-470,000	330,000	390,000				
			-470,000	330,000	390,000		
					-470,000	330,000	390,000
Total	-470,000	330,000	-80,000	330,000	-80,000	330,000	390,000

Before calculating the NPV of each project, the cost of must be restated in nominal terms since cash projections are nominal terms. The nominal cost of capital is equal to 15.0% = (1 +0.1058) (1 + 0.04). The NPV of each project is calculated as follows:

$$NPV_{Zeta} = -360,000 + \frac{250,000}{1.15} + \frac{220,000}{1.15^2} + \frac{-170,000}{1.15^3} + \frac{250,000}{1.15^4} + \frac{220,000}{1.15^5} + \frac{190,000}{1.15^6}$$

$$= 246,425$$

$$NPV_{Sigma} = -470,000 + \frac{330,000}{1.15} + \frac{-80,000}{1.15^2} + \frac{330,000}{1.15^3} + \frac{-80,000}{1.15^4} + \frac{330,000}{1.15^5} + \frac{390,000}{1.15^6}$$

$$= 260,381$$

Since its NPV is greater, GigaTech should select the Sigma project.

5. Solution: C.

The comment sin the memo from GIgaTech's board of directors are both incorrect. Earnings per share (EPS) is not a suitable criteria to evaluate capital budgeting projects. Under capital rationing, a firm selects the projects that increase the value of the firm by the greatest amount (i.e., have the highest NPV) subject to the capital constraints of the firms's budget. It is perfectly possible that projects that increase EPS will not get selected. For example, if a project has an NPV of $80 and increases EPS by $0.50 and a second project has an NPV of $200 but will initially reduce EPS by $0.20, the firm should select the second project (if its capital budget will allow it) since it adds more value. The capital budgeting process should not consider sunk costs (i.e., past costs that do not affect the cash flows of the project) such as costs to find investment projects. The cash flow projections should consider the economic impact increased competition resulting from highly profitable investment projects.

6. Solution: B.

When evaluating potential capital investment projects, discount rate should be adjusted for the risk of the project under consideration. This is frequently accomplished by determining a project beta using this beta in the CAPM security market line quation:

$$r_i = R_F + \beta_i \left[E(R_M) - R_F \right]$$

Project betas can be determined in a number of ways including using proxy firms with operations similar to the project under consideration, estimating an accounting beta, or through cross-sectional regression analysis. Whatever method used to determine the discount rate, it should be clear that the weighted average cost of capital (WACC) is only appropriate for projects with risk similar to the overall firm. If a project is more (less) risky than the overall firm, the discount rate used to evaluate the project should be greater (less) than the firm's WACC.

Case 2: Cummings Enterprises, Inc. (考点：Capital Budgeting)

1. Solution: C.

Initial investment outlay

= purchase price + increase in net working capital + shipping and installation costs

= $700,000 + ($50,000 − $20,000) + $100,000 = $830,000

Terminal year after-tax non-operating cash flow (TNOCF)

= SalT + NWCInv − T (SalT − BT)

= 75,000 + 30,000 − 0.4(75,000 − 0)

= 75,000

After-tax operating cash flow (Year 4)

= (S − C) (1 − T) + DT

= ($750,000 − $225,000 − $75,000) (1 − 0.4) + (0.4) ($56,000) = $292,400

The book value at the end of Year 4 is $0 because total depreciation over the four years was $800,000.

Total CF (Year 4) = $292,400 + $75,000 = $367,400

2. Solution: C.

Both recommendations are incorrect. The $100,000 is a sunk cost and is thus not a relevant cash flow. Using straight-line depreciation will reduce the present value of the depreciation tax shield and reduce the NPV.

3. Solution: B.

By ignoring the initial $30,000 cash inflow (recall that you are asked to assume it is an inflow), he has underestimated project NPV by $30,000. By ignoring the terminal cash outflow of $30,000, he has overestimated the project NPV by

$$\frac{\$30{,}000}{1.08^4} = \$22{,}050$$

The net effect is to underestimate NPV by $30,000 − 22,050 = $7,950.

4. Solution: B.

The overall NPV of Project 1 = project NPV − option cost + option value.

Overall NPV = –$7 million − $3 million + $9 million = –$1 million

Without the option, the NPV of the production facility is negative, and the real option does not add enough value to make the overall project profitable.

Holbrook is incorrect that he needs to wait for more information to make the decision on Project 2. If the NPV of the project without the option is positive, the analyst knows that the project with the option must be even more valuable, and determining a specific value for the option is unnecessary. A real option adds value to a project, even if it is difficult to determine the monetary amount of that value.

5. Solution: B.

Economic income = cash flow − economic depreciation

Economic depreciation = beginning market value − ending market value

Market value at time t = present value of all remaining cash flows discounted at the WACC

$$\text{Year 3 beginning market value} = \frac{\text{CF}_3}{(1+\text{WACC})^1} + \frac{\text{CF}_4}{(1+\text{WACC})^2} = \frac{\$318{,}000}{(1.08)^1} + \frac{\$367{,}400}{(1.08)^2}$$

=$294,444+$314,986=$690,430

$$\text{Year 3 ending market value} = \frac{\text{CF}_4}{(1+\text{WACC})^1} = \frac{\$367{,}400}{(1.08)^1} = \$609{,}430$$

Year 3 after-tax operating cash flow (given) = $318,000

Year 3 economic depreciation = $609,430 − $340,185 = $269,245

Year 3 economic income = $318,000 − $269,245 = $48,755

6. Solution: C.

Comment 1 is incorrect. Interest should not be included in a project's cash flows when conducting NPV analysis because it is a financing cost that is reflected in the discount rate use to compute NPV.

Comment 2 is incorrect. In theory, when discounted at the WACC, the present value of the economic profits from a project equals the NPV of the project. For a given period, economic profit = NOPAT − $WACC, where NOPAT is net operating profit after taxes and $WACC is the dollar cost of the capital used during the period. Economic profit reflects the income earned by all capital providers.

Case 3: MavsHD (考点： Dividends and share repurchase)

1. Solution: B.

Managers at MavsHD want to move toward the target payout ratio over a period of 8 years, which makes the adjustment factor equal to: 1 / 8 = 0.125. The previous dividend and the expected dividend increase are given as $21.75 million and $250,000 ($0.25 million) respectively. Additionally, earnings at the end of the current year is $153 million. Plugging each of these figures into the formula:

The expected increase in dividends = (Expected earnings*target payout ratio – previous dividend) *adjustment factor

0.25 Million = (153 million * target payout ratio – 21.75 million) * 0.125

The target payout ratio can be calculated as:

$$\text{Target payout ratio} = \left(\frac{0.25}{0.125} + 21.75\right) \div 153 = 0.1552 = 16\%$$

2. Solution: C.

Paying a premium price for the shares (i.e., a price higher than the current market price of the stock) will reduce the value of the remaining shareholders' shares. However, this value reduction is actually transferred to the selling shareholders since they receive more than the market value per share for selling their shares.

3. Solution: C.

$$\mathrm{P} = \mathrm{D} \times \frac{(1 - T_d)}{(1 - T_{cg})} = 2.25 \times \frac{(1 - 0.15)}{(1 - 0.396)} = 3.17$$

4. Solution: C.

Investors do not like instability in the dividends paid by a company. Any volatility in dividends is seen as a negative sign by investors, and the company's stock price would be punished as a result of varying dividends. According to the bird-in-the-hand theory, investors prefer the assurance of receiving a higher dividend today rather than waiting for returns in the form of capital appreciation. Because of the uncertainty associated with capital appreciation and the relative certainty of dividends, the bird-in-the-hand theory predicts that investors will reward dividend paying companies with a lower cost of equity and, thus, a higher equity value. A repurchase does not provide the same type of assurance since it is an unpredictable and possibly one-time event.

5. Solution: A.

If the company plans on spending $160 million on net investments, then only 60% of the funds need to come from retained earnings. Therefore, MavsHD needs 0.6 x 160 = $96 million in

retained earnings. Net income is projected to be $153 million, leaving $57 million (153 - 96) available to pay dividends. Thus, the dividend payout ratio would equal 57 / 153 = 37.3%.

6. Solution: B.

Under a residual dividend policy, a firm determines the optimal capital budget and then uses retained earnings to fund the optimal capital budget, paying out what is left over to shareholders. Because the amount of distributable earnings is not known in advance and is determined as a function of the capital budget, the dollar dividend paid to shareholders will fluctuate widely from year to year. However, the firm will be able to use internally generated funds to a greater extent when deciding how to fund the optimal capital budget. It is not true; however, that the residual dividend policy will reduce the firm's cost of capital. Investors do not like unpredictable dividends and will penalize the company in the form of a higher required return on equity to compensate for the additional uncertainty related to dividend payments.

Case 4: Aubrey Yacht Manufacturers Case Scenario (考点：Capital structure, dividend policy)

1. Solution: C.

Compare stable dividend, constant dividend payout ratio, and residual dividend payout policies, and calculate the dividend under each policy.

Each year, from 2003 to 2007, the company paid out approximately 51–52% of earnings—indicating a constant dividend payout ratio policy.

Year	EPS ($)	DPS ($)	DPS/EPS × 100
2003	4.18	2.17	51.9%
2004	4.52	2.31	51.1%
2005	4.77	2.48	51.9%
2006	5.05	2.58	51.0%
2007	5.18	2.64	50.9%

2. Solution: A.

Compare stable dividend, constant dividend payout, and residual dividend payout policies, and calculate the dividend under each policy.

Aubrey is proposing a stable dividend policy—one that reflects long-run expected earnings.

The adjustment factor= $\frac{1}{\text{number of years over which adjustment is to occur}} = 1/5$

Expected dividend = Last dividend + (Expected earnings * Target payout ratio – Previous dividend) * Adjustment factor.

For 2014: Expected dividend=3.42+ (8.05*0.35-3.42)*0.20=$3.30.

3. Solution: C.

Explain how clientele effects and agency issues may affect a company's payout policy.

Use the equation for the price decrease when the share goes ex-dividend to solve for the marginal tax rate on dividends income.	
$P_w - P_X = D \times \frac{1 - T_D}{1 - T_{CG}}$	
P_W is the share price with the dividend attached	
P_X is the share price ex-dividend	
D is the dividend	Assumed: $1.00
And T_D and T_{CG} are the marginal tax rates on dividends and capital gains.	T_{CG} given: 23%
If the dividend is assumed to be $1, and the price change is $0.68 of the dividend (as stated by Maturin) (P_W-P_X= 68%)	0.68=1*(1-T_D)/(1-0.23)

Marginal tax rate on dividends	T_D = 47.6%

4. Solution: C.

Explain the Modigliani–Miller propositions concerning capital structure, including the impact of leverage, taxes, financial distress, agency costs, and asymmetric information on a company's cost of equity, cost of capital and optimal capital structure.

1. Determine the cost of equity at the proposed debt level.
According to MM Proposition II, in the presence of taxes
$r_e = r_0 + (r_0 – r_d) (1 – t) D/E$
The company is currently unlevered, so its r_0 = 12% (given)
$r_e = 0.12 + (0.12 – 0.05) \times (1 – 0.30) \times 0.25 = 13.2\%$

2. Determine the WACC using the levered cost of equity.
A D/E of 0.25 corresponds to D/V = 0.25/1.25 = 20%.
$r_{WACC} = D/V \times r_d (1 – t) + E/V \times r_e$
$r_{WACC} = [0.20 \times 0.05 \times (1 – 0.30)] + [0.80 \times 0.132] = 11.3\%$

r_e = Marginal cost of equity capital for levered firm
r_0 = Cost of equity capital for unlevered firm
r_d= Marginal Cost of debt, before tax
t = Corporate tax rate
D, E, V = market value of debt, equity, and value of firm respectively
r_{WACC} = weighted average cost of capital for firm

Case 5: England Case Scenario (考点：Capital structure, dividend policy)

1. Solution: C.

Determine the yearly cash flows of expansion and replacement capital projects, and evaluate how the choice of depreciation method affects those cash flows.

Using Equation 8: after-tax operating cash flow (CF):

$$CF = (sales - cash\ operating\ expenses)*(1 - tax\ rate) + depreciation*tax\ rate$$
$$= (3.24 - 1.94 - 0.21)*(1 - 0.32) + 0.21*0.32 = 0.8084$$

2. Solution: B.

Calculate and interpret accounting income and economic income in the context of capital budgeting.

Economic profit (EP):

$$EP = EBIT*(1 - \text{tax rate}) - WACC*capital$$

Use the real WACC in Exhibit 2: 10.1%.

Find Capital at the beginning of 2013 (i.e., the end of 2012):

Capital = Investment = Capital investment required + Additional working capital.

Capital = 10.36 + 2.20 = 12.56.

Note: The consultant fee is a sunk cost.

Find EP:

$$EP = 0.67*(1 - 0.32) - 0.101*12.56 = -0.813$$

3. Solution: B.

Based on the first phone conversation with Weinberger, the cost of equity for the new division should be implied from OUT. Further, the cost of equity implied from OUT is a nominal rate that will need to be inflation adjusted.

Imply nominal cost of equity from OUT using CAPM (RF = risk-free rate) (data in Exhibit 2):

$$\text{Nominal cost of equity} = R_F + \text{Beta}*\text{market premium}$$
$$= 0.025 + 1.80*0.082 = 0.1726$$

Find real cost of equity:

$$\text{real cost of equity} = \frac{1 + \text{nominal cost of equity}}{1 + \text{inflation rate}} - 1$$
$$= \frac{1 + 0.1726}{1 + 0.0078} - 1 = 0.1635$$

4. Solution: B.

OUT's takeover defense seeking an angel investor, who bought a substantial minority stake of its stock, enough to block our hostile takeover bid—is consistent with the White Squire defense.

5. Solution: B.

The after-tax non-operating cash flow is the $12 million inflow less the taxes paid on the capital gains plus the net working capital that is recovered.

Book value of the assets = Initial capital investment – Accumulated depreciation:

9.31=10.36-(5*0.21)

Capital gains taxes: = (12.00-9.31)*0.32=0.8608

Net cash inflow from sale = 12.0 − 0.8608 = 11.13.

The total net working capital investment that will be recovered:

3.84=2.20+0.62+0.43+0.28+0.19+0.12

The after-tax non-operating cash flow:

14.97=11.13+3.84

6. Solution: B.

Find the expected NPV in Exhibit 3:

-2.53=0.25*(-5.21) +0.50*(-3.08) +0.25*1.25

The additional value of the real options is the expected NPV with real options (0.75) less the expected NPV in Exhibit 3: 3.28=0.75-(-2.53)

Case 6: Alertron (考点：Merger and Acquisition)

1. Solution: B.

Ozer's memo states that in an acquisition, Alertron would want to maintain the successful Escarigen brand and operational structure. As a result, the most likely form of integration would be a subsidiary merger in which Escarigen would become a subsidiary of Alertron. Most subsidiary mergers occur when the target has a well-known brand that the acquirer wants to maintain, which is the case here. Note that in a statutory merger, the target company would cease to exist as a separate entity. Since both Alertron and Escarigen are involved in the pharmaceutical industry, the type of merger would be best described as horizontal. The merger would not be vertical as Alertron would not be moving up or down the supply chain.

2. Solution: B.

The potential acquisition of Carideo is described as a stock purchase, which means that Carideo's shareholders would be responsible for paying capital gains taxes on the deal and no taxes would be levied against Carideo at the corporate level. The other answers are incorrect. The potential deal with Escarigen is described as a cash offering.

In most cash offerings, the acquirer borrows money to raise cash for the deal, which would increase the acquirer's financial leverage. In the potential deal with BriscoePharm, shareholders generally only approve asset purchases when the purchase is substantial (greater than 50% of firm assets). In this case, shareholder approval would not be required. In a proxy battle for Dillon Biotech, Alertron would try to have shareholders approve new members of the board of directors to try to gain control of the company. Trying to purchase shares from shareholders individually is a tender offer.

3. Solution: C.

The only pair combination that correctly identifies a pre-offer and post-offer defense, respectively, is a supermajority voting provision, which is a pre-offer defense requiring shareholder approval in excess of a simple majority; and a leveraged recapitalization, which is a post-offer defense where a target borrows money to repurchase its own shares. Pre-offer defenses suggested include poison puts, fair price amendments, restricted voting rights, poison pills, and staggered board elections. The only other post-offer defense suggested was greenmail, which was incorrectly categorized.

4. Solution: C.

First, calculate the value of the combined firm after the merger:

Post-merger value of the combined firm: VAT = VA + VT + S - C

VA =$9,000 VT =$3,120 S = $600

C = $0 because no cash is changing hands

The value of the combined firm is therefore VAT = $9,000 + $3,120 + $600 - 0 = $12,720

Next, to account for the dilution and to find the price per share for the combined firm, PAT divide the post-merger value by the post-merger number of shares outstanding. Since we are told that Alertron would exchange 0.75 shares of its stock for each share of Carideo, the number of new shares issued is:

80 million shares x 0.75 = 60 million new shares

This means the actual value of each share given to Carideo's shareholders is $60.57 and the actual price paid for Carideo is:

PT = (N x PAT) = (60 x $60.57) = $3,634.20

Carideo's gain in the merger as the target is:

GainT = TP = PT - VT = $3,634.20 - $3,120 = $514.20

Note that Carideo's gain simply represents the takeover premium in the transaction.

5. Solution: A.

In a cash offer, the acquirer assumes the risk and receives the potential reward from the merger, while the gain to the target shareholders is limited to the takeover premium. In this case, Alertron is comfortable with the estimate of synergies and thinks the estimate may even be conservative. By making a cash offer, the takeover premium realized by Carideo would remain unchanged, with any excess benefit from synergies going to Alertron. Based on its forecasts, Alertron would prefer a cash deal.

However, if the synergies were less than expected, the takeover premium realized by Carideo would still be unchanged with a cash deal, but Alertron's gain may decrease. Since Carideo management believes the estimate of synergies is too high, they would also prefer a cash deal to lock in the gain they realize from the takeover premium.

6. Solution: C.

3 Pre-merger HHI: $(0.20\times100)^2 + (0.18\times100)^2 + (0.15\times100)^2 + (0.12\times100)^2 + (0.10\times100)^2 + (0.07\times100)^2 + (0.03\times100)^2\times6] = 1,296$

The post-merger market share of the combined firms would be 15% + 10% = 25%.

$$Post\ merger\ HHI = (0.25\times100)^2 + (0.2\times100)^2 + (0.18\times100)^2 + (0.12\times100)^2 + (0.07\times100)^2 + \left[(0.03\times100)^2\times6\right] = 1,596$$

Change in HHI = 1,596 - 1,296 = 300

A post-merger HHI that is between 1,000 and 1,800 indicates a moderately concentrated industry. With a change in an HHI that is greater than 100, there is certainly the potential for an antitrust

challenge by regulators.

Case 7: Kazmaier Foods (考点：Dividend policy)

1. Solution: C.

Using a target debt-to-equity ratio of 1:1, the $150 million in capital spending for 20X1 will be financed with $75 million in internal equity and $75 million in debt. The total dividend is the remaining internal equity of $112.5 - $75 = $37.5 million, or $37.5 / 56.25 = $0.67 per share.

2. Solution: C.

Nagys three rationales all correctly describe common advantages of share repurchases.

3. Solution: C.

Shareholders would prefer that the company repurchase its shares instead of paying dividends when the tax rate on capital gains is lower than the tax rate on dividends.

4. Solution: C.

The implementation of Proposal, a stock dividend, would not affect a shareholder's proportionate ownership because all shareholders would receive the same proportionate increase in shares. Stock dividends, which are generally not taxable to shareholders, do not impact an investor's total cost basis (they merely reduce the cost basis per share).

A is incorrect because stock dividends are generally not taxable to shareholders. A stock dividend merely divides the "pie" (the market value of shareholders' equity) into smaller pieces.

B is incorrect because an investor's total cost basis will not be affected by a stock dividend; a stock dividend merely reduces the cost basis per share.

Case 8: Cindy Scott (考点：Capital Budgeting, Capital Structure)

1. Solution: C.

Operating income before tax – Interest = Taxable income

$102,750 – ($300,000 × 0.12) = $66,750

Accounting income or net income = Taxable income × (1 – Tax rate)

$66,750 × (1 – 0.40) = $40,050

A is incorrect. It is the operating income after tax (from Exhibit 1) less the interest expense: 61,650 – (300,000 × 12%) = 25,650

B is incorrect. It is the operating income after tax (from Exhibit 1): 102,750 × (1 – 0.40) = 61,650.

2. Solution: B.

Ludlow's suggestion of considering alternate economic environments is an example of scenario analysis.

A is incorrect. Ludlow's suggestion is an example of scenario analysis.

C is incorrect. Ludlow's suggestion is an example of scenario analysis.

3. Solution: C.

The value of the depreciation tax savings is increased, and the value of the real after-tax interest expense is also increased. Due to the lower inflation, the value has increased (essentially discounting at a lower rate).

4. Solution: A.

Determine the unleveraged cost of equity from the current cost of capital and capital structure:

$r_e = r_0 + (r_0 – r_d)(1 – t)(D/E)$

where

r_0 = cost of equity of an all-equity company = ?

r_e = cost of equity for the firm = 0.15 (Exhibit 1)

r_d = cost of debt for the firm = 0.08 (Exhibit 1)

Solve for r_0 based on current debt and equity mix given the following original inputs:

Current D/E = debt-to-equity ratio = 0.50/(1 – 0.50) = 1.0 (implied from Exhibit 1)

t = tax rate = 0.40 (Exhibit 1)

$0.15 = r_0 + (r_0 – 0.08)(1 – 0.40)1.0$

$= r_0(1 + 0.6) – 0.048$

$$\frac{0.15 + 0.048}{（1 + 0.6）} = r_0 = 0.12375$$

Then solve for r_e based on the new debt and equity mix (0.60) and the new cost of debt (0.0875):

Revised D/E = debt-to-equity ratio = 0.60/(1 – 0.60) = 1.5 (based on debt ratio of 0.60)

$r_e = 0.12375 + (0.12375 – 0.0875)(1 – 0.4)1.5 = 0.15637$

5. Solution: B.

If demand is "high," the NPV is

$$\text{NPV} = -200 + \sum_{t=1}^{10} \frac{50}{1.11^t} = 94.461$$

If demand is "low," the NPV is

$$\text{NPV} = -200 + \sum_{t=1}^{10} \frac{30}{1.11^t} = -23.323$$

The expected NPV is 0.50(94.461) + 0.50(–23.323) = 35.569.

6. Solution: A.

Both suggestions are bad. In valuing projects, expected cash flows should be discounted at required rates of return that reflect their risk, not at a risk-free rate that ignores risk. Even though both options cannot be simultaneously exercised, they can both add value. If demand is high, you can exercise the growth option, and if demand is low, you can exercise the abandonment option.

Case 9: Ouse Inc. (考点：Corporate Governance and Other ESG Considerations in Investment Analysis)

1. Solution: C.

Ouse was initially a family-owned business, owned by Catherine Ferguson and her sister, which can make it difficult to attract quality talent for management positions. However, the implementation of a performance-based compensation plan two years ago would improve the motivation and rewards available to management and make it easier to attract quality talent.

A is incorrect. Family-owned businesses often suffer from a lack of transparency. The granting of some equity to senior management might not necessarily improve transparency because the Fergusons are still majority shareholders.

B is incorrect. Interlocking directorships can be a problem in family-owned businesses when there is a corporate group controlling several corporations. There is no mention here of other related companies.

2. Solution: C.

Ferguson asked about the possibility of a dual class share structure, which creates concentrated ownership and concentrated voting power. The controlling shareholders may be able to allocate resources to their own benefit at the expense of the minority shareholders. This situation is known as the principal–principal problem.

A is incorrect. Voting caps describe legal restrictions on the voting rights of large share positions and are usually designed to deter foreign investors from obtaining control of strategically important local companies.

B is incorrect. The principal–agent problem arises when voting power and ownership are both dispersed, leading to weak shareholders and strong managers. In this situation, managers may seek to use company resources to pursue their own interests.

3. Solution: B.

The private equity fund is using proprietary methods to identify and assess ESG investments. Proprietary methods include analysts using their own judgement based on information available from corporate reports, industry organizations, news reports, and environmental groups.

A is incorrect. ESG data providers would be independent organizations, such as MSCI or Sustainalytics, from whom the private equity fund would purchase information.

C is incorrect. GRI (Global Reporting Initiative) and SASB (Sustainable Accounting Standards Board) are examples of not-for-profit organizations working to develop sustainability reporting standards. The private equity firm is not relying on those sources.

4. Solution: B.

The new packaging initiative is expected to reduce costs associated with shipping, packaging, and handling. These savings should increase Ouse's operating margins and operating cash flows. The higher earnings should result in an increase in the fair value estimate of Ouse.

A is incorrect. The new packaging initiative is expected to reduce costs associated with shipping, packaging, and handling. These savings should increase Ouse's operating margins and operating cash flows. The increase in margins and cash flow would decrease the risk premium, not increase it.

C is incorrect. Reducing packaging and the plastic footprint of customers increases the company's reputation as a leader in environmental initiatives and would be reflected positively in the qualitative ESG analysis. But the plan will also save costs that will increase operating margins and cash flows, which are quantitative ESG factors.

6. Equity Valuation

6.1. Key Points

6.2. Key Practice

Case 1: Western Investments Analytics Case Scenario(考点：Return Concepts)

1. Solution: C.

Hilliard prefers to use the DDM-based estimate for return on equity in the WACC.

$$WACC = \frac{MVD}{MVD+MVCE} r_d \ (1-\text{Tax rate}) + \frac{MVCE}{MVD+MVCE} r$$

$\frac{MVD}{MVD+MVCE}$ Is the market based weight of debt for the firm and $\frac{MVCE}{MVD+MVCE}$ is the weight of equity. In this case, with a debt-to-equity ratio of 45%, Hattie's Apparel has a weight of debt of 0.31034 (calculated as 0.45/1.45). The weight of equity is 0.68966 (calculated as 1 – 0.31034). The pretax cost of debt is 9%, and the tax rate is 32%. The cost of equity is calculated using the Gordon model as:

$$\frac{2.75\times1.03}{45} + 0.03 = 0.09294.$$

The WACC is: [0.31034 × 0.09 × (1 – 0.32)] + [0.68966 × 0.09294] = 0.08309 = 8.3%.

2. Solution: A.

Colbaugh's first recommendation pertains to the use of the Pastor–Stambaugh model, which adds a fourth factor to the FFM—compensation for the degree of liquidity of an equity investment.

3. Solution: C.

Colbaugh suggests comparing Hattie's PEG to Triway's PEG. PEG is useful but must be used with care: PEG assumes a linear relationship between P/E and growth, does not factor in differences in risk, and does not account for differences in the duration of growth. Further, per computations shown below, Hattie's Apparel is more attractive than Triway Textiles based on PEG, not less attractive.

	Dividends	Payout Ratio	EPS	Price	P/E	Growth	PEG
Hattie's Apparel	2.75	0.40	2.75/0.40 = 6.875	45	45/6.875 = 6.54545	3%	6.54545/3 = 2.2
Triway Textiles	8.45	0.55	8.45/0.55 = 15.36364	115.48	115.48/15.36364 = 7.51645	2.5%	7.51645/2.5 = 3.0

4. Solution: A.

Colbaugh's last suggestion is to apply Blume's adjustment to the published CAPM equity beta.

Blume's adjusted beta = (2/3) × (Unadjusted beta) + (1/3) × (1.0)

Triway's beta with Blume's adjustment = (2/3) × (0.75) + (1/3) × (1.0) = 0.8333

Case 2: Arnaud Aims (考点：Market-based Valuation)

1. Solution: A.

Book values are more likely to be positive than EPS. Thus, the P/B ratio suffers less often from the problem where P/E ratios are not meaningful because of a negative EPS. The other two advantages given are actually disadvantages associated with using P/B ratios.

2. Solution: A.

Aims is correct about both ratios. For example, let's take the trailing P/E ratio, which is P0/E0. Multiplying by the net profit margin results in P0/E0 × E0/S0 = P0/S0. The justified P/E is (1 - b) (1 + g) / (r - g), the justified P/S is (E0/S0) (1 - b)(l + g) / (r - g). Multiplying the leading P/E ratio by the ROE results in P0/E1 × E1/B0 = P0/B0. If the justified P/E is (1 - b) / (r - g), the justified P/B is ROE (l - b) / (r - g). This becomes (ROE - b × ROE) / (r - g). Since b × ROE = g (from sustainable growth equation), the equation becomes (ROE - g) / (r - g).

3. Solution: A.

Both criteria are poorly applied by the associate. Generally, a lower PEG ratio is considered desirable, not a higher one. The difference in the trailing and leading P/E ratios could be due to transitory elements in the current year's income in the denominator of the trailing P/E. In a constant growth model (admittedly a strong assumption), the leading P/E will naturally be smaller than the trailing P/E because earnings are growing by g.

4. Solution: C.

Comment 1 about EBITDA ratios is incorrect. EBITDA is a pre-interest variable, so it is a flow available to all suppliers of capital, not just common shareholders. The comment about dividend yields is reasonable.

Case 3: Mendosa (考点：Discounted Dividend Valuation, Residual Income Valuation)

1. Solution: C.

Using the PVGO and assuming that the company has no positive net present value (NPV) projects, the PVGO Model is:

$$V_0 = \frac{E_1}{r} + PVGO = \$70 = \frac{\$5.33 \times 1.15}{0.124} + PVGO$$

$70 = $49.43 + PVGO

PVGO = $70 - $49.43 = $20.57

2. Solution: B.

Using the H-model:

$$H\ Model: V_0 = \frac{D_0(1+g_L) + D_0 H(g_S - g_L)}{r - g_L}$$

$$D_0 = \$5.33 \times 0.60 = \$3.20;$$

H = 1/2 of the life of high-growth period = 10/2 = 5 years

$$H\ Model: V_0 = \frac{\$3.20 \times 1.04 + \$3.20 \times 5 \times (0.15 - 0.04)}{0.124 - 0.040} = \frac{\$3.33 + \$1.76}{0.084} = \$60.60$$

3. Solution: C.

Raman is most accurate with respect to his comments on the CAPM. In portfolios, the idiosyncratic risk of individual securities tends to offset against each other leaving largely beta (market) risk. For individual securities, idiosyncratic risk can overwhelm market risk and, in that case, beta may be a poor predictor of future average return. Thus the analyst needs to have multiple tools available.

4. Solution: B.

Statement 3 by Raman is most accurate. The residual income model, also called the excess earnings method, does not have the same weakness as the FCFE approach, because it is an estimate of the profit of the company after deducting the cost of all capital: debt and equity. Further, it makes no assumptions about future earnings and dividend growth.

5. Solution: C.

Using a multi-stage residual income model and the data in Exhibit 2:

Equity charge = Equity capital × Cost of equity capital

= 20.97 × 0.124 = $2.60 million

Residual income of the more recent year = Net income – Equity charge

= 8.00 – 2.60 = $5.40 million

Raman's assumed growth rate during the forecast period of five years = 15%

Annual residual income during the no growth period (after Year 5) = $5.40 \times (1.15)^5 = \$10.86$

Present value (PV) of the residual income from perpetual period, as at T = 5:

($10.86/0.124)=$87.58

PV of the perpetual period residual income at T = 0: $87.58/ (1.124)^5$=$48.82

Case 4: The Stratton Club (考点：Market-based Valuation)

1. Solution: B.

Zhang believes that the acquisition costs will continue to be incurred and, therefore, should not be excluded from Cratt's core EPS; however, the legal costs are non-recurring and should be excluded.

Using that definition, recurring EPS in 2017 = $1.03 + 0.10 = $1.13. Trailing P/E = $11.31 ÷ $1.13 = 10.01.

2. Solution: C.

C is correct. The observation about Lane's P/E is incorrect with respect to risk. Companies with higher-than-average risk (operating or financial) have lower P/Es, not higher ones. She is correct with respect to the growth rate. Companies with higher-than-average growth rates have higher P/Es.

A is incorrect. The observation is incorrect with respect to the risk. Companies with higher-than-average risk (operating or financial) have lower P/Es, not higher ones. She is correct with respect to the growth rate. Companies with higher-than-average growth rates have higher P/Es.

B is incorrect. She is correct with respect to the growth rate. Companies with higher-than-average growth rates have higher P/Es.

3. Solution: B.

B is correct. Zhang's statement is incorrect with respect to small outliers. The harmonic mean tends to mitigate the impact of large outliers. It may aggravate the impact of small outliers, but such outliers are bounded by zero on the downside.

A is incorrect. The harmonic mean may aggravate the impact of small outliers, but such outliers are bounded by zero on the downside.

C is incorrect. The harmonic mean may aggravate the impact of small outliers, but such outliers are bounded by zero on the downside.

4. Solution: A.

A is correct. The average ROE over the most recent full cycle times the current book value is the most appropriate method to use to calculate normalized EPS in cyclical industries when there have been changes in the company's size, as is the case for Rapier and its asset growth.

B is incorrect. Even though the company is mid-cycle, the current EPS may not be the same as the average or normalized EPS over the cycle.

C is incorrect. Averaging the EPS over the cycle is one way to calculate normalized EPS in a cyclical industry but does not account for changes in the business's size.

5. Solution: A.

A is correct. Kaminski recommends that the club invest in KPK. That would be appropriate if the company is currently undervalued. He has forecasted a share price based on fundamentals (DCF) and has forecasted EPS. Therefore, the club can calculate a justified (fundamental) P/E based on those inputs and compare it with the other P/E values to determine the attractiveness of the stock. The justified (fundamental) P/E would be a better metric to base the decision on than one of the other P/Es because it is supported by company fundamentals. From Exhibit 3, the justified (fundamental) P/E is greater than the trailing P/E. Therefore, KPK is currently undervalued by (15.0 – 14.6) ÷ 14.6 = 2.7%, and the club should invest.

B is incorrect. The forward P/E is not the most reliable P/E, because it is not based on company fundamentals.

C is incorrect. The index is a general comparable and does not represent the value of the company as well as the justified P/E. Therefore, it not as reliable a buy signal.

Case 5: Angela Green(考点：Industry and Company Analysis)

1. Solution: A.

A bottom-up approach for developing inputs to equity valuation models begins at the level of the individual company or a unit within the company. By modeling net sales using the average annual growth rate, Candidate A is using a bottom-up approach. Both Candidate B and Candidate C are using a top-down approach, which begins at the level of the overall economy.

2. Solution: B.

A top-down approach usually begins at the level of the overall economy. Candidate B assumes industry sales will grow at the same rate as nominal GDP but that Chrome will have a 2 percentage points decline in market share. Candidate B is not using any elements of a bottom-up approach; therefore, a hybrid approach is not being employed.

3. Solution: C.

Candidate C assumes that the 2013 gross margin will increase by 20 bps from 2012 and that net sales will grow at 50 bps slower than nominal GDP (nominal GDP = Real GDP + Inflation = 1.6% + 2.0% = 3.6%). Accordingly, the 2013 forecasted costs of sales are $19.27 million, rounded to $19.3 million.

Metric	Calculation	Result
2013 gross margin = 2012 gm + 20 bps	$35.1/$53.9 = 65.12% + 0.20% =	65.32%
100% – gross margin	100% – 65.32% =	34.68%
2013 net sales = 2012 net sales × (1 + Nominal GDP – 0.50%)	$53.9 million × (1 + 0.036 – 0.005) = $53.9 million × 1.031 =	$55.57 million
2013 cost of sales = 2013 net sales × Cost of sales/net sales	$55.57 × 34.68% =	$19.27 million

4. Solution: B.

Candidate A assumes that the 2013 SG&A/net sales ratio will be the same as the average SG&A/net sales ratio over the 2010-2012 time period, and that net sales will grow at the annual average growth rate in net sales over the 2010-2012 time period. Accordingly, the 2013 forecasted selling, general, and administrative expenses are $25.5 million.

Metric	Calculation	Result
Average SG&A/net sales, 2010–2012*	(41.24% + 44.55% + 46.57%)/3 =	44.12%
Average annual growth sales in net sales, 2010–2012**	(7.91% + 6.73%)/2 =	7.32%
2013 net sales = 2012 net sales × (1 +	$53.9 million × 1.0732 =	$57.85

Average annual growth rate in net sales)		million
2013 SG&A = 2013 net sales × Average SG&A/net sales	$57.85 million × 44.12% =	$25.52 million

*SG&A/net sales ratios are calculated as follows:

Metric	**2010**	**2011**	**2012**
Net sales	46.8	50.5	53.9
SG&A expenses	19.3	22.5	25.1
SG&A-to-sales ratio	41.24%	44.55%	46.57%

**Growth rate in net sales is calculated as follows:

Years	Calculation
2011	($50.5/$46.8)-1=7.91%
2012	($53.9/$50.5)-1=6.73%

Case 6: Metev (考点：Private Company Valuation)

1. Solution: A.

Using data from Exhibit 3, the cost of equity (build-up method) = Risk-free rate + Equity risk premium + Small stock risk premium + Industry risk premium + Company-specific risk adjustment.

Cost of equity = 3.9 + 6.0 + 2.5 – 1.0 + 1.5 = 12.9%

WACC = Pre-tax cost of debt (1 – T) × (Debt weight) + Cost of equity × (Equity weight)

WACC = 10.0 × (1 – 0.25) × (0.3) + 12.9 × (0.7) = 2.25 + 9.03 = 11.28%

2. Solution: A.

Nenkov is incorrect with respect to his first comment because the capitalized cash flow method is rarely used for the valuation of public companies and it is more appropriate for valuing a private company such as RRBL. Nenkov's second comment is correct because the excess earnings method involves estimating the earnings remaining after deducting the amounts that reflect the required returns to working capital and tangible assets. The residual amount of earnings (i.e., the excess earnings) is capitalized to obtain an estimate of the value of intangible assets. Therefore, Nenkov's second comment is correct.

3. Solution: A.

Adjusted EV/EBITDA multiple = 7.2 × (1.25) = 9.0

EV = EBITDA2013 × Adjusted EV/EBITDA = 105.1 × 9.0 = 945.9

Value of equity = EV + Cash and short-term investments – debt = 945.9 + 50.0 – 30.0-8.0 = 957.9

4. Solution: A.

Statement 1 is correct because EBITDA is a pre-interest earnings figure, in contrast to earnings per share, which is a post-interest figure. Thus the differences in financial leverage do not affect EBITDA. Statement 2 is incorrect because EBITDA overestimates cash flow from operations if working capital is growing. Therefore, only Statement 1 is correct.

Case 7: GreenSnacks (考点：Discounted Dividend Valuation, Residual Income Valuation)

1. Solution: C.

GNSK is in the growth stage because it is expanding rapidly and enjoying the benefits of the health food market, which is also growing rapidly. GNSK is also experiencing high and growing profit margins as well as abnormally high earnings per share growth, which are all indicative of a company in its growth phase.

2. Solution: A.

The H-model that Tanner decides to use is a variant of the two-stage dividend discount model. It assumes growth begins at a high rate and declines linearly throughout the super-normal growth period until it reaches a normal rate at the end. In the case of GNSK, the H-model is appropriate for estimating the required return because Tanner expects extraordinary earnings growth of 20% next year with the rate of growth diminishing over time to match industry conditions in Year 6.

$$r = \frac{D_0}{P_0}\left[(1+g_L)+H(g_s-g_L)\right]+g_L$$

H = Half-life in years of the super-normal growth rate = 5 x 0.5 = 2.5

D_0 = 2.45 × 0.25 = $0.6125

g_L = Sustainable growth rate for the industry = ROE × (1-payout) = 0.128×(1 – 0.65) = 0.0448 or 4.48%

g_s = Short-term growth rate of GNSK = 0.20

$$r = \frac{0.6125}{21.875}\left[(1+0.0448)+2.5(0.20-0.0448)\right]+0.0448$$

= (0.028) {(1.0448) + 0.388} +0.0448

= 0.08492 or 8.5%

3. Solution: C.

$$V_0 = \frac{D_0(1+g)}{r-g}$$

Rearranging:

$$\frac{D_0}{P_0} = \frac{r-g}{1+g}$$

Let D_0/P_0 = d and rewrite the equation:

$$g = \frac{r-d}{1+d}$$

Using the industry data in Exhibit 1:

$$g = \frac{0.11-0.037}{1+0.037} = 0.0704 or 7.0\%$$

Alternatively:

$0.037 = (0.11 – g)/ (1 + g)$

$0.037(1 + g) + g = 0.11$

$0.037 + 0.037g + g = 0.11$

$1.037g = 0.11 – 0.037$

$g = 0.073 / 1.037 = 0.0704 \approx 7.0\%$

4. Solution: B.

Baldridge's statement is least accurate. The residual income approach uses the book value of equity, and it requires that the clean surplus relationship holds.

Case 8: Cuyahoga River Navigators, Inc. (考点：Discounted Dividend Valuation & Free Cash Flow valuation)

1. Solution: C.

The H-model is

$$V_0 = \frac{D_0(1+g_L) + D_0 H(g_S - g_L)}{r - g_L}$$

Where

D0 = Dividend/Number of shares

D0 = \$48/\$50 = \$0.96

g_S = Initial short-term dividend growth rate = 20%

g_L = Normal long-term dividend growth rate = 6%

r = 11% + 2% = 13%

H = 4/2 = 2

$$\frac{D_0(1+g_L)}{r - g_L} = \frac{0.96(1.06)}{0.13 - 0.06} = 14.54$$

$$\frac{D_0 H(g_S - g_L)}{r - g_L} = \frac{0.96 \times 2 \times (0.2 - 0.06)}{0.13 - 0.06} = \$3.84$$

V_0 = \$14.54 + \$3.84= \$18.38

2. Solution: C.

FCFF = EBITDA (1 – Tax rate) + Depreciation (Tax rate) – FCInv – WCInv FCFE

= FCFF – Interest (1 – Tax rate) + Net borrowing

(\$ millions)		
EBITDA (1 – Tax rate) a	275 (1 – 0.35)	\$178.75
Plus: Depreciation (Tax rate) a	82.5(0.35)	28.87
Less: Net investment in fixed capital		(165.3)
Less: Net increase in working capital b		1.8
Less: Interest (1 – Tax rate) a	16 (1 – 0.35)	(10.38)
Plus: Net borrowing	(157.5 + 20) – (150 + 15)	12.5
Free cash flow to equity		\$46.24
FCFE per share	46.24/50	\$0.92
a Jatin's tax rate = 35%, which is different from the original tax rate. b Net increase in Net Working Capital 2013 is less by \$1.80, so it is a positive number.		

3. Solution: B.

	2014	2015	2016	2017
FCFE per	\$0.96 (Jatin's	\$0.96(1.2) =	$\$0.96(1.2)^2$ =	$\$0.96(1.2)^3$ = \$1.66

share for the year	est.)	$1.15	$1.38	
Present value (2013) of FCFE and total value2014	$0.96/1.13 = $0.85	$1.15/$1.13^2$ = $0.90	$1.38/$1.13^3$ = $0.96	$\frac{\$1.66}{1.13^4} = \$1.02$ $\frac{(\$1.66 \times 1.06)/(0.13 - 0.06)}{1.13^4}$ $= \$15.42$
V_0 as of 2013	$0.85 + $0.90 + $0.96 + $1.02 + $15.42 = $19.15			

4. Solution: B.

B is correct. Jatin is correct with respect to Statement 1 only. The H-model is a variant of the two-stage model in which growth begins at a high rate and declines linearly throughout the supernormal growth period until it reaches a normal growth rate at the end. A smoother transition to the mature phase growth rate would be more realistic than the erratic growth rate in dividends displayed by the data.

A is incorrect. With an increase in leverage, FCFE will increase in the year debt is issued, not decrease.

C is incorrect. The FCFE model explicitly recognizes the company's investment and financing policies as well as its dividend policy.

5. Solution: C.

C is correct. Lederman is correct with respect to Statement 2 only. The Pastor–Stambaugh model adds a liquidity premium as a fourth factor to the Fama–French model and thus helps make an adjustment for the liquidity concerns surrounding the stock.

A is incorrect. The accounting data used in residual income models may require significant adjustments.

B is incorrect. CRN is a high-beta stock, and with Blume adjustment the adjusted beta will be smaller than its unadjusted counterpart; thus, the required return on the stock will decrease, not increase.

Case 9: Yummy Doughnuts (考点：Residual Income Valuation)

1. Solution: C.

A decrease in the value of available-for-sale securities that bypasses the income statement would artificially increase net income and, consequently, ROE. Book value is unaffected as the decrease is accounted for in the OCI section of shareholders' equity.

2. Solution: B.

$V_0 = B_0 + [(ROE-r) * B_0] / (r-g)$

Book value = equity / total shares = 131 / 18.6 = 7.04 (from Exhibit 1)

r = cost of equity =0.15 (given in Exhibit 2)

ROE = 0.17 (given in Exhibit 2)

g = 0.10 (given in Exhibit 2)

$V_0 = 7.04 + [(0.17 - 0.15) * 7.04] / (0.15 - 0.10) = 9.86$

3. Solution: A.

It is difficult for a company to maintain a high ROE because of competition. The persistence factor will be lower for those companies. A company that has a low dividend payout has greater growth opportunities than a company with a high dividend payout. The greater growth opportunities should support a higher persistence factor.

4. Solution: C.

Statement 1 is correct. The multistage residual income model uses continuing residual income to denote the long-run residual income. Based on reversion to the mean, and increasing competition for YD, continuing residual income would be expected to decline to zero over time.

Statement 2 is correct. Based on the residual income model formula, $V_0 = B_0 + (ROE - r) * B_0 / (r — g)$. If ROE = r, then $V_0 = B_0$.

Case 10: Valuation Strategies Case Scenario (考点：Residual Income Valuation)

1. Solution: B.

B is correct. Chance's statement is the most accurate. When cash flows are negative in the analyst's comfortable forecast time horizon, the RI model is most appropriate. Residual income is sometimes called economic profit because it estimates the company's profit after deducting the cost of all capital. The RI model is less sensitive to estimates of terminal value than discounted dividend or cash flow models.

A is incorrect. Tinker is incorrect: Residual income is sometimes called economic profit because it is an estimate of the profit of the company after deducting the cost of all capital.

C is incorrect. Evers is incorrect: The residual income model is less sensitive to estimates of terminal value than discounted dividend or cash flow models.

2. Solution: C.

C is correct. RSTU's required return using the Fama–French model is 6.52%, as shown in the following table:

	Factor Sensitivity			Risk Premium		
	Mkt	Size	Value	Mkt	Size	Value
RSTU	0.90	(0.44)	0.70	4.10	2.00	2.30
Required Return = Sum of (Sensitivity × Premium) + short-term Rf						
FS × RP Mkt	FS × RP Size	FS × RP Value	Sub Total	Rf	**Total**	
3.69	(0.88)	1.61	4.42	2.10	**6.52**	

A is incorrect. The long-term risk-free rate is used.

B is incorrect. It includes the liquidity factor, which is not used in Fama–French: (0.02 × 0.02) + 6.52 = 6.56.

3. Solution: B.

B is correct. Tinker's response is most accurate. Although the PEG ratio does reflect differences in growth between companies, it does not factor in differences in risk. Risk is an important determinant of P/E. The relationship between P/E and growth rate is not linear. Because duration of growth is not reflected in the PEG ratio, longer-term growth forecasts, not shorter-term ones, are recommended.

A is incorrect. Evers is incorrect: the relationship between P/E and growth rate is not linear.

C is incorrect. Chance is incorrect: because duration of growth is not reflected in the PEG, longer-, not shorter-, term growth forecasts are recommended.

4. Solution: A.

A is correct. The forecasted annualized percentage return is 20.0, calculated as follows:

Determine current price: Current P/E = 15.1, and EPS = 2.69

P/E × EPS = 15.1 × 2.69 = 40.62: current price

Forecast forward EPS (EPS3) in two years: EPS0 = 2.69, and g = 0.077

EPS3 = EPS0 × $(1 + g)^3$ = 3.36: EPS3

Converge to industry P/E: Forward P/E = 17.4, and EPS3 = 3.36

P/E × EPS3= 17.4 × 3.36 = 58.46: price in 2 years

Return calculation:

$(Ph/P0)^{0.5} - 1 = (58.46/40.62)^{0.5} - 1 = (1.4392)^{0.5} - 1 = 0.1997$ or 19.97%

B is incorrect. It uses the forecasted trailing EPS (or EPS2), thus calculating the wrong future price of $66.99.

Determine current price: Current P/E = 15.1, and EPS = 2.69

P/E × EPS = 15.1 × 2.69 = 40.62: current price

Forecast trailing EPS (EPS2) in two years: EPS0 = 2.69, and g = 0.077

EPS2 = EPS0 × $(1 + g)^2$ = 3.12: EPS2

Converge to Industry P/E: Forward P/E = 17.4, and EPS2 = 3.12

P/E × EPS2 = 17.4 × 3.12 = 54.29: price in 2 years

Return Calculation:

$(Ph/P0)^{0.5} - 1 = (54.29/40.62)^{0.5} - 1 = (1.3365)^{0.5} - 1 = 0.1561$ or 15.61%

C is incorrect. It finds the correct holding period return for two years of 0.4392 then divides by two to get 21.96 instead of discounting properly: [(58.46/40.62) – 1]/2

Case 11: Chan Mei Yee (考点：Free Cash Flow valuation)

1. Solution: B.

FCFF = NI + NCC + Int (1 - Tax Rate) - FCInv - WCInv Net income (given) = $626;

Interest Expense (given) = $186;

Tax rate = 294/920 = 32% Non-cash charges (depreciation) (given) = $243;

Fixed capital investment (given) = $535

WC Investment	2012 ($)	2011 ($)	Net increase($)
Current assets excluding cash	1,290 - 32 = 1,258	1,199 - 21 = 1,178	
Current liabilities	2,783	2,678	
Working capital	-1,525	-1,500	-25
FCFF = 626 + 243 + 186(1 - 0.32) - 535 -(-25) = 485.48 = $485 million			

2. Solution: B.

FCFE = FCFF - Interest (1 - T) + Net borrowing

Given: 2012 FCFF base case estimate = $500; Interest exp = $186; Tax rate = 32%

	2012	2011	Net increase
Long-term debt ($)	2,249	2,449	-200
FCFE = 500 - 186 × (1 - 0.32) + (-200) = $174 million			

3. Solution: C.

First it is necessary to estimate FCFE2013

FCFE = Net income - (1 - DR) (FCInv - Depreciation) - (1 - DR) (WCInv)

Where

DR = debt ratio, which is 40%

FCInv = investment in fixed capital

Which is 30% of EPS WCInv = investment in working capital

Which is 10% of EPS

On a per-share basis:

FCFE: (2013) = 1.80 - (1 - 0.40) (0.30 × 1.80) - (1 - 0.40) (0.10 × 1.80)

FCFEi (2013) = 1.80 - 0.324 - 0.108 = 1.368.

FCFE will grow at the same rate as net income, 6% annually.

$$\frac{FCFF_1}{r-g}=\frac{1.36}{0.12-0.06}=22.8$$

The value per share is $22.80.

4. Solution: A.

The three possible actions are: dividend increase = 110; share repurchase =60; and the debt repayment = 100. Reducing debt by $100 million reduces FCFE (the amount of cash available to equity holders) by that amount. The cash dividend and the share repurchase are uses of FCFE, and do not change the amount of cash available to equity holders. Therefore FCFE will decrease by $100 million.

5. Solution: C.

Analysts should use a free cash flow to equity valuation whenever dividends differ significantly from the company's capacity to pay dividends or when a change of control is anticipated. A FCFF valuation is preferred over a FCFE valuation whenever the capital structure is unstable or ever-changing. So Nicosia's first statement is correct, and her second and third statements are incorrect.

Case 12: Geoffrey Chaucer (考点：Industry and Company Analysis)

1. Solution: A.

Chaucer and Palmeiro's analysis indicates that although there are alternative products available for some situations, paints and coatings are the logical or only choice for many applications. Thus, the threat of substitutes would be considered low to medium, which would improve the competitive position and profitability of firms in the industry.

B is incorrect. The industry is fragmented with no dominant market leader, and there is a strong rivalry for market share, which limits pricing power. This would reduce competitive strength and profit opportunities.

C is incorrect. Brand loyalty is not of great importance to customers. Many products are basically identical, and switching costs for customers is low. This would reduce competitive strength and profit opportunities.

2. Solution: C.

The return on capital employed (ROCE) is a pre-tax return measure that can be useful in the peer comparison of companies in countries with different tax structures. AW's two main competitors are located in different countries with significantly different tax structures, and therefore, a pre-tax measure of return on capital is better than an after-tax measure.

3. Solution: A.

	2015(€ millions)	2016 vs. 2015	Calculation	2016(€ millions)
Sales	9,280	GDP+1% = 5.5% increase	9,280 × 1.055	9,791
COGS	5,401	Percentage of sales, expected to decline 0.5% in 2016	[(5,401/9,280)–0.005)] × 9,790	5,649
Gross profit	3,879			4,142
Selling expenses	1,940	Stable percentage of sales	(1,940/9,280)× 9,790	2,047
G&A	485	No change		485
D&A	294	No change		294

	2015(€ millions)	2016 vs. 2015	Calculation	2016(€ millions)
Operating	1,160			1,316

Interest expense	92	Rate on 2015 net debt = 92/1,533 = 6% Debt to decline by €100 million	1,433 × 0.06	86
EBT	1,068			1,230
Income taxes	320	30% tax rate	1,230 × 0.3	369
Net profit	748			861

4. Solution: A.

Industry cyclicality can influence the analyst's choice of timeframe because the forecast period should be long enough to allow the business to reach an expected mid-cycle level of sales and profitability. Factor 2 best justifies the use of a five-year forecast horizon given that the industry's performance is closely tied to the business cycle.

B is incorrect. Nordjford's 25% annual turnover would be more consistent with a four-year forecast horizon.

C is incorrect. Given that the benefits of the corporate restructuring are expected to be fully realized within two years, a five-year forecast horizon is more than sufficient to see the impact in Darwin's financial statements.

Case 13: Mary Barton (考点：Discounted Dividend Valuation)

1. Solution: A.

The Gordon growth model cannot be used when r < g. In this case, r = 8.84%, and g = 13.84%. The calculations are as follows:

Gordon growth model: $P_0 = D_1/(r - g)$

where

P_0 = current price

D_1 = next period's dividend

r = required return on equity

g = growth rate of dividends.

The calculated expected growth rate of dividends is based on the sustainable growth rate model:

g = b × ROE, where b = 1 – (DPS/EPS)

= [1 – (1.77/3.15)] × 0.316 = 0.1384

where

g = sustainable growth rate

b = retention ratio

DPS = dividends per share EPS = earnings per share

The required return on equity is RF + βi[E(RM) – RF]= 0.0294 + (0.94 × 0.0628) = 0.0884 = 8.84%.

B is incorrect. The sustainable growth must be less than the economy's growth rate (3.7%) for the Gordon growth model to be appropriate,

C is incorrect. Although r must be greater than g, the appropriate growth rate is the company's growth rate in dividends rather than the economy's growth rate (3.7%).

2. Solution: C.

Barton's statement is incorrect because the company is in the mature phase. The economy's nominal growth rate, from Exhibit 1, is Real growth rate + Inflation rate = 3.7% + 2% = 5.7%.

XRL's compound growth rate over the four-year period is 5.7%, which is approximately equal to the economy's growth rate and calculated as follows:

$$g = \left(\frac{EPS_{2015}}{EPS_{2011}}\right)^{1/4} = \left(\frac{3.15}{2.52}\right)^{1/4} = 5.7\%$$

where g is the compound growth rate in earnings, and EPS is earnings per share.

A company in the mature phase typically has earnings growth at a rate comparable with the economy's growth rate.

A is incorrect. A company in the transition phase is characterized by earnings growth rates above the average nominal growth for the economy but with the growth rate declining. The

growth rate is not above the economy's nominal growth rate, so the fact that it is declining (2.7% for 2015 vs. 2014) is not relevant.

B is incorrect. A company in the supernormal growth phase has growth higher than the economy's nominal growth rate.

3. Solution: B.

The growth rate of dividends over the past five years is calculated as follows:

$$\left(\frac{D_5}{D_1}\right)^{1/n} - 1 = \left(\frac{2.53}{1.89}\right)^{\frac{1}{4}} - 1 = 7.56\%$$

where

D_5 = 2015 dividend

D_1 = 2011 dividend

n = number of years between the first and last dividends

Using the Gordon growth model, the intrinsic value is

$$\frac{D_0 \times (1+g)}{r-g} = \frac{2.53 \times 1.0756}{(0.1048 - 0.0756)} = \$93.19$$

where

D_0 = dividend just paid (in 2015)

g = compound growth rate in dividends

r = required return on the stock, given in Exhibit 1

With a current market price of $93.05, the stock is fairly valued according to the fund's definition of mispricing (i.e., mispriced by less than $1). It should not be added to the portfolio as either a short or long position.

Note that the answer is calculated without rounding intermediate steps. If rounding is used, the calculated answer may differ slightly.

A is incorrect. The stock's intrinsic value differs by less than $1 from the market price, so it should not be added to the portfolio.

C is incorrect. The stock's intrinsic value differs by less than $1 from the market price, so it should not be added to the portfolio.

4. Solution: C.

Dividend discount models assume stylized patterns of dividend growth, but a spreadsheet allows any assumed dividend pattern. Therefore, a spreadsheet model would be best suited for these anticipated special dividends.

A is incorrect. Dividend discount models assume stylized patterns of dividend growth, but a spreadsheet allows any assumed dividend pattern.

B is incorrect. Dividend discount models assume stylized patterns of dividend growth, but a spreadsheet allows any assumed dividend pattern.

Case 14: Tom Baker (考点：Free Cash Flow valuation, Private Company Valuation)

1. Solution: C.

Transactions between the company and its shareholders (through cash dividends, share repurchases, and share issuances) do not affect free cash flow. However, leverage changes, such as the use of more debt financing, have some impact on free cash flow because they increase the interest tax shield (reduce corporate taxes because of the tax deductibility of interest) and reduce the cash flow available to equity.

2. Solution: A.

Both the current shareholders and the future shareholders (the private investment group) share the same expectations. It is most reasonable to assume that both are concerned with Wadgett's intrinsic value, which market prices should reflect when the company is brought public under less volatile market conditions.

3. Solutio: A.

Cash flow from operations (CFO) already reflects changes in working capital items, therefore Paschel's first comment is correct. EBITDA has the non-cash charges of depreciation and amortization added back, so Covey's statement is incorrect, not all non-cash charges will need to be added back. Net borrowing is added back for FCFE not FCFF, so Paschel's second statement is incorrect.

B is incorrect. Depreciation has already been added back to EBITDA, though there may be other items that still need to be added back.

C is incorrect. Adjusting for net borrowing is not necessary for FCFF (just FCFE).

4. Solution: C.

FCFF is preferred over FCFE when a company is leveraged and expecting a change in capital structure. FCFF growth will reflect fundamentals more clearly because FCFE growth will reflect fluctuating amounts of net borrowing. Second, in a forward-looking context, the required return on equity might be expected to be more sensitive to changes in financial leverage than changes in the WACC.

A is incorrect. Statement 1 suggests that FCFE should be used, but this choice is inappropriate given the already levered balance sheet and coming increase in debt capital.

B is incorrect. Statement 3 suggests that the required return to equity should apply to both FCFE and FCFF, yet WACC is the proper discount rate to use in the FCFF method.

Case 15: James Watt (考点：Free Cash Flow valuation)

1. Solution: C.

A dividend discount model is most suitable when the firm records a high dividend to free cash flow ratio or investors take a minority perspective of investing. In contrast, a free cash flow valuation method based on FCFF or FCFE is more suitable when a firm does not pay dividends, its dividend payout significantly differs from its capacity to pay dividends or the investor assumes a control perspective.

2. Solution: C.

A firm's working capital investment primarily includes investments in inventory, accounts payable & accounts receivable. Notes payable and the current portion of borrowings would not be included in computation of working capital as these represent financing items rather than operating items.

3. Solution: B.

FCFF and FCFE are computed as follows:

FCFF = NI + NCC + Int (1 - tax rate) – FCInv – WCInv

FCFE = NI + NCC – FCInv – WCInv + Net borrowing

Notes payable represents a short-term debt obligation and hence an increase in notes payable would result in an increase in net borrowings all else equal. Therefore based on the above identities it is clear that an increase in notes payable would result in a higher FCFE while FCFF remains unchanged.

4. Solution: A.

Based on the data in Exhibit 1, the FCFE for 2016 is: FCFE = CFO – FCInv + Net borrowing

$FCFE_{2016}$ = 850 – 250 + 150 = USD 750 mn

The value to equity holders based on the constant-growth FCFE model is computed as:

Equity value = $FCFE_0 \times$ (1 + g) / re – g Where:

$FCFE_0$ = USD 750 mn

g = growth rate in FCFE = 5%

r_e = required return on equity = 3% + 1.2 * 7% = 11.4%

Equity value = 750 × (1 + 5.0%) / (11.4% − 5.0%) = 12,304.69

Intrinsic value to equity holders on a per share basis is = 12304.69 ÷ 300 = USD 41.01≈ USD41

The intrinsic value of the firm is above the current price (USD 20), hence the stock is undervalued.

5. Solution: A.

The additional outlay of USD 500 mn required to purchase the crane represents an increase in the firms fixed capital investment (FCInv)which would result in a decrease in both FCFF and FCFE by USD 500 mn all things being equal. However, the firm is hoping to fund 70% of the outlay (USD 350 mn) via an issue of corporate debentures, which would increase net borrowings by USD 350 mn all things being equal. Hence the net effect would be a decrease in 2017 FCFF by USD 500 mn while 2017 FCFE would decrease by USD 150 mn.

6. Solution: B.

The long term sustainable growth rate for the firm's FCFE can be computed as:
Growth rate = b × ROE Where:
b = retention rate = 1- (0.3 ÷ 1.4) = 1-0.214≈0.786%
ROE = return on equity = 17%
Growth rate = (1 - 21.4%) * 17% = 13.4%
Hence, given Watt's existing 5% growth estimates will be revised upwards.

Case 16: Edward Jenner (考点：Market-Based Valuation)

1. Solution: B.

Calculating a normalized EPS for Cerulean Plantations using the average EPS method involves averaging the recorded EPS over the 2008-2012 period, which is: (-1.43 + 2.34 - 0.86 + $2.89 + $1.56) ÷ 5 ≈0.9. Hence the trailing P/E based on this estimate is: 8.50/$0.9 = 9.4.

2. Solution: A.

Based on fundamentals, the justified P/E is positively related to the earnings growth rate and inversely related to the stocks required rate of return on equity. Miller expects Cerulean to record a higher future earnings growth rate relative to its peers which would likely result in a higher multiple. Further, Cerulean Plantations faces lower financial risk compared with its peers and hence investors would demand a lower required rate of return on equity which would justify a higher P/E multiple.

3. Solution: C.

The P/B multiple is preferred because the book value per share (BVPS) is a cumulative balance sheet amount and hence less likely to be negative even when earnings are negative. As a result, book values are relatively less volatile than earnings. However P/B may be misleading when the levels of assets used by companies under examination are different because of their different business models.

4. Solution: C.

The expression for the justified P/BV multiple based on the residual income valuation approach is:

P_0/B_0 = 1 + (Present value of expected future residual earnings/B_0)

The justified P/BV for Cerulean Plantations based on Miller's estimates would be:

P_0/B_0 = 1 + (30/10.4) = 3.885 ≈3.9.

5. Solution: C.

Most analysts would use a simple approximation for price to cash flow analysis. The Cash flow from operations (CFO) and earnings plus noncash charges are common approximations used in this regard. However free cash flow to firm (FCFF) is not a recommended proxy as it as it represents cash flow available to all investors, not just equity holders.

6. Solution: B.

The harmonic mean is sometimes used to reduce the impact of large outliers—which are typically the major concern in using the arithmetic mean multiple—but not the impact of small outliers (i.e., those close to zero). The harmonic mean may aggravate the impact of small outliers, but such outliers are bounded by zero on the downside.

7. Fixed income

7.1. Key Points

7.2. Key Practices

Case 1: Natalia Berg（考点: Yield curve analysis, embedded options）

1. Solution: A.

Each of the portfolios has an effective duration of five, so a parallel shift in the yield curve will have the same effect on each portfolio, and each will experience the same price performance.

2. Solution: B.

The exposure of each portfolio to changes in the 5- and 10-year rates are equal to the sum of the 5- and 10-year key rate durations:

Portfolio 1 exposure = 0.20 + 0.15 = 0.35

Portfolio 2 exposure = 0.40 + 4.00 = 4.40

Portfolio 2 has the largest exposure, and portfolio 1 has the smallest exposure. If the 5- and 10-year key rates increase, portfolio 1 will fall by the smallest amount and will experience the best price performance (i.e., the smallest decrease in value).

You can confirm this by doing the calculations for a 20 basis point increase:

% change in portfolio 1 = (-0.20 x 0.002 x 100) + (-0.15 x 0.002 x 100) = (-0.35 x 0.002 x 100) = -0.07%

% change in portfolio 2 = (-0.40 x 0.002 x 100) + (-4.00 x 0.002 x 100) = (-4.40 x 0.002 x 100) = -0.88%

3. Solution: A.

Statement 1 is correct. Swap markets tend to have more maturities with which to construct a yield curve as compared to government bond markets. Statement 2 is correct. Retail banks tend to have little exposure to swaps and hence are more likely to use the government spot curve as their benchmark.

4. Solution: C.

The value of a 3-year bond extendible by one year is equal to an otherwise identical 4-year bond that is puttable in three years. Accordingly, the value of bonds B and C should be the same.

5. Solution: C.

The steps in the process of calculating the effective duration of a callable bond using a binomial tree are as follows:

Step 1: Given assumptions about benchmark interest rates, interest rate volatility, and the call and/or put rule, calculate the OAS for the issue using the binomial model.

Step 2: Impose a small parallel shift in the on-the-run yield curve by an amount equal to +Ay.
Step 3: Build a new binomial interest rate tree using the new yield curve.
Step 4: Add the OAS to each of the 1 -year forward rates in the interest rate tree to get a "modified" tree. (We assume that the OAS does not change when interest rates change.)
Step 5: Compute BV_{+Ay} using this modified interest rate tree.
Step 6: Repeat steps 2 through 5 using a parallel rate shift of-Ay to estimate a value of BV_{Ay}.
There is no restriction on the relationship between the assumed change in the yield (Ay) and the OAS.

6. Solution: B.

An upward sloping yield curve predicts an increase in short-term rates according to the pure expectations theory but not necessarily the liquidity premium theory.
The liquidity theory says that forward rates are a biased estimate of the market's expectation of future rates because they include a liquidity premium. Therefore, a positive sloping yield curve may indicate either (1) that the market expects future interest rates to rise or (2) that rates are expected to remain constant (or even fall), but the addition of the liquidity premium results in a positive slope.

Case 2: William Rogers (考点：Valuation of embedded option)

1. Solution: C.

Statement 1 is correct. If the volatility of interest rates decreases, the call option is less valuable, which increases the value of the callable bond. Recall that $V_{calllable} = V_{noncallable} — V_{call}$. Statement 3 is also correct. The value of the noncallable bond increases by more than the callable bond because as yield falls, the value of the call goes up. As the call value increases, the callable value (noncall value - call option value) goes up by less than the noncall value.

2. Solution: B.

Statement 2 is incorrect because the noncallable bond value will be affected by a change in the level of interest rates.

Statement 4 is correct because higher interest rate volatility will increase the value of the embedded put option and increase the value of the puttable bond.

3. Solution: A.

The answer is 1.56 and is found by taking the difference between the value of the *callable and the noncallable bonds: Call option value = 99.77 - 98.21 = 1.56.*

4. Solution: B.

In this case, the bond is callable and puttable at the same price (100). Because Walters states that the embedded options (the issuer's call option and the holder's put option) will be exercised if the option has value (i.e., is in-the-money), the value of the bond must be 100 (plus the interest) at all times. Why? If rates fall and the computed value goes above 100, the company will call the issue at 100. Conversely, if rates increase and the computed value goes below 100, the bondholder will "put" the bond back to the issuer for 100.

The OAS is a constant spread added to every interest rate in the tree so that the model price of the bond is equal to the market price of the bond. In this case, using the interest rate lattice, the model price of the callable bond is greater than the market price. Hence, a positive spread must be added to every interest rate in the lattice. When a constant spread is added to all the rates such that the model price is equal to the market price, you have found the OAS. The OAS will be positive for the callable bond.

5. Solution: B.

The answer is 93.26. This value of the non-callable bond at node A is computed as follows:

$$value = \frac{[0.5\times(V_{up}+\frac{coupon}{2})]+[V_{down}\times(100+\frac{coupon}{2})]}{(1+\frac{\text{interest rate}}{2})}$$

$$= \frac{[0.5\times(91.73+\frac{6}{2})]+[0.5\times(96.17+\frac{6}{2})]}{(1+\frac{0.0791}{2})} = 93.26$$

6. Solution: A.

The correct value is 100.00. The computed value of the callable bond at node A is obtained as follows:

$$value = \frac{[0.5\times(100+\frac{6}{2})]+[0.5\times(100+\frac{6}{2})]}{(1+\frac{0.0315}{2})}$$

However, when working with a callable bond, you have to remember that the value of the bond at any node is the lesser of (1) the bonds computed value or (2) the call price. So, we have:

$$value = Min[100, \frac{[0.5\times(100+\frac{6}{2})]+[0.5\times(100+\frac{6}{2})]}{(1+\frac{0.0315}{2})}] = 100$$

In this case, since the computed value (101.4) is greater than the call price (100), the nodal value is $100.

Case 3: Susan Evermore Case Scenario（考点：Valuation of embedded option）

1. Solution: C.

The value of a putable bond is equal to the value of an otherwise equivalent option-free bond plus the value of the embedded put option. The value of the embedded put option will decrease if yield volatility decreases. The value of the option-free bond will not be affected by changes in yield volatility, so the value of the putable bond will also decrease. Evermore is incorrect in her analysis of both effects.

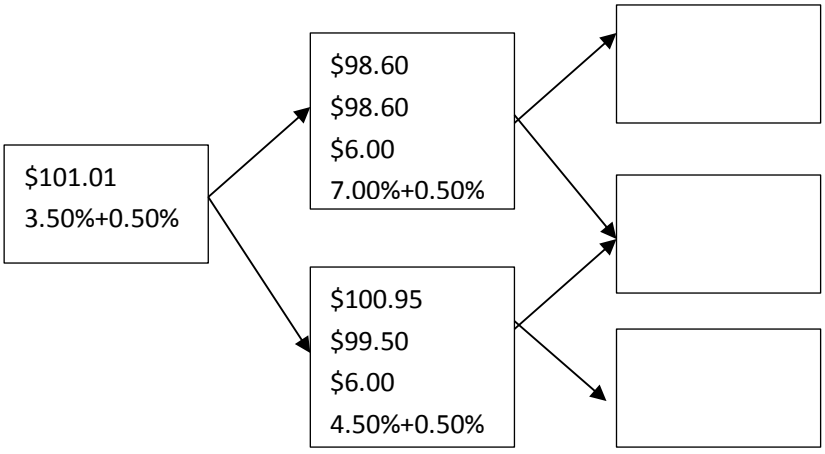
2. Solution: A.

The computed value of a putable bond decreases with a decrease in the assumed level of volatility and therefore the OAS needed to force the model price to be equal to market price will be lower.

3. Solution: B.

The bond will be called in the lower node if the interest rate (including OAS) is 5.0% because the present value of the remaining cash flows ($100.95) is greater than the call price ($99.50). The bond will not be called if rates increase to 7.5% in the upper node because the value of the bond ($98.60) is less than the call price ($99.50). The value of the callable bond according to the model is 101.01:

$$v_0 = \frac{1}{2}\left[\frac{98.60+6.00}{1.04}+\frac{99.50+6.00}{1.04}\right]=101.01$$



4. Solution: C.

The benchmark securities used to create the tree are Treasury securities, so the OAS for each callable corporate bond reflects additional credit risk and liquidity risk relative to the benchmark.

The bonds are overvalued if their OAS are smaller than the required OAS and undervalued if their OAS are larger than the required OAS. The required OAS for both bonds is the Z-spread over Treasuries on comparably rated securities with no embedded options. That required spread is not provided in the vignette. The BB-rated issue is overvalued because its OAS is less than zero, which means it must be less than the required OAS. Therefore, Evermore is correct in her analysis of the BB-rated issue.

The AA-rated issue has a positive OAS relative to the Treasury benchmark, but we don't know the required OAS on similar bonds, so we can't determine whether or not the AA-rated issue is over or undervalued based on the information given. Therefore, Evermore is incorrect to conclude that the issue is undervalued.

5. Solution: A.

Davenport has correctly outlined the appropriate methodology for using a binomial model to estimate effective duration and effective convexity. Evermore fails to adjust for the OAS and, instead, simply adds 100 basis points to every rate on the tree rather than shifting the yield curve upward and then recreating the entire tree using the same rate volatility assumption from the first step. Even if both use the same rate volatility assumption and the OAS is equal to zero, the two methodologies will generate significantly different duration and convexity estimates.

6. Solution: C.

The value of a callable convertible bond is equal to the value of an option-free bond plus the value of the conversion option on the stock minus the value of the call option on the bond.

A decrease in the volatility of High four's common stock returns will decrease the value of the conversion option on the stock. Consequently the value of the convertible bond will also decrease. Evermore was correct in her analysis, and Davenport was incorrect to disagree with her.

A decrease in the yield volatility will decrease the value of the embedded call option. The issuer has written the call option, so a decrease in the value of the call option will increase the value of the convertible bond. Evermore is incorrect in her analysis, and Davenport was correct to disagree with her.

Case 4: Jon Stevenson, CFA（考点：credit analysis models）

1. Solution: A.

Structural models require that the company's assets trade in a frictionless arbitrage free market.

2. Solution: B.

Under the structural model's debt option analogy, owning a company's debt is economically equivalent to owning a riskless bond that pays K dollars at time T, plus simultaneously selling a European put option on the assets of the company with maturity T and strike price K.

3. Solution: B.

Ratings tend to be stable over time, which reduces their correlation to default probabilities; hence, Point 1 is incorrect.

4. Solution: C

The relevant assumption is that the value of the assets (at maturity) has a lognormal distribution.

5. Solution: A.

Market participants typically prefer to use the swap-rate curve as a benchmark (rather than a government bond yield curve) for the following reasons:

- The availability of swaps and the equilibrium pricing are driven only by the interaction of supply and demand. It is not affected by technical market factors that can affect government bond yields.
- The swap market is not regulated by any government, which makes swap rates across different countries more comparable.
- Swap curves across countries are also more comparable than sovereign bond yield curves because swap curves reflect similar levels of credit risk, while sovereign bond yield curves also reflect credit risk unique to each country's government bonds.
- The swap curve typically has yield quotes at 11 maturities between 2 and 30 years. The U.S. government bond yield curve typically only has on-the-run issues trading at four maturities between 2 and 30 years.

Case 5: GD Barton, Inc.（考点：CDS，yield spread, term structure model）

1. Solution: B.

POPRT is part of the index CDS. GD sold protection of $350 million over the 125 equally weighted entities, meaning that it has effective exposure of $350 million / 125 = $2.8 million

On the single-name POPRT CDS, GD purchased protection of $2.5 million, leaving a net notional exposure of 2.8 - 2.5 = $0.3 million.

2. Solution: B.

As the credit spread for TRTRS has widened and GD has purchased protection, GD will gain by selling protection at a higher premium.

3. Solution: C.

Typically, an LBO will result in an increase in the probability of default due to the large increase in debt levels. An investor would, therefore, seek to buy protection, as the premium would rise along with the probability of default. Due to the takeover premium that would result from the LBO, Eagen would also benefit by going long TRTRS stock.

4. Solution: B.

Statement 3 relates to Z-spreads, which represent the constant basis point spread that would need to be added to the implied spot curve in order to determine the price of a bond which has credit risk.

A is incorrect. Statement 2 relates to The Libor–OIS. The Libor–OIS represents the difference between Libor and the overnight index swap rate. Since the Libor–OIS spread is affected by bank's lending rates for unsecured overnight loans, the Libor–OIS spread is a measure of risk in the money markets.

C is incorrect. Statement 1 relates to the TED spread. The TED spread represents the difference between the yield on treasury bills and Libor for a specific maturity date. Since the TED spread is affected by banks' analysis of default of interbank loans, the TED spread is a measure of counterparty risk.

5. Solution: C.

Both statements are incorrect because Madison incorrectly describes both types of models. Equilibrium term structure models are factor models that seek to describe the dynamics of the term structure by using fundamental economic variables that are assumed to affect interest rates. Arbitrage-free term structure models use observed market prices of a reference set of financial instruments, assumed to be correctly priced, to model the market yield curve.

Case 6: Lillian Krishnan （考点: Yield curve analysis, embedded options）

1. Solution: B.

B is correct. All bonds have the same coupon rate and credit rating and approximately the same remaining maturity. The pricing of all three (below par), implies the coupon rate of a par bond with this credit rating and approximate maturity is higher than 7.0%. Bond A is not callable, while Bond B is callable and has a slightly longer maturity than Bond A. Both of these differences imply that Bond B's price should be lower than Bond A's, but it is higher.

A is incorrect because Bond A is option-free while Bond C is putable and has a slightly shorter maturity than Bond A. Both of the ways Bond C differs from Bond A would imply a higher price than Bond A, which it has. Therefore there is no evidence that Bond C is mispriced.

C is incorrect because either Bond A or Bond B must be mispriced, or possibly both.

2. Solution: B.

B is correct. The value of a straight (option-free) bond (Bond A) doesn't change when interest rate volatility changes. The value of the callable bond (Bond B) is equal to the value of the otherwise identical straight bond minus the value of the call option. The value of the putable bond (Bond C) is equal to the value of the otherwise identical straight bond plus the value of the put option. The values of the put and call options decrease when interest rate volatility decreases, so the value of the callable bond will increase and the value of the putable bond will decrease.

A is incorrect because the value of the callable bond will increase when interest rate volatility decreases.

C is incorrect because the value of the straight (option-free) bond (Bond A) doesn't change when interest rate volatility changes.

3. Solution: B.

B is correct. As the yield curve moves from flat to upward sloping, the value of the put option embedded in Bond C will increase. Because the value of a putable bond is the value of the otherwise identical option-free bond plus the value of the put option, the value of Bond C will increase.

A is incorrect because the value of the embedded put option and therefore the value of this putable bond will increase when the yield curve moves from flat to upward sloping.

C is incorrect because the value of the embedded put option and therefore the value of this putable bond will increase when the yield curve moves from flat to upward sloping.

4. Solution: B.

The value is calculated using the interest rate tree, starting with final cash flow (par plus coupon payment) in Year 3.

A is incorrect because it is calculated using a put strike price of par (100).

C is incorrect because it is calculated as if it is a straight bond (ignoring the put option).

5. Solution: C.

$$\text{The effective duration of a bond} = \frac{(PV_{-}) - (PV_{+})}{2 \times (\Delta \text{ curve}) \times PV_{0}}$$

Where the 0, –, and + subscripts refer to the current yield curve, the decrease in the yield curve, and the increase in the yield curve, respectively, and Δ curve refers to the size of the yield curve shift. Therefore, for this bond, the effective duration is

$$\frac{99.384 - 95.376}{2 \times 0.0025 \times 97.584} = 8.21$$

A is incorrect because it uses the par value in the denominator rather than the current value:

$$\frac{99.384 - 95.376}{2 \times 0.0025 \times 100} = 8.02$$

B is incorrect because it ignores the 2 in the denominator and uses a change of 1% rather than 0.25%:

$$\frac{99.384 - 95.376}{0.01 \times 97.584} = 4.11$$

6. Solution: A.

Statement 2 is correct. The convexity of a callable bond turns negative when the call option is near the money, because the upside for the bond is much smaller than the downside (because the value is capped at the call price). The convexity of a putable bond is always positive because when the option is near the money, the upside for the bond is much larger than the downside (because the floor value is the put price).

B is incorrect because the statement is false. The value of a putable bond cannot fall below the put price, whereas the value of the option-free bond can. Therefore the effective duration of the option-free bond can be larger than that of the putable bond.

C is incorrect because at high interest rates, the value of the putable bond is equal to the floor price, so the effective duration is very low and the effective convexity is close to zero. The effective convexity of the option-free bond is higher because its value continues to decrease, albeit at an ever decreasing rate (convexity gets smaller).

Case 7: Daniela Ibarra（考点：Credit analysis models）

1. Solution: B.

The following table shows that the credit valuation adjustment (CVA) for the bond is €36.49, the sum of the present values of expected loss. The steps taken to complete the table are as follows.

Step 1: Exposure at Date T is €1,000/ $(1+r)^{4-T,}$ where r is 3%. That is, exposure is computed by discounting the face value of the bond using the risk-free rate and the number of years until maturity.

Step 2: Recovery = Exposure × Recovery rate

Step 3: Loss given default (LGD) = Exposure – Recovery

Step 4: Probability of default (POD) on Date 1 is 1.50%, the assumed hazard rate. The probability of survival (POS) on Date 1 is 98.50%.

For subsequent dates, POD is calculated as the hazard rate multiplied by the previous date's POS. For example, to determine the Date 2 POD (1.4775%), the hazard rate of (1.50%) is multiplied by the Date 1 POS (98.50%).

Step 5: POS in Dates 2–4 = POS in the previous year – POD

(That is, POS in Year T = POS in year [T – 1] – POD in Year T.)

POS can also be determined by subtracting the hazard rate from 100% and raising it to the power of the number of years:

$(100\% - 1.5000\%)^1 = 98.5000\%$

$(100\% - 1.5000\%)^2 = 97.0225\%$

$(100\% - 1.5000\%)^3 = 95.5672\%$

$(100\% - 1.5000\%)^4 = 94.1337\%$

Step 6: Expected loss = LGD × POD

Step 7: Discount factor (DF) for Date T is $1/(1+r)^T$, where r is 3%.

Step 8: PV of expected loss = Expected loss × DF

Date	Exposure	Recovery	LGD	POD	POS	Expected Loss	DF	PV of Expected Loss
0								
1	915.14	274.54	640.60	1.5000%	98.5000%	9.61	0.970874	9.33
2	942.60	282.78	659.82	1.4775%	97.0225%	9.75	0.942596	9.19
3	970.87	291.26	679.61	1.4553%	95.5672%	9.89	0.915142	9.05
4	1,000.00	300.00	700.00	1.4335%	94.1337%	10.03	0.888487	8.92
							CVA =	€36.49

Value of the bond if the bond were default free would be 1,000 × DF for Date 4 = €888.49.

Fair value of the bond considering CVA = €888.49 – CVA = €888.49 – €36.49 = €852.00.

Because the market price of the bond (€875) is greater than the fair value of €852, B is correct.

A is incorrect because the market price of the bond differs from its fair value. C is incorrect because although the bond's value if the bond were default free is greater than the market price, the bond has a risk of default, and CVA lowers its fair value to below the market price.

2. Solution: B.

The recovery rate to be used now in the computation of fair value is 30% × 1.25 = 37.5%, whereas the hazard rate to be used is 1.50% × 1.25 = 1.875%.

Using the steps outlined in the solution to Question 1, the following table is prepared, which shows that the bond's CVA increases to 40.49. Thus, Koning concludes that a change in the probability of default has a greater effect on fair value than a similar change in the recovery rate. The steps taken to complete the table are the same as those in the previous problem. There are no changes in exposures and discount factors in this table.

Date	Exposure	Recovery	LGD	POD	POS	Expected Loss	DF	PV of Expected Loss
0								
1	915.14	343.18	571.96	1.8750%	98.1250%	10.72	0.970874	10.41
2	942.60	353.47	589.12	1.8398%	96.2852%	10.84	0.942596	10.22
3	970.87	364.08	606.80	1.8053%	94.4798%	10.95	0.915142	10.03
4	1,000.00	375.00	625.00	1.7715%	92.7083%	11.07	0.888487	9.84
							CVA =	40.49

Changes in the hazard and recovery rates do not affect the value of the default-free bond. So, it is the same as in the previous question: €888.49.

Fair value of the bond considering CVA = €888.49 – CVA = €888.49 – €40.49 = €848.00

3. Solution: C.

Structural models require information best known to the managers of the company.

Reduced-form models only require information generally available in financial markets.

A is literally true but when when models were developed is immaterial. Structural models are currently used in practice by commercial banks and credit rating agencies.

B is incorrect because computer technology facilities valuation using option pricing models as well as regression analysis.

4. Solution: A.

The changing probability of default will not affect the binomial tree. The Date 1 value remains unchanged, which is also the VND. The expected exposures, loss given default, and discount factors are also unaffected by the changing probability of default. The following is the completed

credit valuation adjustment table.

Date	Exposure	LGD	POD	POS	Expected Loss	DF	PV of Expected Loss
0							
1	1,151.38	805.97	1.5000%	98.5000%	12.09	1.002506	€ 12.12
2	1,133.58	793.51	0.4925%	98.0075%	3.91	0.985093	€ 3.85
3	1,108.90	776.23	0.4900%	97.5175%	3.80	0.955848	€ 3.64
4	1,087.07	760.95	0.4876%	97.0299%	3.71	0.913225	€ 3.39
						CVA =	€ 22.99

Thus, CVA decreases to €22.99.

5. Solution: C.

The credit rating agencies typically make incremental changes as seen in a transition matrix provided in Exhibit 4 of the reading. Ibarra believes the bond to be undervalued, in that her assessment of the probability of default and the recovery rate is more optimistic than that of the agencies. Therefore, she most likely expects the credit rating agencies to put the issuer on a positive watch.

A is incorrect because the bond is perceived to be undervalued, not overvalued. Ibarra is not expecting a credit downgrade.

B is incorrect because it is not the most likely expectation. The rating agencies rarely jump an issuer all the way from BBB to AAA. In Exhibit 4, the probability of a BBB rated issuer going from BBB to AAA is 0.02%, whereas it is 4.80% to go from BBB to A.

6. Solution: A.

B is incorrect because, although generally true for investment-grade bonds, the statement neglects the fact that high-yield issuers sometimes face a downward-sloping credit term structure. Credit term structures are not always upward sloping.

C is incorrect because there is a consistent pattern to the term structure of credit spreads—typically it is upwardly sloped because greater time to maturity is associated with higher projected probabilities of default and lower recovery rates.

Case 8: Diane Muniz（考点: Yield curve analysis, embedded options）

1. Solution: B.

Statement 2 is incorrect. Both bondholder options and issuer options can be embedded in the same bond. For example, convertible bonds contain a conversion option that allows the bondholder to convert bonds to the issuer's common stock. At the same time, the convertible bond can have an embedded call option that allows the issuer to call the bond issue to take advantage of low interest rates or to force conversion.

A is incorrect. Statement 1 is correct. C is incorrect. Statement 3 is correct.

2. Solution: B.

B is correct, Gomaa is correct. The option-adjusted spread (OAS) is the constant spread that is added to all one-period forward rates on the interest rate tree and results in the present value of the bond's cash flows, or arbitrage-free value, equaling the bond's market price. Gomaa also correctly describes how to use OAS for relative valuation. For two bonds that have otherwise similar characteristics, the bond with the higher OAS is underpriced, or, alternatively, the bond with the lower OAS is overpriced.

3. Solution: A.

Morgan's response to Scahill is incorrect. As interest rate volatility declines, the embedded call option becomes cheaper; thus, the higher the arbitrage-free value (or model value) of the callable bond.

Callable bond value = Value of straight bond – Value of call option

A higher value for the callable bond means that a higher spread need to be added to one-period forward rates to make the arbitrage-free bond value equal to the market price (i.e., the OAS is higher). For putable bonds as interest rate volatility declines, the value of the put option declines as does the arbitrage-free value of the putable bond.

Putable bond value = Value of straight bond + Value of put option

This implies that a lower spread need to be added to one-period forward rates to make the arbitrage free bond value equal to the market price. Thus, in this instance, the OAS is lower.

B is incorrect. Morgan is correct about the impact on OAS for callable bonds. C is incorrect. Morgan is correct about the impact on OAS for putable bonds.

4. Solution: C.

$$\text{Effective duration} = \frac{PV_- - PV_+}{2\,\Delta curve\, PV_0} = \frac{100.64 - 100.32}{2 \times 0.001 \times 100.5} = 1.59$$

A is incorrect. It is incorrectly calculated as:

$$\frac{100.64 - 100.32}{0.001 \times 100.5} = 3.18$$

B is incorrect. It is incorrectly calculated as follows:

$$\frac{100.64 - 100.5}{2 \times 0.001 \times 100.5} = 0.697 \text{ or } 0.70$$

5. Solution: B.

Muniz's comments on the effective duration of callable and putable bonds are incorrect. For callable bonds, when interest rates rise and are high compared to the bond's coupon rate, the call option is out of the money and the price of the callable bond and an otherwise identical straight bond are almost the same. Thus, the effect of an interest rate change on the price of a callable bond and the straight bond is similar— that is, the effective duration of the callable and straight bonds is similar. For putable bonds, when interest rates rise and are high compared to the bond's coupon rate, the put option is in the money and the price of the putable bond will not fall as much as the straight bond because the investor can put the bond. Thus, the effective duration of the putable bond is lower than the effective duration of the straight bond.

A is incorrect. Muniz's comments on the effective duration of callable and putable bonds are incorrect.

C is incorrect. Muniz's comments on the effective duration of callable and putable bonds are incorrect.

6. Solution: A.

A bond's sensitivity to changes in the shape of the yield curve, steepening or flattening, is captured by key rate duration. One-sided duration (up or down) is better than effective or two-sided duration at capturing the interest rate sensitivity of a callable or putable bond but only for a parallel shift in the yield curve, not for changes in the shape of the yield curve.

B is incorrect. A bond's sensitivity to changes in the shape of the yield curve, steepening or flattening, is captured by key rate duration. One-sided duration (up or down) is better than effective or two-sided duration at capturing the interest rate sensitivity of a callable or putable bond but only for a parallel shift in the yield curve, not for changes in the shape of the yield curve.

C is incorrect. A bond's sensitivity to changes in the shape of the yield curve, steepening or flattening, is captured by key rate duration. One-sided duration (up or down) is better than effective or two-sided duration at capturing the interest rate sensitivity of a callable or putable bond but only for a parallel shift in the yield curve, not for changes in the shape of the yield curve.

Case 9: Sandy Sherry（考点：Valuation of Capped or Floored Bond, convertible bond）

1. Solution: A.

The value of the bond's cash flows using spot rates is $103.4816 and is determined as follows:

$$103.4816 = \frac{3.20}{(1.011)^1} + \frac{3.20}{(1.01504)^2} + \frac{103.20}{(1.02013)^3} = 3.1652 + 3.1059 + 97.2105$$

So, strips could be purchased for $103.4816 and reconstituted into the bond, which could be sold for $103.50, representing an arbitrage opportunity.

B is incorrect because reconstituting the bond requires valuing all the strips and comparing to the market price of the bond. There are no market prices for strips provided to make a comparison between the arbitrage-free value of each individual strip.

C is incorrect because incorrectly using the par rates instead of the spot rates, the bond's cash flows have a value of $103.519, producing an arbitrage opportunity to buy the bond, strip the cash flows, and sell them at a profit.

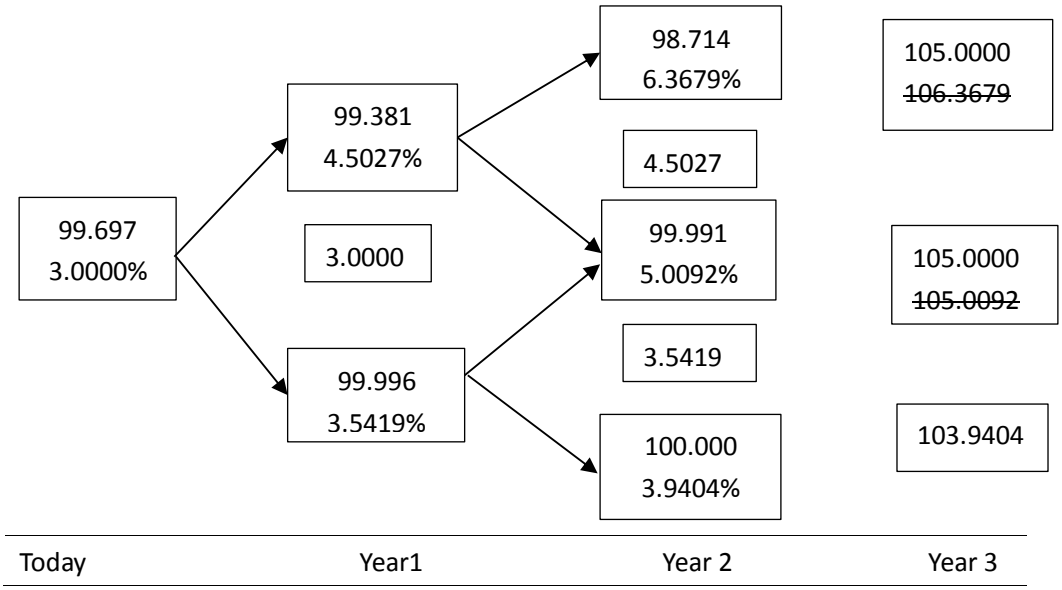
2. Solution: C.

Using a Monte Carlo simulation, the model will produce benchmark bond values equal to the market prices only by chance. A constant is added to all interest rates on all paths such that the average present value for each benchmark bond equals its market value.

A is incorrect because adjusting the volatility assumption will generate another random value not equal to the benchmark bond value. The benchmark bond is option-free, so its value should not be affected by interest rate volatility.

B is incorrect because increasing the model beyond 2000 paths will not lead to a different average value for the benchmark bond.

3. Solution: A.



4. Solution: C.

The risk-return characteristics of a convertible bond depend on the market price of the issuer's common stock (underlying share price) relative to the bond's conversion price. When the underlying share price is well below the conversion price, the convertible bond exhibits mostly bond risk-return characteristics. In this case, the price of the convertible bond is mainly affected by interest rate movements and the issuer's credit spreads. In contrast, when the underlying share price is above the conversion price, the convertible bond exhibits mostly stock risk-return characteristics. In this case, the price of the convertible bond is mainly affected by the issuer's common stock price movements. The underlying share price ($30) is lower than the conversion price of Bond 2 ($50). Thus, Bond 2 exhibits mostly bond risk-return characteristics and is least affected by Varlep's common stock price movements.

Case 10: Scarlett Johansson （考点：Credit analysis of ABS, CDS）

1. Solution: C.

A is incorrect. Ito correctly describes auto ABSs use portfolio approach; they are typically homogeneous in nature given eligibility requirements for loan obligations to be included in a specific asset pool.

B is incorrect. Yui's comments on leveraged loan CLOs are most likely correct regarding the non-granularity of the pool and the loan-by-loan approach to credit analysis.

C is correct. Scarlett's statements regarding CMBS is inaccurate with regard to statistical approach. Loan-by-loan analysis should be used for the heterogeneous nature and non-granular of the pools.

2. Solution: B.

Vito is incorrect about single-name CDSs. The reference obligation is not the only instrument covered by the CDS. Any debt obligation issued by the borrower that is pari passu (ranked equivalently in priority of claims) or higher relative to the reference obligation is covered.

Vasquez correctly describes index CDSs and tranche CDSs.

A is incorrect. Vito correctly describes an index CDS.

C is incorrect. Vito correctly describes an index CDS.

8. Derivatives

8.1. Key points

8.2. Key Practice

Case 1: Ryan Parisi Case Scenario（考点：Pricing & valuation of forward）

1. Solution: A.

At inception the value of a forward contract is set to zero. That is:

$$V_0(0,T) = S_0 - \frac{F(0,T)}{(1+r)} = 0$$

2. Solution: A.

$$V_{30}(0,60) = (1450.82e^{-0.025(30/360)}) - (1403.22e^{-0.0392(30/360)}) = \$1,447.80 - \$1,398.64 = \$49.16$$

3. Solution: B.

PV of coupons = $25/(1.04)^{90/360} + 25/(1.04)^{270/360} = 24.7561 + 24.2753 = \$49.03$

$$F(0,360) = (1071.33 - 49.03)(1.04)^{360/360} = \$1,063.19$$

4. Solution: C

Parisi is incorrect. Kwon has entered into a short forward contract. Between marked to market dates, if the price of the contract rises above the price of the contract at inception, it is Kwon's counterparty that is exposed to credit risk, not Kwon. Kwon is exposed to credit risk if the price of the contract falls below the price of the contract at inception.

5. Solution: C.

$$FRA(0,90,360) = \left[\frac{1+0.045(\frac{450}{360})}{1+0.032(\frac{90}{360})} - 1\right](\frac{360}{360}) = 0.0479$$

6. Solution: B.

$$F(0,T) = \left(\frac{1.3900}{(1.06)^{270/360}}\right)(1.04)^{270/360} = \$1.3703 per €$$

Case 2: Meredith Whitney Case Scenario（考点：Pricing & valuation of swap）

1. Solution: B.

The appropriate present value factors are provided below:

$B_0(90)$ 0.9965
$B_0(180)$ 0.9909
$B_0(270)$ 0.9843
$B_0(360)$ 0.9669

For example, $B_0(90)$ is calculated as:

$$\frac{1}{1+0.0142\times\left(\frac{90}{360}\right)}=0.9965$$

Other present value factors are calculated in a similar manner.

The fixed rate is calculated as follows:

$$\frac{1.0-B_0\left(h_n\right)}{\sum_{j=1}^{n}B_0\left(h_j\right)}$$

$$\frac{1.0-0.9669}{0.9964+0.9909+0.9843+0.9669}=0.0084$$

The annualized rate = 0.0084 × 4 = 0.0336

2. Solution: B.

Per $1 of notional principal the present value of the fixed payments= (0.0084) × (0.9972 + 0.9903 + 0.9772 + 0.9587) + (1 × 0.9587) = 0.9917

Per $1 the present value of the floating payments = present value of first floating payment + the present value of future floating payments= ((0.0142 × 90 / 360) + 1) × (0.9972) = 1.0007

The market value of the pay floating receive fixed rate swap = $250,000,000 × (0.9917 – 1.0007)= –$2,250,000

3. Solution: B.

Initially Grand receives €25,000,000 and pays HK$285,500,000 based on the current exchange rate of HK$11.42 per euro. We are told that Grand will pay an interest rate of 2.32% on the euro and receive 1.84% on the Hong Kong dollar.

Forty-five days into the swap:

Per HK$1 of notional principal the present value of the fixed payments received on the Hong dollar = (0.0046) × (0.9976 + 0.9909 + 0.9834 + 0.9674) + (1 × 0.9674) = 0.9855

Per €1 of notional principal the present value of the fixed payments paid on the euro= (0.0058) × (0.9963 + 0.9888 + 0.9811 + 0.9650) + (1 × 0.9650) = 0.9878

Note that based on the exchange rate of HK$11.42, the actual notional principal = 1 / 11.42 = €0.08757

The present value of euro fixed payments = 0.9878 × 0.08757 = 0.08649

The present value of euro fixed payments in HK$ = 0.08649 × 9.96 = 0.8615

The market of the swap = 285,500,000 × (0.9855 – 0.8615) = HK$35,402,000

4. Solution: B.

The market value of the swap per $ notional principal = value of $1 investment in equity – present value of floating payment.

Value of $1 investment in equity = 905 / 925 = 0.97838

Per $1 the present value of the floating payments = present value of first floating payment + the present value of future floating payments= ((0.0142 × 90 / 360) + 1) × (0.9972) = 1.0007

Market value of swap = (0.97838 – 1.0007) × $100,000,000 = –$2,232,000

5. Solution: A.

At this point, 45 days into the swap, the swap can be settled with a cash payment to the counterparty if the market value is negative. Alternatively, if the market value is positive, then Novatel would receive a cash payment from the counterparty.

6. Solution: C.

Interest rate and equity swaps do not involve an exchange of principal. Therefore, credit risk is greater during the middle of the life of these swaps. KPS Financial has entered into an equity swap, so the credit risk is higher during the middle of its life.

Case 3: Bridget Moyle（考点：Pricing & valuation of futures, swap and option）

1. Solution: A.

Petsas' response to Moyle is correct. Futures and spot prices must converge at expiration. If they do not, then it is possible to earn an arbitrage profit. If the spot price is greater than the futures price, then one could earn an arbitrage profit by buying the futures contract and executing the contract to purchase the underlying at the lower futures price and to sell it at the higher spot price. If the futures price exceeds the spot price at expiration, then an investor could purchase the asset at the spot price and enter into a short futures contract to sell it at the higher price, thus locking in a profit.

2. Solution: B.

The futures price is calculated as follows:

$$f_0(T) = \frac{B_0^C(T+Y)[1+r_0(T)]^T - FV(CI,0,T) - AI_T}{CF(T)}$$

$$f_0(T) = \frac{\$156,000[1.015]^{\frac{8}{12}} - \$3,508.6958 - 1166.67}{1.098} = \$139,239$$

$\$3,508.6958 = 3,500(1.015)^{(2/12).}$

3. Solution: A.

$$\pi = \frac{1+r-d}{u-d} = \frac{1+0.0025-0.96}{1.12-0.96} = 0.2656$$

$$1-\pi = 0.7344$$

$p^{++} = Max[0, X - S^{++}] = Max[0, 590 - 765.06] = 0$

$p^{+-} = Max[0, X - S^{+-}] = Max[0, 590 - 655.76] = 0$

$p^{--} = Max[0, X - S^{--}] = Max[0, 590 - 562.08] = 27.92$

$S^{++} = 609.90 \times 1.12 \times 1.12 = 765.06$

$S^{+-} = 609.90 \times 1.12 \times 0.96 = 655.76$

$S^{--} = 609.90 \times 0.96 \times 0.96 = 562.08$

$$p = \frac{\pi p^+ + (1-\pi)p^-}{(1+r)} = \frac{0.2656\times 0 + 0.7344\times 20.45}{1.0025} = \$14.98$$

$$p^- = \frac{\pi p^{-+} + (1-\pi)p^{--}}{(1+r)} = \frac{0.2656\times 0 + 0.7344\times 27.92}{1.0025} = \$20.45$$

$$p^+ = \frac{\pi p^{++} + (1-\pi)p^{+-}}{(1+r)} = \frac{0.2656\times 0 + 0.7344\times 0}{1.0025} = \$0$$

4. Solution: C.

Iacocca is incorrect about the risk-free rate. Higher risk-free rates result in higher call option prices and lower put option prices. She is correct about the impact of time to expiration and volatility on put and call option prices.

5. Solution: A.

Petsas is incorrect in stating that an interest rate swap is a combination of a long interest rate call option and a long interest rate put option. A combination of the purchase of an interest rate call option and the sale of an interest rate put option is equivalent to a plain vanilla interest rate swap payment. Thus, if the underlying variable rate is below the exercise rate, the call is worthless and the short put will require a net payment to the holder of the put. This scenario replicates the situation in an interest rate swap in which the fixed payment (exercise rate) exceeds the variable rate resulting in a net payment by the buyer of the swap.

6. Solution: C.

The appropriate present value factors are provided in the following table:

$B_0(90)$	0.9922
$B_0(180)$	0.9832
$B_0(270)$	0.9728
$B_0(360)$	0.9604

$$B_0(90) = \frac{1}{1 + 0.0313 \times (\frac{90}{360})} = 0.9922$$

$$B_0(180) = \frac{1}{1 + 0.0341 \times (\frac{180}{360})} = 0.9832$$

$$B_0(270) = \frac{1}{1 + 0.0373 \times (\frac{270}{360})} = 0.9728$$

$$B_0(360) = \frac{1}{1 + 0.0412 \times (\frac{360}{360})} = 0.9604$$

The fixed rate is calculated as follows:

$$\frac{1.0 - B_0(h_n)}{\sum_{j=1}^{n} B_0(h_j)},$$

$$\frac{1.0-0.9604}{0.9922+0.9832+0.9728+0.9604}=0.0101$$

The annualized rate = 0.0101 × 4 = 0.0404.

Case 4: Shirley Nolte（考点：BSM model）

1. Solution: A.

Nolte is long in the underlying stock, so she should short call options, and she can use any of the options to delta hedge. The hedge ratio (the number of calls per share) is (1 / delta), so any of these four short call positions will hedge her long position in the stock:

(1/0.54) x 5000=9259 1-month call options

(1/0.58) x 5000=8621 3-month call options

(1/0.61) x 5000=8197 6-month call options

(1/0.63) x 5000=7937 9-month call options

2. Solution: A.

The hedge must be continually rebalanced, even in the unlikely event that the stock price doesn't change, because the option's delta changes as time passes and the option approaches maturity. If she simultaneously buys an equivalent amount of put options, the overall position (including the calls, the puts, and 5,000 shares of Pioneer) will no longer be delta hedged.

3. Solution: B.

Delta hedged portfolio consists of long position in stocks and short position in call options. Because the gamma of long stock position is zero and the gamma of short call is negative, the net gamma of a delta hedged portfolio is negative.

As the stock price increases, call delta increases and we need fewer calls. As we reduce the number of short calls, the net gamma increases (becomes less negative).

4. Solution: B.

Both the 3-month and the 9-month put options are correctly priced according to put- call parity. Note that you are given the continuously compounded risk-free rate, so you have to use the continuous version of put-call parity.

$$P_0 = C_0 - S_0 + \frac{X}{e^{R_f^c \times T}}$$

$$P(3-\text{month}) = \$5 + \frac{\$40}{e^{0.05\times 0.25}} - \$40 = \$4.50$$

$$P(9-\text{month}) = \$8.81 + \frac{\$40}{e^{0.05\times 0.75}} - \$40 = \$7.34$$

Therefore, she's correct that the 3-month put is not mispriced, but incorrect in her conclusion that the 9-month put is mispriced.

5. Solution: C.

S_0=\$60, S^+=60(1.15) =\$69, S^-=60(0.85) =\$51, X=\$60.

C^+=69-60=\$9, C^-=0.

$$h = \frac{C^+ - C^-}{S^+ - S^-} = \frac{9-0}{69-51} = 0.5$$

$$C_0 = hS_0 + \frac{-hS^+ + C^+}{1+R_f} = 0.5(60) + \frac{(-0.5)(69)+9}{(1.05)} = \$5.71$$

Because the current call price of \$6.90 is higher than the no-arbitrage price, an arbitrage profit can be earned by writing calls and buying 0.5 shares per call written.

Case 5: Michelle Norris（考点：Currency swap）

1. Solution: A.

The futures price can be calculated by growing the spot price at the difference between the continuously compounded risk-free rate and the dividend yield as a continuously compounded rate. The continuously compounded risk-free rate is ln(l.040811) = 4%, so the futures price for a 240-day future is:

$FP = S_0e^{(r-d)t} = 1{,}050e^{(0.04-0.02)(240/365)} = 1{,}064$

2. Solution: C.

The futures price for a given contract maturity must converge to the spot price as the contract moves toward expiration. Otherwise, arbitrage opportunities would exist.

3. Solution: B.

First, calculate the continuously compounded risk-free rate as ln(l.040811) = 4% and

then calculate the theoretically correct futures price as follows:

$FP = S0e^{(r-d)t} = 1{,}015e^{(4.0\%-2.0\%)(180/365)} = 1{,}025$

Then, compare the theoretical price to the observed market price: 1,035 — 1,025 = 10. The futures contract is overpriced. To take advantage of the arbitrage opportunity, the investor should sell the (overpriced) futures contract and buy the underlying asset (the equity index) using borrowed funds. Norris has suggested the opposite.

4. Solution: B.

An increase in the growth rate in dividends for stocks would increase the spot price of the equity index. As the spot price increases, the futures price for a given maturity also increases (holding interest rates constant). Higher dividends during the short period of time until maturity of the futures contract would have only a minimal negative impact on the futures price.

5. Solution: A.

Given the decrease in the index level, the value of the short party's position in a forward contract should be positive. Because the futures contracts are marked to market, the value to the short (or long) party only reflects the change in futures price since the last mark to market. Hence, the value of the futures contract should be lower than the value of the forward contract.

6. Solution: A.

Based on the exchange rate at initiation, the notional principals were €1,000,000 and SF

1,120,000. Sixty days after initiation, the remaining settlement days are 30,120,210, and 300 days into the future. The value of the Swiss franc position (per 1 SF notional) is calculated as: (0.0096 / 4) x (0.9996 + 0.9978 + 0.9961 + 0.9932) + 1 x 0.9932 = SF 1.0028. For the notional principal of SF 1,120,000, the value is SF 1,123,136. Based on the current exchange rate, this translates into (1,123,136 / 1.10) euros or €1,021,033.

The euro position value is given as €1.0014 per €1 notional. For €1 million notional, this translates into a value of €1,001,400. Because Witkowski's client paid the euro notional at initiation, they will receive the euros and have a value of €1,001,400 - €1,021,033 = - €19,633.

Case 6: IST Risk Solutions（考点：Contingent Claims）

1. Solution: B.

B is correct. According to the expectations approach of options valuation, option values are simply the present value of the expected terminal option payoffs (based on risk- neutral probabilities) discounted at the estimated risk-free interest rate, rather than the risk-adjusted periodic rate.

2. Solution: C.

C is correct. When using the two-period binomial model to value interest rate options, the value of the underlying instrument at Node 0 is the spot rate. The spot rate (and the at-the-money strike price) is the current Libor rate of 1.00%.

B is incorrect. The value of the underlying instrument is the spot rate, not the forward rate.

A is incorrect. The value of the underlying instrument is 1.00%; 1.25% is the client's upper tolerance bound.

3. Solution: B.

B is correct. Franco is incorrect because he describes a long call option, which according to the Black model can be viewed as the futures component minus the bond component. Long put options hedge against rising interest rates. The Black model evaluates put options as the bond component minus the futures component.

A is incorrect. The statement is incorrect.

C is incorrect. The Black model evaluates put options as the bond component minus the futures component.

4. Solution: C.

C is correct. A payer swaption would hedge against rising interest rates. According to the Black model, the value of a payer swaption can be described as the swap component minus the bond component.

B is incorrect. A receiver swaption hedges against falling interest rates and Weber is describing a payer swaption.

A is incorrect. The receiver swaption is evaluated as the bond component minus the swap component.

5. Solution: A.

A is correct. The call delta is 0.5952. The number of calls to hedge 100,000 shares is calculated as

1/0.5952 = 168,010. An appropriate hedge for 100,000 shares of stock with a delta of 1 would be to sell 168,010 calls.

B is incorrect. This assumes DeltaH (used when selling calls against 100,000 short puts) should be used. The portfolio delta is 1 and the put delta is –0.4010 and DeltaH = –0.6737 (or –0.4010/0.5952), which would be used when hedging a short position of puts on 100,000 shares of stock. Using calls, the number of hedging units is 1/–0.6737; 1/0.6737 = 148,428.

C is incorrect. The correct number of puts to purchase is calculated as 1/Delta put or 249,376 puts.

6. Solution: B.

B is correct. Typically, theta is negative for options. The speed of the option value decline increases, however, as time to expiration decreases. Vega is high when options are at or near the money. During the next 30 days, the options will approach expiration and approach being at the money.

A is incorrect.

C is incorrect. Vega increases as the options become closer to at-the-money.

Case 7: Mafadi（考点：Pricing & valuation of futures, swap）

1. Solution: B.

Fourie's second comment to Jacob regarding marking to market is incorrect. Futures contracts are marked to market each day, whereas forward contracts are not. Comments 1 and 3 are accurate.

A is incorrect. Fourie's first comment is accurate. Because futures contracts are marked to market daily, profits are paid out and the value is reset to zero. As a result if you are long a contract and the price has risen, the forward contract will likely have a higher value than the futures contract.

C is incorrect. Fourie's last comment is accurate. The market value of both futures and forward contracts at initiation is zero.

2. Solution: B.

Fourie's fundamental rules for arbitrageurs are correct. The two fundamental rules of the arbitrageur are (a) do not use your own money and (b) do not take any price risk. The arbitrageur does not spend proceeds from short selling transactions but invests them at the risk-free rate. The arbitrageur does not take market price risk, even though each step of the transaction may individually involve price risk. Because the steps are undertaken simultaneously, however, the price risk is offset.

A is incorrect. The arbitrageur does not use their own money. Also, they do not spend proceeds from short selling transactions but invests them at the risk-free rate.

C is incorrect. The arbitrageur does not take market price risk but component transactions may individually involve price risk.

3. Solution: C.

Calculate the sum of PV = 0.9802 + 0.9560 + 0.9311 = 2.8673.

Calculate the fixed swap rate = (1 – 0.9311)/2.8673 = 0.0240.

Calculate swap value per ZAR = (0.0300 – 0.0240) 2.8673 = 0.0172.

Thus, total swap value = 0.01720 × ZAR20,000,000 = ZAR344,076.

B is incorrect. B uses wrong PV factor for Fixed swap rate (1 – 0.9311)/2.8673 = 0.6905 = (0.0300 – 0.006905) × 2.8673 = 0.066219 × 20,000,000 = 1,324,380.

A is incorrect. A does not subtract Fixed Swap rate in step 3 so = (0.0300) × 2.8673 = 0.0860 × 20,000,000 = 1,720,380.

4. Solution: A.

If the ZAR/NZD forward rate is less than the spot rate, then the carry arbitrage model indicates the South African interest rate will be lower than the New Zealand rate. This dynamic occurs

because when interest rates fall, forward prices decline.

B is incorrect. If the forward and spot rates are different it indicates a difference in interest rates under the carry arbitrage model.

C is incorrect. The rates should be higher not lower per the carry arbitrage model.

5. Solution: C.

The formula for calculating the forward price ($F_0[T]$), where S denotes the spot market price, γ (gamma) denotes carry benefits such as dividends or interest payments, and θ (theta) denotes carry costs, is: $F_0(T) = FV_{0,T}(S_0 + \theta_0 - \gamma_0) = FV_{0,T}(S_0) + FV_{0,T}(\theta_0) - FV_{0,T}(\gamma_0) = 60.5(1 + 0.0325)^{3/12} + 0 - 3.00 = ZAR57.99$. The dividend received is a carry benefit that decreases the cost of the forward price.

B is incorrect. This answer results from failing to account that the 3.25 percent interest is on an annualized basis: $60.5(1 + 0.0325) + 0 - 3.00 = ZAR59.47$.

A is incorrect. This answer results from adding the 3.00 dividend instead of subtracting it: $60.5(1 + 0.0325)^{3/12} + 0 + 3.00 = ZAR63.99$.

6. Solution: A.

The quarterly interest rate is calculated as $[(1 + 3.2\%)^{(1/4)}] - 1 = 0.0079$, so the fixed cash flow Ndlovu receives is ZAR5,000,000 × 0.0079 = ZAR39,528.77. The return of the equity is negative, so Ndlovu will also receive ZAR5,000,000 × 0.0360 = ZAR180,000.00 from the Tanzanite return. Therefore, the net cash flow to Ndlovu is ZAR219,528.77 (39,528.77 + 180,000.00).

B is incorrect. This answer results from subtracting the ZAR180,000 equity related return instead of adding it.

C is incorrect. This answer results from using the annual fixed rate of 0.0320 for the quarter resulting in a fixed payment of ZAR160,000 plus the equity returns of ZAR180,000.

Case 8: Nils（考点：Pricing & valuation of futures, swap,swaption）

1. Solution: B.

Characteristic 2 is incorrect. The conversion factor in a futures contract does not apply to accrued interest. It is a mathematical adjustment to the amount required when settling a futures contract that is supposed to make all eligible bonds equal the same amount—for example, adjust each bond to an equivalent 6% coupon bond. When multiple bonds can be delivered for a particular maturity of a futures contract, a cheapest-to-deliver bond typically emerges after adjusting for the conversion factor.

A is incorrect because Characteristic 1 is correct.

C is incorrect because Characteristic 3 is correct.

2. Solution: B.

We first find the PV factors and then solve for the fixed swap rates. Based on the data given, we construct the following present value data table. The calculations are shown to the sixth decimal place in an effort to minimize rounding error. Rounding differences may occur in the solutions.

Days to Maturity	A$ Spot Interest Rates(%)	Present Value(A$1)	US$ Spot Interest Rates(%)	Present Value(US$1)
90	2.50	0.993789	0.10	0.999750
180	2.60	0.987167	0.15	0.999251
270	2.70	0.980152	0.20	0.998502
360	2.80	0.972763	0.25	0.997506
	Sum:	3.933870	Sum:	3.995009

Therefore, the Australian dollar periodic rate is

$$C_{AUD} = \frac{1 - PV_4}{\sum_{i=1}^{4} PV_i} = \frac{1 - 0.972763}{3.933870} = 0.692381\%$$

and the US dollar periodic rate is

$$C_{USD} = \frac{1 - PV_4}{\sum_{i=1}^{4} PV_i} = \frac{1 - 0.997506}{3.995009} = 0.062422\%$$

The annualized rate is simply (360/90) times the period results: 2.7695% for Australian dollars and 0.2497% for US dollars.

3. Solution: A.

The US dollar notional amount is calculated as A$100 million divided by the current spot exchange rate at which US$1 dollar trades for A$1.1400. This exchange is equal to US$87,719,298 (= A$100,000,000/1.14).

4. Solution: A.

The current five-year swap rate is not used as a discount rate with swaptions. The swaption time

to expiration is 0.25, not the life of the swap.

Case 9: Allen Powell（考点：Contingent Claims, Black Model）

1. Solution: A.

The hedge ratio requires the underlying stock and call option values for the up move and down move. $S^+ = 56$, and $S^- = 46$. $c^+ = \text{Max}(0,S^+ - X) = \text{Max}(0,56 - 50) = 6$, and $c^- = \text{Max}(0,S^- - X) = \text{Max}(0,46 - 50) = 0$. The hedge ratio is

$$h = delta = \frac{\Delta c}{\Delta S} = \frac{c^+ - c^-}{S^+ - S^-} = \frac{6}{10} = 0.6$$

2. Solution: A.

The call option can be estimated using the no-arbitrage approach or the expectations approach. With the no-arbitrage approach, the value of the call option is

$c = hS + PV(-hS^- + c^-)$.

$h = (c^+ - c^-)/(S^+ - S^-) = (6 - 0)/(56 - 46) = 0.60$.

$c = (0.60 \times 50) + (1/1.05) \times [(-0.60 \times 46) + 0]$.

$c = 30 - [(1/1.05) \times 27.6] = 30 - 26.286 = 3.714$.

Using the expectations approach, the risk-free rate is $r = 0.05$, the up factor is $u = S^+/S = 56/50 = 1.12$, and the down factor is $d = S^-/S = 46/50 = 0.92$. The value of the call option is

$c = PV \times [\pi c^+ + (1 - \pi)c^-]$.

$\pi = [FV(1) - d]/(u - d) = (1.05 - 0.92)/(1.12 - 0.92) = 0.65$.

$c = (1/1.05) \times [0.65(6) + (1 - 0.65)(0)] = (1/1.05)(3.9) = 3.714$.

3. Solution: B.

Recall Black's model for call options can be expressed as $c = e^{-rT}[F_0(T)N(d_1) - XN(d_2)]$.

4. Solution: B.

In using the Black model, a forward or futures price is used as the underlying. This approach is unlike the BSM model in which a spot price is used as the underlying.

9. Alternative

9.1. Key Points

9.2. Key Practice

Case 1: Karen Westin(考点：Publicly Traded Real Estate Securities)

1. Solution: A.

For industrial properties, the most important factor affecting economic value is retail sales growth, which is expected to be low in West Lundia. The most important factor affecting economic value for apartment REITs are job creation and population growth, which are both expected to be high. For office properties, the most important factor is job creation, which is expected to be high.

2. Solution: C.

There are two components to this valuation. The first component is the cash flows for the first seven years. The second component is the terminal value.

PV of CFs in years 1-7:

PMT = 7.0; I/Y = 10; N = 7. The PV = WL $34.08 million.

PV of terminal value:

An appropriate terminal cap rate can be calculated using the following equation:

cap rate = discount rate — growth rate = 10% - 3.25% = 6.75%.

The terminal value is calculated using the following inputs: WL $8.5 million divided by the terminal cap rate of 6.75%. The value in Year 7 is WL$ 125.93 million, discounting this value to the present:

FV = WL $125.93 million; N = 7, I/Y =10 results in a present value of WL $64.62 million.

WL $34.08 + WL $64.62 = WL $98.7 million.

3. Solution: C.

NAVPS based on forecasted NOI:

Option #2 (REIT)	(in WL$ millions)
Recent NOI	140.0
Subtract: Non-cash rents	- 5.0
Add: Full-year adjustment for acquisition	+ 5.0
Pro forma cash NOI	140.0
Projected NOI @ 2.5% growth	143.5
Estimated value of operating real estate @ cap rate of 7.0%	2050.0
Add: Other assets	+ 50.0
Estimated gross value	2100.0

Subtract: Total liabilities	- 300.0
NAV	1800.0

NAVPS = 1800 / 15 = 120, which is lower than the current market price of WL $125.00. This REIT is selling at a premium to NAVPS.

4. Solution: C.

Option 1 represents private investment in real estate, while Options 2 and 3 entail investing through public securities. Tax advantages can be enjoyed by direct investments in real estate, as well as through public securities. Similarly, use of leverage can be pursued by all three options. Option 1 does not have the problem of structural conflicts of interest that may be present in REITs (Option 2).

5. Solution: A.

The terminal value estimate is 12.0 x WL $13.5 MM for end of year 7 or WL$ 162.0 MM. The discount rate is the cap rate of 7.0% plus the growth rate of 2.5%, or 9.5%. Discounting this terminal value to find the present value: FV = WL$ 162.0 MM; I/Y = 9.5; N = 7; PV = WL $85.83 MM. Add the present value of all dividends of WL $39.7 MM for a total of WL $125.53 MM. Divide WL$ 125-53 MM by 1 million shares outstanding for a value per share of WL $125-53.

6. Solution: C.

Investment in both public REOCs and public REITs enjoy high liquidity, as shares of both trade on a stock exchange. Tax advantages favor REITs as REOCs are not tax- advantaged. REOCs are more reliant on capital appreciation due to their ability to reinvest cash flows, while REITs tend to have higher current income (i.e., yield).

Case 2: Horizon Yield (考点：Introduction to Commodities and Commodity Derivatives)

1. Solution: B.

A speculator's goal is to take distinct market positions, deliberately taking on risk by betting on rising or falling prices. Billingsley took a long position in wheat futures, expecting to profit from an increase in the price of wheat. Billingsley may achieve the expected gains if the price of wheat increases, but he is also exposed to significant losses if the price of wheat falls. Therefore, Billingsley is a speculator.

A is incorrect because a market participant is classified as a hedger if an existing or expected cash position is compensated for via an opposite future. Billingsley did not enter into the wheat futures contracts to offset an existing or expected cash position.

C is incorrect because an arbitrageur tries to take advantage of time-or location-based price differences in commodity futures markets, or between spot and futures markets, in order to generate riskless profits. Billingsley's trades in wheat were long-only and were not riskless.

2. Solution: C.

Wheat is a consumable asset and this has its value determined primarily through global supply and demand factors.

A is incorrect because consumable assets do not generate income. As a result, interest rates have only a minor effect on their values.

B is incorrect because, in contrast to stocks and bonds, consumable assets do not generate continuous cash flows. As a result, cash flows are not a material factor in determining the value of consumable assets.

3. Solution: C.

Backwardation describes a term structure curve that has a negative trend (i.e. futures prices with longer time to maturity are lower than current spot prices). Exhibit 1 shows that the wheat price for delivery in December is lower than that of the spot price on 1 September. As a result, the forward curve is in backwardation.

A is incorrect because Exhibit1 shows that wheat for delivery in December is lower than the spot price on 1 September. As a result, the forward curve is in backwardation and not flat.

B is incorrect because in a contango situation, the futures price lies above the spot price. Exhibit 1 shows that wheat for delivery in Decembers lower than the spot price on 1 September.

4. Solution: A.

Convenience yield is the monetary benefit from holding a commodity physically instead of being long the respective futures, and is affected in large part by inventory levels. Supply shortages increase the spot price and provide profit opportunities for holders of the commodities, thus

increasing the convenience yield. Supply surpluses, on the other hand, decrease the spot price and the convenience yield.

B is incorrect because supply shortages increase the spot price and provide profit opportunities for holders of the commodities, thus increasing the convenience yield.

C is incorrect because a short-term change in the supply of a commodity would affect the convenience yield either positively or negatively; it would not remain the same.

5. Solution: B.

The roll return reflects the profit from the convergence of the futures price toward the spot price over time, and the subsequent rolling of the maturing futures into the next nearest month's futures contract. If the commodity market is in backwardation, the rolling from the maturing to the next shortest futures contract generates positive income. Because Billingsley is selling at the spot price ($4.50) and is buying at the lower futures price ($4.20), the roll return will be positive.

A is incorrect because the spot price ($4.50) is higher than the futures price ($4.20), so that the roll return will be positive, not zero.

C is incorrect because the spot price ($4.50) is higher than the futures price ($4.20), so that the roll return will be positive, not negative.

6. Solution: A.

Considering the storage theory, non-storable commodities are characterized by a high percentage of backwardation, while commodities with low storage costs, such as precious metals, are almost exclusively in contango.

B is incorrect because empirical evidence has verified the storage hypothesis, demonstrating that low-storage-cost commodities are in contango the majority of the time.

C is incorrect because a negative trending forward curve is indicative of a commodity in Backwardation, not contango.

Case 3: Yushan Capital (考点：Private Equity Valuation)

1. Solution: A.

A is correct. A clawback provision requires the GP to return capital to LPs in excess of the agreed profit split between the LPs and GPs. This provision ensures that when a private equity firm exits a highly profitable investment early in the life of the fund but subsequent exits are less profitable, the GP pays back capital contributions, fees, and expenses to LPs to ensure that the profit split is in line with the terms outlined in the fund's prospectus. Carried interest represents the GP's share of profits generated by the fund. A ratchet clause is a mechanism that determines the allocation of equity between shareholders and the management team of the private equity controlled company.

B is incorrect. Carried interest represents the GP's share of profits generated by the fund.

C is incorrect. A ratchet clause is a mechanism that determines the allocation of equity between shareholders and the management team of the private equity controlled company.

2. Solution: C.

C is correct. The co-investment provision is generally favorable for LP investors. With this provision, LPs generally have a first right of co-investing along with the GP. This can be advantageous for the LPs because fees and profit share are likely to be lower (or zero) on co-invested capital. The GP and affiliated parties are also typically restricted in their co-investments to prevent conflicts of interest with their LPs. Placement fees are paid to the fundraiser, either up front or as a trailer fee, corresponding to a fraction of the amount invested by the limited partners.

A is incorrect. The co-investment provision is generally favorable for LP, not GP, investors.

B is incorrect. The items Chen lists as benefits for LP investors are accurate.

3. Solution: C.

C is correct. DPI (distributed to paid in) is the cumulative distributions paid out to LPs as a proportion of the cumulative invested capital. In this case, DPI = £345 (Total distributions)/£280 (Total call downs) = 1.23×.

A is incorrect; 2.35 represents the value for TVPI (DPI + RVPI) = 1.23 + 1.12.

B is incorrect; 1.12 reflects the value for RVPI = £312.6/£280.

4. Solution: B.

B is correct. The solution table was constructed using the information provided in Exhibit 1. The carried interest is shown in column 7 and is calculated as 20% times the increase in net asset value (NAV) before distributions: 0.2 × (563.552 – £431.24) = £26.462 million. Note that for carried interest to apply, NAV before distribution must exceed committed capital.

	Called Down	PIC	Mgmt. Fee	Operating Results	NAV	Carried Interest	Distribution	NAV Post-Dist.
2011	120	120	2.4	–15	102.6			102.6
2012	40	160	3.2	–35	104.4			104.4
2013	25	185	3.7	60	185.7			185.7
2014	60	245	4.9	105	345.8	9.16	60	276.64
2015	25	270	5.4	135	431.24	17.088	110	304.152
2016	10	280	5.6	255	563.552	26.462	175	362.09

A is incorrect. It reflects the NAV in 2016 minus the total paid in capital times 20%: 0.2 × (£563.552 – £280) = £56.71 million.

C is incorrect. It reflects the carried interest amount in 2015.

5. Solution: B.

B is correct. From the information provided (limited market history, weak asset base, low cash predictability, new management team), Robologistix is most likely a venture-stage company. Early-stage companies are best evaluated using the replacement cost or real option methods. Discounted cash flow (DCF) valuation is more appropriate for companies that have a longer operating history and is least appropriate for Robologistix.

A and C are incorrect. Early-stage companies are best evaluated using the replacement cost, venture capital, or real option approaches.

6. Solution: C.

C is correct. Using the basic VC method, the price per share can be calculated for the general case in a five-step procedure:

Step 1: POST = V/(1 + r) = £32/[(1.4)6] = £32/7.5295= £4.2499

Step 2: PRE = POST – I = £4.2499 – £3.00= £1.2499 million

Step 3: F = I/POST = £3.0/£4.2499= 70.5899%

Step 4: y = x[F/(1 – F)] = 500,000[0.7059/(1 – 0.7059]= 1,200,000

Step 5: p1 = I/y = £3,000,000/1,200,000= £2.50

A is incorrect. A incorrectly uses POST instead of I in Step 5.

B is incorrect. B incorrectly uses 1,200,000 as the total share count, not the share count for Yushan for its investment. After backing out the initial 500,000 shares, the price per share is £3,000,000/700,000 = £4.2857.

Case 4: Julian Fuentes(考点：Private Real Estate Investments)

1. Solution: C.

While almost any private equity real estate investment will be unique (if for no other reason than that they must be in different locations), residential properties tend to have the fewest unique characteristics. Transactions-based indices tend to be more useful for residential commercial property benchmarking than for nonresidential commercial properties due to the large amount of data required for many properties and the unique features of many nonresidential commercial properties.

2. Solution: C.

Commercial uses with higher management involvement, such as restaurants, hotels, shopping centers, also have higher operational risks. One way to check this given the specifics in this case is to look at management fees as a percentage of effective gross income for the three properties.

Property #1 3.97% ($145,000 I $3,652,000)

Property #2 3.99% ($172,500 / $4,327,500)

Property #3 4.06% ($138,288 / $3,407,557)

Therefore, Property #3 would be expected to have greater operational risk.

3. Solution: B.

Property #2 is an older office building with unique characteristics that could not be easily reproduced using current architectural designs and materials. Therefore, the cost approach would be less appropriate than the income approach as a basis for appraisal. The sales comparison approach would also be less suitable as the property is relatively unique.

4. Solution: B.

DCF valuation based on a required return of 9.5% is:

	NOI	Present Value
Year 1	$1,706,500	$1,558,447.49
Year 2	$1,774,760	$1,480,169.30
Year 3	$1,845,750	$1,405,822.60
Year 4	$1,919,580	$1,335,210.50
Year 5	$1,996,364	$1,268,145.64
Terminal value	$27,150,550	$17,246,780.74
Property #1	value	$24,294,576.27

Selected Calculation:

Terminal value is computed by applying the terminal cap rate to NOI in year 6. To estimate NOI for year 6, we need a growth rate estimate. We are not given the growth rate directly, but given

the discount rate of 9.5% and the terminal cap rate of 7.5%, we can estimate the growth rate to be 2%.

$$TV_5 = NOI_5(1+g)/C_t = 1{,}996{,}364 \times (1+0.02)/0.075 = 27{,}150{,}550.40$$

Note: Make sure that you use the uneven cash flow function to compute NPV using your financial calculator.

5. Solution: A.

The maximum loan amount will typically be based on the lower of loan-to-value (LTV) or debt service coverage ratio. Based on LTV of 70%, ALIC would be willing to loan $21 million ($30 million x 0.70). Based on a debt service coverage ratio of 1.5x, ALIC will loan just under $20.7 million. ALIC will be willing to loan only an amount equal to the lower of these two measures.

The calculation for maximum debt service based on a minimum debt service coverage ratio of 1.5x is:

$$\text{Maximum debt service} = NOI_t/DSCR = 1{,}706{,}500/1.5 = 1{,}137{,}666.67$$

Maximum debt service on an interest-only loan can be used to calculate the maximum loan amount

$$\text{Maximum debt service Maximum loan} = \text{Maximum debt service}/\text{Interest rate}$$
$$= 1{,}137{,}666.67/0.055 = 20{,}684{,}848.48$$

6. Solution: B.

AIP should earn a higher return on equity by financing part of its purchase price with a mortgage because the cost of mortgage funds (5.5%) is less than the required return on equity (9.5%). Including the mortgage funding in a weighted-average cost of capital (WACC) will increase the value over the purchase price required if only equity funding is used.

Case 5: Eric Silverman (考点：Private Real Estate Investments)

1. Solution: B.

B is correct. The investment committee is correct in that direct real investment will likely generate income and price appreciation, but their view on the diversification is incorrect. Real estate returns generally have low correlations with returns on other assets classes, such as stocks and bonds, and thus allow the endowment to diversify portfolio risk.

A is incorrect. Investors in direct real estate can expect to generate income by leasing or renting the property.

C is incorrect. Investors in direct real estate can expect price appreciation on the real estate investment.

2. Solution: A.

A is correct. Dua is correct about factors that drive demand for office space and industrial and warehouse space but incorrect about retail space. Employment growth drives demand for office space, while warehouse space demand depends broadly on economic strength. The level of import and export activity is more directly related to demand for industrial and warehouse space, not retail space. Demand for retail space depends on consumer spending, job growth, and economic strength.

B is incorrect. Dua is correct about factors that drive demand for office space and industrial and warehouse space but incorrect about retail space.

C is incorrect. Dua is correct about factors that drive demand for and industrial and warehouse space.

3. Solution: A.

A is correct. Under the DCF approach the value of the office property is the sum of the present value of lease payments (NOI) of $750,000 per year for 4 years plus the present value of the estimated resale value in Year 4.

PV of level NOI over 4 years:

$750000/1.075+750000/1.075^2+750000/1.075^3+750000/1.075^4 = \$2,511,994.70$

Year 5 NOI = 750,000 × (1.15) = $862,500

Estimated resale value after 4 years = ($862,500/0.055) = $15,681,818.18

PV of estimated resale value = [$15,681,818.18/(1.0754)] = $11,742.553.76

Current value of property = $2,511,994.70 + $11,742,553.76 = $14,254,548.46

C is incorrect. The estimated resale value is not discounted to PV. The current value of property is incorrectly calculated as $18,193,812.88 = $2,511,994.70/$15,681,818.18.

B is incorrect. Here the PV of NOI is incorrect, but the estimated resale value after 4 years is not discounted to PV and is incorrectly calculated.

PV of NOI =750000/1.055+750000/1.055^2+750000/1.055^3+750000/1.055^4= $2,628,862.59

Estimated resale value after 4 years = ($750,000/0.055) = $13,636,363.64

Incorrect value of property = $16,265,226.23 = $2,628,862.59 + $13,636,363.64.

4. Solution: C.

C is correct. The calculation of the estimated property value using the cost approach is shown in the following table.

Market value (MV) of land	$2,500,000
Replacement building costs	$20,000,000
Curable physical depreciation costs	$500,000
Incurable physical depreciation costs	$3,500,000
Cost of modernizing heating and cooling system	$1,200,000
Estimated property value	$17,300,000

Estimated property value = MV of land + Replacement building costs – Curable physical depreciation costs – Incurable physical depreciations costs – Cost of modernizing heating and cooling system.

A is incorrect. This calculation excludes the market value of land.

B is incorrect. This calculation excludes the market value of land and does not deduct curable physical depreciation costs.

5. Solution: A.

A is correct. Using the sales comparison approach, the price PSF of the comparable properties is adjusted relative to the subject property to account for age and condition. For example, Property 1 is 10 years old, and the subject property is 7 years old. Because the subject property is newer by three years, the price PSF of Property 1 is adjusted up by 3% per year for three years, or 9%. Property 1 is in average condition, but the subject property is in excellent condition. Thus, the value of Property 1 is adjusted up 14%, the adjustment factor provided for the condition adjustment. Thus, the price PSF of Property 1 is adjusted up by 23% from $1,150: Adjusted price PSF for Property 1 = $1,150 × 1.23 = $1,414.50. A similar calculation is made for Property 2. The average adjusted price PSF of both properties is $1,403. The value of the subject property is calculated by applying $1,402.88 to the size of the property (12,000 square feet):

Value of subject property = $1,402.88 × 12,000 = $16,834,500

The following table shows the calculations:

Adjustment	**Property 1**	**Property 2**

Price PSF	$1,150	$1,325
Age	9.0%	–9.0%
Condition	14.0%	14.0%
Total	23.0%	5.0%
Adjusted price PSF	$1,414.50	$1,391.25
Average price PSF	$1,402.88	
Estimated value	$16,834,500	

B is incorrect. The adjustment for age is incorrect. Property 1 is adjusted down instead of up, and Property 2 is adjusted up instead of down.

Adjustment	**Property 1**	**Property 2**
Age	–9.0%	9.0%
Condition	14.0%	14.0%
Total	5.0%	23.0%
Adjusted PSF	$1,207.50	$1,629.75
Average	$1,418.63	
Value	$17,023,500	

C is incorrect. It is a simple average of the sales prices of Property 1 and Property 2.

Sales price Property 1 = 8,000 × $1,150 = $9,200,000

Sales price Property 2 = 14,000 × $1,325 = $18,550,000

6. Solution: A.

A is correct. Although Lin is correct that the DCF method takes into account the cash flows that investors care about, she is not correct in stating that DCF takes into account the cyclical nature of the real estate market.

C is incorrect. Lin is correct about the cost approach.

B is incorrect. Lin is correct about the sales comparison approach.

Case 6: Premier Immobilier (考点：Private Real Estate Investments)

1. Solution: C.

C is correct. An investor in Golden Age Equity Partners would most likely enjoy all three benefits. All three (Timbrian Equity, Multifam Equity, and Golden Age Equity) are diversified geographically, and their returns should not be highly correlated with the equity markets. Both Golden Age and Timbrian would generate income—Golden Age from resident fees and Timbrian from the periodic sale of timber. Because trees grow over time and become increasingly valuable (owing to the longer growing cycle before the product is sellable), depreciation would not be a reason to invest. Multifam Equity investors would hope primarily to realize period capital gains from periodic sales expected to occur within 14–24 months of each project initiation. Depreciation is not a primary goal for Multifam Equity but is not impossible if properties do not sell. Only investors in Golden Age, which intentionally owns properties subject to depreciation, could typically pass those tax benefits on to investors and would explicitly seek all three benefits.

2. Solution: B.

B is correct. Multifam Equity Partners would likely see the greatest negative impact from unexpected inflation because of rising ongoing construction costs, which would reduce profit potential from property sales whose sale prices have already been agreed upon. Rising interest rates would increase financing costs since Multifam Debt Partners' financing is floating-rate debt. As a private investment, Golden Age Equity Partners would probably not see its income affected as much by unexpected inflation or higher interest rates because these property investments would be expected to have stable cash flows and longer time horizons than those of Multifam Equity Partners. Timbrian Partners could actually benefit from unexpected inflation since it would be in a position to sell more timber at higher prices due to higher inflation.

A and C are incorrect.

3. Solution: A.

A is correct. A hedonic index is a transaction-based real estate index, which relies on a single sale of a property as opposed to repeat sales of the same property. Multifam Equity Partners will be selling multiple newly constructed apartment buildings and have sales data for each transaction individually. It would not be contributing appraisal data, because its activities consist of single sales of multiple newly built properties. Golden Age Partners is engaged in building, but not selling, of properties. NOI is a component of return in an appraisal-based index.

B and C are incorrect.

4. Solution: C.

C is correct. Multifam III has the highest assumed growth rate. According to the discounted cash

flow method approach to valuation, the relationship between the discount rate and the cap rate is:

Capitalization rate = Discount rate – Growth rate.

where the NOI is usually based on what is expected during the current or first year of ownership.

Cap rates of the three properties are as follows:

(NOI × Number of units) ÷ Value

Multifam I: (25,000 × 90) ÷ 45,000,000 = 5.0%.

Multifam II: (30,000 × 100) ÷ 50,000,000 = 6.0%.

Multifam III: (20,000 × 120) ÷ 60,000,000 = 4.0%.

The discount rate is the required rate of return, and each property has a similar expected rate of return. For any given discount rate, the growth rate will be

Discount rate – Cap rate = Growth rate.

Therefore, the property with the lowest cap rate has the highest assumed growth rate.

5. Solution: B.

B is correct. Multifam II would have the highest permitted LTV. The relationship between debt service, NOI, and the debt service coverage ratio is

DSCR = NOI/Debt service, or Debt service = NOI/DSCR.

An interest-only loan has no principal payments, so the loan balance remains con- stant over time.

Debt service, as a percentage of market value, for the three properties is as follows:

Multifam I: [(90 × 25,000) ÷ 1.30] ÷ 45,000,000 = 3.85%.

Multifam II: [(100 × 30,000) ÷ 1.40] ÷ 50,000,000 = 4.29%.

Multifam III: [(120 × 20,000) ÷ 1.50] ÷ 60,000,000 = 2.67%.

Multifam II has the highest permitted debt service as a percentage of market value and, therefore, also has the highest permitted LTV.

6. Solution: A.

A is correct. Due diligence for Timbrian Equity Partners would not emphasize structural engineering issues or zoning compliance. Golden Age Equity Partners invests in and operates facilities for senior living. Due diligence would include structural inspection, compliance with local zoning ordinances, operating expenses (such as utilities), and property taxes. These would not be necessary for Timbrian's timberlands and would be necessary only to a small extent for the new construction being done by Multifam Equity Partners.

Case 7: Zhao Xin (考点：Private Real Estate Investments, Publicly Traded Real Estate Securities, Private Equity Valuation)

1. Solution: C.

Based on the loan-to-value ratio, the loan would be 90 percent of ¥5 million, which is ¥4.5 million. But with a DSCR of 1.25, the maximum debt service would be ¥400,000/1.25 = ¥320,000. This amount is the mortgage payment that would result in a 1.25 DSCR for an interest-only loan.

If the loan is interest only, then we can obtain the loan amount by simply dividing the mortgage payment by the interest rate. Therefore, the actual loan amount would be ¥320,000/0.08 = ¥4,000,000 rather than ¥4.5 million.

The first-year cash flow is the NOI less the mortgage payment.

NOI	¥400,000
Debt service	¥320,000
Cash flow	¥80,000

The amount of equity is the purchase price less the loan amount.

Price	¥5,000,000
Mortgage	¥4,000,000
Equity	¥1,000,000

The equity yield rate is the Cash flow/Equity = $80,000/$1,000,000 = 8%.

2. Solution: A.

A is correct. The calculation of FFO is based on net income after adding back amortization and depreciation.

Net income available to common		$430 million
Depreciation and amortization		$30 million
FFO		$460 million
Number of shares outstanding		140
FFO per share	460/140	$3.29
P/FFO	49/3.29	14.9

3. Solution: C.

C is correct. Liquidation is the route chosen if the company is no longer viable. The exit route used for LOL, Inc., was a secondary market transaction at a price that indicated a strong company.

B is incorrect because a management buyout is possible, given that management already has an equity stake in the firm.

A is incorrect because an initial public offering is possible, though likely more expensive than a secondary market transaction.

4. Solution: C.

The statement's first sentence describes costs associated with the management of a private equity investment which usually includes a fixed annual management fee as well as a variable performance-based fee. Such costs are classified as management and performance fees. The second sentence describes the cost associated with stock options being granted to managers which leads to the dilution of equity holder's value. Such costs are known simply as dilution.

Case 8: Ionia Legend(考点：Private Equity Valuation, Introduction to Commodities and Commodity Derivatives)

1. Solution: A.

Define variables for the key assumptions we have made.

V = terminal value (at time of exit) = $25 million (in four years)

t = time to exit event = 4 years

I = amount of investment = $3 million

r = discount return used by investors = 50 percent

x = number of existing shares (owned by the entrepreneurs) = 1 million

- Step 1: Determine the Post-Money Valuation

  Post-money valuation=$\frac{V}{(1+r)^t}=\frac{25\ million}{1.5^4}$=$4,938,272

- Step 2: Determine the Pre-Money Valuation.

  Pre-money valuation = Post-money valuation - I= 4,938,272 – 3,000,000 = $1,938,272

- Step 3: Determine the Ownership Fraction:

  F=$\frac{I}{Post\ money\ valuation}$=3,000,000/4,938,272=60.75%

  F is the required ownership fraction for the investor

- Step 4: Obtain the Number of Shares

  1,000,000 × $\frac{0.6075}{1-0.6075}$ =1,547,771

- Step 5: Obtain the Price of Shares

  P=$\frac{3\ million}{1547771}$=$1.94

2. Solution: B.

B is correct. The investment exit value is $30 million. The expected payoff to Piltover is calculated as (all amounts in millions):

Expected exit value	$30.00
Debt remaining at exit: ($12-5.6)	$6.40
Preference shares:7.2×1.15^6	$16.65
Common equity: $30 exit-6.4 debt- 16.65 preference	$6.95

Initial investment: $7.2(preference) + 0.9 × $0.8(common) = $7.92

Proceeds at exit: $16.65(preference) + 0.9 × $6.95(common) = $22.91

Multiple of expected proceeds to invested funds: $22.91 exit value/$7.92 initial investment = 2.89×

3. **Solution: C.**

C is correct. The life cycle of livestock does vary widely by product. Grains have uniform, well-defined seasons and growth cycles specific to geographic regions. Therefore, both statements are correct.

4. Solution: B.

B is correct. The portfolio manager has a long position in the total return commodity swap. He will receive payments when the commodity index rises and make payments when the commodity index declines. Moreover, swap payments are made periodically (in this case monthly) and not withheld to the end of the contract. The calculations for the two swap payments are as follows:
Month 1: $150 million × (- 3%) = -$4.5 million.
Month 2: $150 million × 3.5% = $5.25 million.

5. Solution: B.

B is correct. The energy sector will comprise a sizable portion of a production value-weighted index, and thus will be a meaningful driver of returns for such an index. A is incorrect because a production value-weighted index will be more, not less, sensitive to the energy sector. C is incorrect because a production value-weighted index will be more, not equally, sensitive to the energy sector.

10. Portfolio Management

10.1. Key Points

10.2. Key Practices

Case 1: Pearl Asset Management（考点：Multifactor models, economic analysis, active security returns）

1. Solution: B.

Macroeconomic models are based on surprises in macroeconomic data. Principal component analysis is used to identify the factors of a statistical factor model, which cannot necessarily be described using conventional economic variables. Fundamental factor models use firm-specific valuation metrics such as PE with standardized sensitivities.

2. Solution: C.

Information ratio for Lincoln fund = IR = active return/active risk = (7.6% - 6.5%)/5% = 0.22

Sharpe ratio of benchmark = SR_B = (6.5%-3%) / 11% = 0.32. The optimal amount of active risk can be calculated as:

$$\sigma_A^* = (IR / SR_B) \times \sigma_B = \left(0.22 / 0.32\right) \times 11.0\% = 7.56\%$$

The weight of the active Lincoln portfolio should be 7.56% / 5.0% = 1.51, and the weight on the benchmark portfolio would be 1 -1.51 =-0.51.

3. Solution: A.

The highest Sharpe ratio can be calculated using the relation $SR_p^2 = SR_B^2 + IR^2$:

$$SR_P = \sqrt{SR_B^2 + IR^2} = \sqrt{0.32^2 + 0.22^2} = 0.388$$

Thus, the highest Sharpe ratio that can be achieved by combining the active and passive portfolios is approximately 0.39.

4. Solution: B.

An asset whose value is negatively correlated to the investor's utility from future consumption provides a poor hedge against bad consumption outcomes. That is, the asset pays off more when the investor's utility is low. Such assets would command a higher risk premium.

5. Solution: B.

For countries with high expected economic growth rates, real rates will be high. Investors will be less concerned about the future, and the inter-temporal rate of substitution will be low.

Also, investors will want to increase current consumption and, hence, will borrow more and save less.

Case 2: Millennium Investments（考点：Multifactor models, Economic analysis）

1. Solution: C.

E (R_p) = 0.6E (R_{WMB}) + 0.4E (R_{REL}) = 0.6(9%) + 0.4(10.8%) = 9.72%

2. Solution: B.

$$\beta_{P,INF} = 0.6\beta_{WMB,INF} + 0.4\beta_{REL,INF} = 0.6(-2.2) + 0.4(-1.0) = -1.72$$

3. Solution: A.

$$8 = E(R) + (-0.9 \times 0.5) + (1.2 \times 0.5) + (0.5)$$

E(R) = 7.35%

4. Solution: B.

Consider portfolio A comprising 50% portfolio X and 50% portfolio Z. Portfolio A will have an expected return of 12.5% and a factor sensitivity of 1.25. A long position in portfolio A and short position in portfolio Y will have an expected return of 0.5% with zero factor sensitivity.

5. Solution: B.

Active risk squared = active factor risk + active specific risk

6. Solution: C.

Credit spreads tighten during times of economic expansions. During such times, lower-rated bonds outperform higher-rated bonds.

Case 3: Tamara Ogle（考点：Active security returns）

1. Solution: A.

$$E(R_A) = \sum w_{p,j} E(R_{p,j}) - \sum w_{B,j} E(R_{B,j}) = 11.07\% - 10.44\% = 0.63\%$$

2. Solution: C.

Both statements are correct. Information ratio, unlike the Sharpe ratio, is affected by an allocation to cash or by the use of leverage. For an unconstrained optimization, a change in aggressiveness in active weights changes both the active return and active risk proportionally, leaving the information ratio unchanged.

3. Solution: B.

IR(Dena) = IR(Orient)

$$(0.2) \times (0.99) \times \sqrt{12} = (0.25) \times (0.80) \times \sqrt{X}$$

$$\sqrt{X} = 3.429; X = 11.76$$

4. Solution: A.

Both statements are incorrect. The portfolio with the highest information ratio will have the highest Sharpe ratio. Recall that the Sharpe ratio of the portfolio is computed as $SR_p^2 = SR_B^2 + IR_p^2$. Given that benchmark Sharpe ratio (SR_B) is the same for all similar active portfolios, the active portfolio with the highest information ratio will also be the portfolio with the highest Sharpe ratio. The optimal active risk for a constrained portfolio=TC *optimal active risk for an unconstrained portfolio. Given that TC < 1 for constrained portfolio, the optimal active risk for a constrained portfolio will be lower than the optimal active risk for an unconstrained portfolio.

Case 4: Halimah Yusuf（考点：Multifactor model, active security returns）

1. Solution: B.

Quek is incorrect in stating that APT specifies the number of factors in a multifactor model but is correct in stating that APT does not specify the identity of factors in a multifactor model. APT does not indicate the number of factors or their identity.

A is incorrect. Quek is incorrect in stating that APT specifies the number of factors in a multifactor model but correct in stating that APT does not specify the identity of factors in a multifactor model. APT does not indicate the number of factors or their identity.

C is incorrect. Quek is correct in stating that APT does not specify the identity of factors in a multifactor model. APT does not indicate the number of factors or their identity.

2. Solution: C.

In macroeconomic models, the factors are "surprises" (how much higher or lower than what was expected) in macroeconomic variables, not the level or value of macroeconomic variables.

A is incorrect. Statistical models are described accurately. Statistical factor models use factor analysis to produce factors that are portfolios of securities that best explain historical return covariences. Alternatively, they use principal component analysis to derive factors that are portfolios of securities that best explain historical return variances.

B is incorrect. Fundamental factor models are described correctly; the factors are company share attributes, such as price-to-earnings ratio and market capitalization.

3. Solution: C.

$E(R_p) = R_F + \beta_{p,1Market} + \beta_{p,2Small\text{-}Cap} + \beta_{p,3Value} + \beta_{p,4Momentum}$

$= 0.013 + 1.05 \times 0.035 + 0.5 \times 0.047 + (-0.6) \times (-0.045) + 0.5 \times 0.051$

= 0.12575, or 12.58%.

A is incorrect. This calculation incorrectly neglects to add the Market factor:

$0.0890 = 0.013 + 0.5 \times 0.047 + (-0.6) \times (-0.045) + 0.5 \times 0.051$

B is incorrect. This calculation incorrectly neglects to add the risk-free rate (1.3%):

$0.1128 = 1.05 \times 0.035 + 0.5 \times 0.047 + (-0.6) \times (-0.045) + 0.5 \times 0.051$

4. Solution: A.

Cerra is correct regarding the growth bias. The factor sensitivity for the Value factor is –0.6, which signifies a growth bias. Cerra is incorrect regarding a large-cap orientation and a contrarian strategy. The portfolio factor sensitivity for the Small-Cap factor is 0.5, indicating a small-cap orientation. For the Momentum factor, the factor sensitivity of 0.5 indicates a momentum bias, not a contrarian strategy, which would be true if the factor sensitivity for the Momentum factor were negative and not close to zero. B is incorrect. Cerra is incorrect with regard to the contrarian

strategy. For the Momentum factor, the factor sensitivity is 0.5, which indicates a momentum bias.

C is incorrect. Cerra is incorrect with regard to a large-cap orientation. The portfolio factor sensitivity for the Small-Cap factor is 0.5, indicating a small-cap orientation.

5. Solution: B.

Cerra is correct. To determine which factor contributes most to active return, note the following:

Active return = 6.755% + 1.5% = 8.255% = $\sum$[(Portfolio sensitivity) − (Benchmark sensitivity)] × (Factor return) + Security selection

Return from factor tilts = Sum of the absolute contribution to active return = $\sum$[(Portfolio sensitivity) − (Benchmark sensitivity)] × (Factor return)= 6.755%

The proportional contribution to active return for each factor = Return from factor tilts ÷ Active return.

The table below shows that the Value factor had the highest contribution to active return, 43.61% (3.6% ÷ 8.255%).

Factor Sensitivity			(1) – (2)	Factor	Contribution to Active Return	
Factor	Portfolio	Benchmark	Difference	Return	Absolute	Proportion
	(1)	(2)	(3)	(4)	(3) × (4)	
Market	1.05	1	0.05	3.5%	0.175%	2.12%
Small-Cap	0.5	0.3	0.2	4.7%	0.940%	11.39%
Value	–0.6	0.2	–0.8	–4.5%	3.600%	43.61%
Momentum	0.5	0.1	0.4	5.1%	2.040%	24.71%
/			Return from factor tilts		6.755%	81.83%
			Security selection		1.500%	18.17%
			Active return		8.255%	100.00%

A is incorrect. Quek is incorrect. The Value factor has the highest contribution to active return.

C is incorrect. Singh is incorrect. The Value factor has the highest contribution to active return.

6. Solution: C.

C is correct. Portfolio Z has the highest active factor risk exposures to the style factor.

Portfolio Z active style risk squared ÷ Active risk squared = 10 ÷ 16 = 62.5%.

Portfolio X active style risk squared ÷ Active risk squared = 28 ÷ 64 =43.75%.

Portfolio Y active style risk squared ÷ Active risk squared = 14.4 ÷ 36 = 40%.

A is incorrect. Portfolio X active style risk squared ÷ Active risk squared = 28 ÷ 64 = 43.75%.

B is incorrect. Portfolio Y active style risk squared ÷ Active risk squared = 14.4 ÷ 36 = 40%.

Case 5: Sally Sishek（考点：Market Risk, ETF, Electronic Markets）

1. Solution: B.

VaR has been calculated using the parameters (mean and standard deviation) of the portfolio and assuming a distribution for portfolio risk factors. A historical simulation would instead identify actual returns from the portfolio and identify the 5^{th} percentile.

2. Solution: C.

To calculate the daily VaR from an annual VaR, the mean and standard deviation must be adjusted using the 250 trading days described.

The mean has been correctly calculated as 9.4% / 250 = 0.0376%

The standard deviation, however, should be divided by$\sqrt{250}$: 14.2%/$\sqrt{250}$=0.898%

This would result in a 5% daily VaR = [0.0376% − (1.65 × 0.898%)] = –1.44%.

3. Solution: B.

Liquidating a position when losses exceed a certain amount is an example of a stop loss limit.

4. Solution: C.

Maximum drawdown is most commonly defined as the worst peak-to-trough decline in a portfolio's returns, or the worst-returning month or quarter for a portfolio. Maximum drawdown is an important risk measure for hedge funds. Redemption risk is a measure for open-end funds of the percentage of a portfolio could be redeemed at peak times.

5. Solution: A.

Statement 1 is correct. Some ETF legal structures expose investors to counterparty risk: the invested amount could be lost in the event of counterparty failure. Statement 2 is incorrect. Settlement risk is applicable for ETFs that use OTC derivative contracts, however ADRs are exchange-traded.

6. Solution: B.

Wash trading is a kind of market manipulation where the investor buys and sells the same financial instrument simultaneously, in order to simulate demand in the instrument by boosting trading volume. Placing a legitimate trade on one side of the market and several bogus orders on the other side of the market is known as layering. Entering large quantities of fictitious orders into the market and instantaneously canceling them is known as quote stuffing.

Case 6: Brendan Mollie（考点：Trading costs and electronic markets）

1. Solution: A.

The best (i.e., highest) bid is $12.22, and the best (i.e., lowest) ask is $12.26.

inside spread = best ask – best bid = $12.26 – $12.22 = $0.04.

2. Solution: B.

Dealer B's quotes are $12.21–$12.31 for a midquote of $12.26.

per share effective spread transaction cost

= (side) × (transaction price – midquote price)

= (+1) × (12.27 − 12.26) = $0.01

effective spread = 2 × (per share effective spread transaction cost)

= 2 × 0.01 = $0.02

Case 7: Faster Analytics Capital Management（考点：Multifactor models, economic analysis, active security returns）

1. Solution: A.

The optimal combination of the CF and the benchmark portfolio will result in highest possible Sharpe ratio.

The Sharpe ratio for the optimal portfolio consisting of the benchmark and the CF can be calculated using the following equality: $SR_P^2 = SR_B^2 + IR^2$.

$$SR_P = \sqrt{SR_B^2 + IR_{CD}^2} = \sqrt{0.30^2 + 0.12^2} = 0.3231$$

2. Solution: B.

$$Optimal\ active\ risk = \sigma_{ZF}^* = \frac{IR_{ZF}}{SR_B}\sigma_B = \frac{0.25}{0.30}0.20 = 16.67\%$$

Expected excess return for ZF (active return):

$E(R_A) = IR \times \sigma_A = (0.25) \times (0.1667) = 4.17\%$

Benchmark excess return = (0.30) × (0.20) = 6%

Total excess return = 4.17% + 6% = 10.17%

3. Solution: B.

The equations for required rate of return using the CAPM and a 2-factor APT are respectively:

CAPM: $R_{EF} = RF + \beta_{EF}\,[E(R_M) - RF]$

2-factor APT: $R_{EF} = RF + \beta_{EF,1}(\lambda_1) + \beta_{EF,2}(\lambda_2)$

Using the data provided in Figures 2 and 3:

CAPM required rate of return = 0.04 + 0.80(0.08) = 0.104 = 10.4%

2-factor APT required rate of return = 0.04 + 1.5(0.05) + 2(0.02) = 0.155 = 15.5%

The expected return for the EF is 12%, which exceeds the CAPM required return. Therefore, Rodriguez predicts that the EF portfolio return will exceed its CAPM required return; a signal to continue investing in EF. However, the forecasted EF return of 12% is less than the 2-factor APT model required return of 15.5%; this is a signal to not invest in EF.

4. Solution: C.

The covariance between the uncertain future price of a default-risk-free bond and the investor's intertemporal rate of substitution is negative, resulting in a positive risk premium for a longer-term, default-risk-free bond.

5. Solution: C.

A portfolio that has a factor beta equal to one for one factor and factor betas equal to zero for all

other factors is called a factor portfolio. In contrast, a portfolio that has factor betas equal to the benchmark factor betas is called a tracking portfolio. Unlike the tracking portfolio, the factor portfolio betas are not identical to the benchmark betas. As a result, factor portfolios have higher active factor risk (which refers to the deviations of a portfolio's factor betas from those of the benchmark). Therefore, Woodson's first statement is not correct. Her second statement is correct. When markets are in equilibrium, all expected (i.e., forecast) asset returns are equal to their required returns. An arbitrage opportunity refers to an investment that requires no cost and no risk yet still provides a profit. If markets are in equilibrium, no profits can be earned from a costless, riskless investment.

6. Solution: C.

The information ratio equals active return divided by active risk. Active return equals the average difference between the CF portfolio return and the benchmark return. Active risk equals the standard deviation of the CF return minus benchmark return. From the comments made by Rodriquez about the historical performance of the CF portfolio, we know that the numerator of the information ratio is positive and that the denominator is very close to zero. Therefore, the information ratio will be high.

The fund standard deviation is very close to that of its benchmark (since its returns were nearly always a constant percentage above the benchmark). The CF rose and fell with the benchmark (same risk as the benchmark) but always beat the benchmark (outperformed the benchmark). Therefore, tracking risk (which is also referred to as active risk) is low.

Case 8: Seva Wolff（考点：ETF, economic analysis）

1. Solution: B.

ETFs trade on both primary and secondary markets. Primary market trades occur between authorized participants and an ETF sponsor or manager. The ETF manager discloses a list of securities on a daily basis as part of the creation basket.

2. Solution: B.

Authorized participants pass on the creation/redemption costs in the form of bid-ask spreads, which means that only transacting shareholders pay these costs, unlike with mutual funds where all shareholders bear this cost. Similarly, unlike mutual funds, ETFs are tax fair because redemptions are in-kind and do not affect the nontransacting shareholders; hence, capital gains distributions tend to be lower for ETFs compared to traditional mutual funds.

3. Solution: B.

The covariance between a risk-averse investor's intertemporal rate of substitution and expected future price is negative.

4. Solution: B.

The breakeven inflation rate equals expected inflation plus a risk premium for inflation uncertainty.

5. Solution：C

Wolff's description of ETF tracking error includes a reference to securities lending by the ETF portfolio manager. Many ETF portfolio managers lend a portion of their portfolio holdings to short sellers. Securities lending provides income for an ETF that offsets a portion of an ETF's administrative expenses.

A is incorrect. Trading costs are a source of tracking error but are not caused by operations with short sellers.

B is incorrect. Replication (lack of full replication) is a source of tracking error but is not caused by operations with short sellers.

Case 9: Pari Patel（考点：VaR, Economic analysis, Electronic markets）

1. Solution: A.

Conditional VaR, also referred to as expected tail loss or expected shortfall, is used to determine the average loss that would be incurred if the VaR cutoff is exceeded.

B is incorrect. Incremental VaR is used to determine how VaR will change if a position size is changed relative to the remaining positions.

C is incorrect. Marginal VaR is similar to incremental VaR and measures the effect of an anticipated change to the portfolio.

2. Solution: A.

Observation 3 regarding consumption hedging is incorrect. Because of the pro-cyclicality of economies and corporate profits, equities are not a good hedge against bad consumption outcomes, which is one of the reasons equity investors require a risk premium.

Observation 2 is correct. Corporate profitability tends to sharply recover with any uptick in demand during a recession given leaner cost structures at that time and can be an important indicator of the business cycle.

Observation 1 is correct. Given inferior consumption hedging properties, equity investors should demand a risk premium relative to fixed-income investors. Equity risk premiums tend to be highly correlated with corporate bond spreads.

3. Solution: 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 qruity risk premium)

4. **Solution: A.**

Once built, electronic systems are indeed cheaper to operate than floor-based trading systems. They require less physical space than do trading floors, and in contrast to floor-based trading systems, they do not require exchange officials to record and report prices. Furthermore, the widespread use of electronic trading systems significantly decreased trading costs for buy-side traders. Costs fell as exchanges obtained greater cost efficiencies from using electronic matching systems instead of floor-based manual trading systems. These technologies also decreased costs and increased efficiencies for the dealers and arbitrageurs, who provide much of the liquidity offered at exchanges.

While electronic trading has had a significant effect on equity markets, it has not had as much of an effect on the markets for corporate and municipal bonds. The market structures of corporate and municipal bond markets have hardly changed since the late 19th century. Despite the efforts of many creative developers of electronic bond trading systems, most public investors in these

markets still trade largely over the counter with dealers.

5. Solution: C.

Both suggestions will likely be effective in minimizing the systemic risk introduced by electronic trading. First, exhaustive testing of the algorithm prior to its launch can minimize risk relating to programming errors, which could result in an extreme market reaction that could trigger an even more extreme market reaction. Second, imposing mandatory trade halts in case of large price changes (outside a given threshold) would limit potential undesired results and help minimize systemic risk.

6. Solution: B.

Low-latency traders include news traders who subscribe to high-speed electronic news feeds reporting news releases made by corporations, governments, and other aggregators of information. They can quickly analyze these releases to determine whether the information will move markets and can profit when they can execute against stale orders that do not yet reflect the new information.

A is incorrect. Electronic dealers, like all dealers, make markets with the expectation that they can profit from round trips at favorable net spreads. Although they often monitor news feeds, it is more often in order to decide whether to provide liquidity to or withdraw liquidity from other traders.

C is incorrect. Electronic arbitrageurs look across markets for arbitrage opportunities in which they can buy an undervalued instrument and sell a similar overvalued one.