Questions #1-6 of 60

Questions 1 through 6 relate to Ethical and Professional Standards.

Blanchard Investments Case Scenario

Carol Blackwell, CFA, has been hired into the research department of Blanchard Investments. Blanchard's manager, Thaddeus Baldwin, CFA, has worked in the securities business for more than 50 years. On Blackwell's first day at the office, Baldwin gives her an incomplete research report on Tops Groceries, Inc., to finish up.

Upon researching Tops, information about the financial instability of Tops Groceries' largest customer surfaces. Blackwell revises the research report by lowering the earnings projections. The day the report is to be released, Blackwell learns that Baldwin has replaced the lower, revised earnings projections with his earlier estimates.

Baldwin realizes that many of the firm's practices and policies would benefit from a compliance check. Baldwin wants Blackwell to ensure that the policies and procedures at the firm are in compliance.

While reviewing a draft research report on Patel, Inc., Blackwell notices that the research analyst responsible for authoring the report had used neural networks in forecasting revenues and earnings. Since that analyst was no longer employed at the firm, and Blackwell is not familiar with that specific quantitative tool, he deletes the segment pertaining to neural networks but otherwise does not change the report before signing off on it.

Blanchard's investment banking department recently announced that they were successful in obtaining the account of Teos Toys, Inc. In light of this announcement, Baldwin wants to know whether he can continue to rate Teos' stock favorably.

During a local society luncheon, Blackwell is seated next to CFA candidate Lucas Walters, who has been assigned the task of creating a compliance manual for Borchard & Sons, a small brokerage firm. Walters asks for her advice.

When Walters returns to work, he is apprised of the following situation: Borchard & Sons purchased 25,000 shares of CBX Corp. for equity manager Quintux Quantitative just minutes before the money manager called back and said it meant to buy 25,000 shares of CDX Corp. Borchard then purchased CDX shares for Quintux, but not before shares of CBX Corp. declined by 1.5%. The broker is holding the CBX shares in its own inventory.

Borchard proposes three methods for dealing with the trading error.

Method 1:	Quintux directs additional trades to Borchard worth a dollar value equal to the amount of the trading loss.
Method 2:	Borchard receives investment research from Quintux in exchange for Borchard covering the costs of the trading error.

Method 3: Borchard transfers the ordered CBX shares in its inventory to Quintux, which allocates them to all of its clients on a pro-rata basis.

Question #1 of 60

Question ID: 1220672

Blackwell's *most appropriate* course of action to remain in compliance with the Code and Standards is to:

A) include a disclosure indicating that lower earnings estimates are available.

B) follow up the first report with a second report emphasizing lower earnings projections.

C) **remove her name from the report if they release the report with higher earnings estimates.**

Explanation

Standard V(A) Diligence and Reasonable Basis requires that appropriate due diligence be performed and that recommendations be substantiated. Moreover, the Standards require that supervisory procedures must be in place to ensure compliance with the policy. If the report is released with the supervisor's revision, Blackwell should insist that her name be removed.

For Further Reference:

(Study Session 1, Module 2.8, LOS 2.a)

Question #2 of 60

Question ID: 1220673

When updating the proxy-voting policy to conform to CFA Institute recommendations, which of the following recommendations is *least appropriate* for Blanchard to adopt?

A) Determine the economic impact of non-routine proxy votes.

B) **Follow the same proxy-voting procedures regardless of the nature of the proposal.**

C) If the proxy voter’s preference differs from the preference of a client who has delegated his voting powers, go with the client’s preference.

Explanation

Standard III(A) Loyalty, Prudence, and Care. Unusual proposals, such as hostile takeovers and executive changes, may require more review than routine matters such as renewing stock-repurchase agreements. Money managers should provide a means to review complex proxies. Establishing evaluation criteria and disclosing the firm's proxy voting policies and procedures to clients are basic elements of a proxy-voting policy. Client wishes regarding proxy voting should always be followed.

For Further Reference:

(Study Session 1, Module 2.4, LOS 2.a)

Question #3 of 60

Question ID: 1220674

According to the Standards of Professional Conduct, Baldwin's *most appropriate* action regarding Teos Toys would be to:

A) refuse to have any involvement with Teos because of a conflict of interest arising from the firm's other relationships with the company.

B) **complete an independent and objective analysis of Teos and issue a report disclosing the nature of business relationship with Teos Toys.**

C) provide a copy of the research report to analysts at reputable research outfits and ask for some input.

Explanation

Analysts may undertake research related to firms with which they also have an investment banking relationship. The research must remain objective and unbiased to avoid violating the Code and Standards. Furthermore, the research report must fully disclose the nature of the investment banking relationship and any potential conflict of interest.

For Further Reference:

(Study Session 1, Module 2.9, LOS 2.a)

Question #4 of 60

Question ID: 1220675

Does Blackwell violate any standard through his actions related to the research report on Patel, Inc.?

A) No.

B) **Yes, pertaining to diligence and reasonable basis.**

C) Yes, pertaining to disclosure of conflicts.

Explanation

By removing the section pertaining to quantitative tools that Blackwell is not familiar with, the research report may not be grounded in adequate basis for recommendation. If Blackwell would have concluded that the output of the model did not contribute to the overall report, then he could have removed that model from analysis without violating the diligence and adequate basis standards. However, no such information is given in the case.

For Further Reference:

(Study Session 1, Module 2.8, LOS 2.a)

Question #5 of 60

Question ID: 1220676

If Walters wants the manual to satisfy the requirements and recommendations of the Code and Standards, which of the following instructions is *least appropriate* to include in the section on fair dealing?

A) Whenever possible, disseminate investment recommendations to all clients at the same time.

B) **Execute all clients' requested trades promptly and without comment, regardless of the company's opinion on the stock being traded.**

C) Members of the investment-policy committee should not discuss possible changes in investment recommendations with anyone else in the firm until after an official decision has been made.

Explanation

Standard III(B) Fair Dealing requires firms to notify clients of changes in investment advice before executing trades that go counter to that advice. While equal dissemination is usually impossible, it is an admirable goal. Firms should establish dissemination guidelines that are fair to all clients. Trading disclosures and confidentiality regarding investment rating changes are sensible precautions that meet the spirit of the fair dealing Standard. Maintaining client lists that detail client holdings will simplify the process of deciding how to best disseminate a change in investment recommendation.

For Further Reference:

(Study Session 1, Module 2.5, LOS 2.a)

Question #6 of 60

Question ID: 1220677

Which method for dealing with the trading error is *most* consistent with the Code and Standards?

A) Method 1.

B) **Method 2.**

C) Method 3.

Explanation

Method 2 is the best answer. Quintux should cover the cost of the trading error, and if Borchard is willing to accept investment research in lieu of cash, that's all the better for Quintux. If Quintux compensates Borchard with extra trades, its clients are covering the costs of the error, which may violate Standard III(A) Loyalty, Prudence, and Care if directing future trades to Borchard is not in the clients' best interest. By accepting the CBX shares it did not request and allocating the shares to all client accounts rather than paying for the error, Quintux is violating Standard III(C) Suitability, since the shares are not likely to be appropriate for all of its client accounts and may not be suitable for any accounts since the shares were obtained as a result of a trading error, not an intentional investment action. Passing on client names is a violation of Standard III(E) Preservation of Confidentiality.

For Further Reference:

(Study Session 1, Module 2.6, LOS 2.a)

Questions #7-12 of 60

Questions 7 through 12 relate to Quantitative Methods.

Lead Equity, LLP, Case Scenario

Mihir Kotak, CFA, is the managing partner at Lead Equity, LLP, a private equity firm based in southern California. Kotak has decided to revise the model the firm uses to identify attractive investment opportunities by supplementing the model

with big data analysis. Kotak sets up a meeting with Ketan Mehta, the lead analyst with Big Solutions, Inc., a consulting company providing solutions related to big data.

During the meeting, Mehta makes the following statements about the steps involved in big data analysis.

Statement 1:	The same steps are used in big data analysis whether we are using structured or unstructured data.
Statement 2:	The data exploration step is critical; it includes exploratory data analysis, feature selection, and engineering.

Kotak states that the model is intended to identify companies that would be likely takeover targets over the subsequent 12 months. Kotak says he is concerned that while the analysis may look attractive on paper, it could be inaccurate in making predictions. Specifically, Kotak wants to avoid the scenario where the model incorrectly identifies a company as a target.

Mehta illustrates the type of analytics that can be performed before the model is implemented in business operations. **Confusion matrixes** shows an excerpt of the report that Mehta provides for illustration.

Confusion matrixes

Model A				**Model B**		
	Actual: Takeover Target	**Actual: Not Target**			**Actual: Takeover Target**	**Actual: Not Target**
Prediction: takeover target	14	9		**Prediction: takeover target**	13	4
Prediction: not target	5	246		**Prediction: not target**	4	253

Mehta then discusses one of the possible approaches to applying big data analysis to the task at hand as shown in **Steps in Data Analysis**.

Steps in Data Analysis

Step 1:	We start with a sample consisting of the companies in the Russell 2000 Index and then assign them to 50 heterogeneous (based on financial characteristics) buckets.
Step 2:	We then randomly select 10 stocks from each of the buckets to assign to one of two classes: *takeover target* and *not a takeover target*, based on financial, nonfinancial, and textual data.

Upon further discussion, Mehta makes the following comments about machine learning.

Comment 1:	Overfitting is an issue with unsupervised ML. Overfitting results when a large number of features are included in the data sample.
Comment 2:	A learning curve plots the error rate in the validation or test sample versus the size of the training sample.

Question #7 of 60

Question ID: 1220679

Regarding Mehta's statements about steps in big data analysis:

A) only statement 1 is correct.

B) **only statement 2 is correct.**

C) both statements are correct.

Explanation

Statement 1 is incorrect. The first several steps in data analysis for unstructured and structured data differ. Statement 2 is correct. Data exploration includes exploratory data analysis, feature selection, and feature engineering.

For Further Reference:

(Study Session 3, Module 8.1, 8.2, LOS 8.a, 8.c)

Question #8 of 60

Question ID: 1220680

Based on Kotak's concerns about using the model to identify takeover targets, Kotak is *most likely* interested in increasing the model's:

A) accuracy score.

B) F1 score.

C) **precision.**

Explanation

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.

For Further Reference:

(Study Session 3, Module 8.3, LOS 8.g)

Question #9 of 60

Question ID: 1220681

Using information in **Confusion matrixes**, the model with highest precision and highest accuracy are respectively:

	Highest precision	Highest accuracy
A)	Model A	Model B
B)	Model A	Model A
C)	**Model B**	**Model B**

Explanation

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

For Further Reference:

(Study Session 3, Module 8.3, LOS 8.g)

Question #10 of 60

Question ID: 1220682

Based on information in Exhibit 2, the value of the hyperparameter specified in **Steps in Data Analysis** is:

A) 10.

B) **50.**

C) 2,000.

Explanation

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.

For Further Reference:

(Study Session 3, Module 7.3, LOS 7.d)

Question #11 of 60

Question ID: 1220683

The approach identified in step 2 of Exhibit 2 is *most likely* to represent:

A) **supervised learning to predict a categorical target variable.**

B) unsupervised learning to predict a categorical target variable.

C) supervised learning to predict a continuous target variable.

Explanation

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

For Further Reference:

(Study Session 3, Module 7.1, LOS 7.a)

Question #12 of 60

Question ID: 1220684

Regarding Mehta's comments about machine learning:

A) both comments are accurate.

B) only one comment is accurate.

C) neither comment is accurate.

Explanation

Both comments are inaccurate. Overfitting is an issue with *supervised* ML and results when a large number of features (i.e., independent variables) are included in the data sample. A learning curve plots the accuracy rate (i.e., 1 – error rate) in the validation or test sample versus the size of the training sample.

For Further Reference:

(Study Session 3, Module 7.1, LOS 7.b)

Questions #13-18 of 60

Questions 13 through 18 relate to Financial Reporting and Analysis.

JJK Holdings, Inc., Case Scenario

Ali Saminder, CFA, has recently been hired by JJK Holdings, Inc. (JJK), a U.S.-based financial services holding company. JJK has global operations in commercial and investment banking alongside a significant wealth management division, JJK BMD. Saminder is currently on a six-month rotation working in the risk management division of JJK. She is seeking to become familiar with JKK's approach to risk management and the maintenance of an adequate capital base.

Saminder has reviewed an internal document outlining JJK's approach to meeting regulatory requirements and has made a note of two fundamental rules that she believes are used to help analyze capital adequacy.

Rule 1:	When assessing the tier 1 capital ratio, assets should be weighted according to their risk, with riskier assets assigned a lower value than risk-free assets such as cash.
Rule 2:	Off-balance-sheet assets should be excluded from the asset base of the bank when assessing capital adequacy.

The document provided to Saminder outlines JJK's approach to calculating regulatory capital. Extracts from the document are shown in Exhibit 1.

Exhibit 1: Internal Memo—Regulatory Capital Calculation (extracts)

- Tier 1 capital is defined in accordance with global regulatory standards and is appropriately adjusted for intangible and deferred tax assets resulting from losses carried forward.
- Other tier 1 capital consists of irredeemable non-cumulative preferred stock with a fixed divided of 4.3%.
- Consistent with local regulatory standards, Tier 2 capital is comprised of $18,047m of subordinated debt maturing in five years, and a convertible bond issue convertible only at maturity at the end of 20X9 (convertible into common stock).
- JJK Holding has a target tier 1 ratio of 15% and total capital ratio of 20%.
- 20X8 year-end figures are forecast as follows:

	20X8 ($m)
Regulatory capital	

Common equity tier 1 capital	87,390
Additional tier 1 capital	16,401
Tier 2 capital	25,447
Total assets	510,948
Risk-weighted assets	601,312

Saminder is particularly interested in two elements of JJK's total capital. First, she is aware that the deferred tax asset referred to in Exhibit 1 totals $7,002m and is carried on the balance sheet without a valuation allowance. She wishes to calculate the impact on the common equity tier 1 ratio if the deferred tax asset was fully written down.

Secondly, Saminder notes that the convertible bond is due for conversion in 20X9. She intends to recalculate the 20X8 tier 1 ratio as if the bonds had been converted already.

Saminder has also reviewed an internal memo outlining some key trends over the last three years that were labeled 'Possible concerns?' by a previous employee. However, it was not clear from the document which trends if any were actual cause for concern. The trends included in the documents are shown in **Exhibit 2: Internal Memo—Three-Year Trends**.

Exhibit 2: Internal Memo—Three-Year Trends

	20X5	20X6	20X7
	$m	$m	$m
Assets under management[1]	139,398	118,957	108,086
Net outflows[2]	100,483	112,482	196,429
High quality liquid assets	111,432	127,352	198,393
Available stable funding	376,092	376,653	388,624
Required stable funding	327,043	301,275	303,182

[1] Represents client assets managed by JJK BMD Trusts

[2] 30-day liquidity needs in a stress scenario

Saminder makes the following note using the data in **Exhibit 2: Internal Memo—Three-Year Trends**:

> "Assets under management have decreased by a total of 22.5% over the three-year period, but these are client assets, require no capital funding, and hence are not a consideration for the risk analysis of the bank."

Question #13 of 60

Question ID: 1220686

Which of Saminder's fundamental rules is *most likely* to be accurate?

A) Only rule 1 is accurate.

B) Only rule 2 is accurate.

C) **Neither rule is accurate.**

Explanation

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 adjusted 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.

For Further Reference:

(Study Session 5, Module 16.1, LOS 16.b)

Question #14 of 60

Question ID: 1220687

Using the forecasted data and explicit targets given in **Exhibit 1: Internal Memo—Regulatory Capital Calculation (extracts)**, Saminder is *most likely* to conclude that JJK Holdings would:

A) **meet its targeted tier 1 ratio and total capital ratio.**

B) meet its targeted tier 1 ratio but not its targeted total capital ratio.

C) fail to meet either target.

Explanation

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

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

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

For Further Reference:

(Study Session 5, Module 16.5, LOS 16.e)

Question #15 of 60

Question ID: 1220688

When Saminder makes the adjustment related to the deferred tax asset, the common equity tier 1 ratio is *most likely* to:

A) increase.

B) decrease.

C) remain unchanged.

Explanation

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.

For Further Reference:

(Study Session 5, Module 16.5, LOS 16.e)

Question #16 of 60

Question ID: 1220689

How are tier 1 capital and total capital *most likely* to change when Saminder makes her stated adjustment for the convertible bonds?

A) Common equity tier 1 capital and total capital will both remain unchanged.

B) Tier 1 capital will increase and tier 2 capital will decrease.

C) Other tier 1 capital will decrease and total capital will remain unchanged.

Explanation

Per **Exhibit 1: Internal Memo—Regulatory Capital Calculation (extracts)**, 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.

For Further Reference:

(Study Session 5, Module 16.5, LOS 16.e)

Question #17 of 60

Question ID: 1220690

Saminder's note regarding assets under management is *best* described as:

A) accurate.

B) inaccurate, as the assets do require capital funding.

C) inaccurate, as assets should be considered in the risk analysis.

Explanation

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 could impact the stability of the bank.

For Further Reference:

(Study Session 5, Module 16.5, LOS 16.d)

Question #18 of 60

Using the data in **Exhibit 2: Internal Memo—Three-Year Trends**, which of the following statements is *most accurate*?

A) The number of days JJK can withstand a stress-level-volume of cash outflows decreased by three days from 2015 to 2017.

B) The liquidity coverage ratio decreased in each of the two years.

C) The trend in net stable funding ratio indicates an increase from 2015 to 2017 in highly liquid funding available, compared to the level of funding required.

Explanation

	2015	2016	2017
High quality liquid assets	111,432	127,352	198,393
Net outflows	100,483	112,482	196,429
Liquidity coverage ratio = $\frac{\text{High quality liquid assets}}{\text{Net outflows}}$	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
	30 × 1.11	30 × 1.13	30 × 1.01
Number of days of stress volume of cash outflows	**33.3**	**34.0**	**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.

For Further Reference:

(Study Session 5, Module 16.5, LOS 16.e)

Questions #19-24 of 60

Questions 19 through 24 relate to Corporate Finance.

Dan Andrews Case Scenario

Dan Andrews, CFA, is the equity analyst for a large pension fund. One of the fund's holdings is Debian Corporation. After a period of rapid growth, Debian has underperformed its peers over the past two years. Debian's management has announced a change in ownership structure for part of its business, or possibly a disposal of part of the business. Several options are under consideration: a spin-off, a carve-out, or an asset sale. Andrews decides to research each of these

options to understand the impact on Debian's business and their shareholders. He has read the following comments regarding the various methods:

Statement 1:	Involves shares being issued to the general public.
Statement 2:	Shareholders have a choice of holding onto the new shares automatically issued to them or disposing of the shares on the open market.
Statement 3:	Shareholders will be more easily able to link executive compensation to the performance of the business involved.
Statement 4:	The firm separates a portion of its operations from the parent company.
Statement 5:	A new independent entity will be created that is completely distinct from the parent; the parent will lose all control of the business.

Debian's management announced in the last conference call that a potential buyer, Fedora, Inc., is interested in buying Ubuntu, one of Debian's divisions. Fedora has offered to pay $90 million cash to buy Ubuntu. Relevant information is provided in Exhibit 1.

Exhibit 1

Value of Ubuntu as a stand-alone business	$78 million
Value of Ubuntu to Debian	$85 million
Value of Fedora (5 million shares, $10 par)	$132 million
Value of Fedora and Ubuntu as a combined entity (post cash acquisition of Ubuntu)	$135 million

Alternatively, Fedora is prepared to offer to buy Ubuntu by directly issuing to the shareholders of Debian a total of 3 million $10 par value shares that will rank equally with its existing shares.

Andrews frequents continuing education seminars offered by his local CFA society. During one of these seminars, Andrews meets Jason Arnold, a corporate finance specialist. Andrews agrees with Arnold that a comprehensive equity analysis should include an analysis of payout policies. Andrews, however, is unsure of his recollection from graduate school. Arnold states that he could recall two specific principles:

Principle 1:	Stock dividends and splits do not create wealth for shareholders.
Principle 2:	Irregular cash dividends, stock splits, and stock dividends do not represent a commitment to pay cash to stockholders periodically.

Among other companies that Andrews is researching, he has identified a potential acquisition target, Mandriva, Inc. Mandriva has enjoyed good growth over the past few years and is expected to continue to do so in the near future. Andrews wants to value Mandriva using both the comparable company method and the comparable transaction approach. Andrews obtains data on recent acquisitions of similar companies. **Exhibit 2** summarizes this data.

Exhibit 2

- The mean price-to-book ratio of comparable firms is estimated to be 2 times, and the mean price-to-earnings ratio of the same comparable firms is 25 times.

- The mean acquisition price-to-book ratio of recent targets is estimated to be 2.80 times, and the mean price-to-earnings ratio of the same firms is 30 times.
- Mandriva's book value per share is $18, and EPS is $1.50.
- The mean takeover premium of recent acquisitions in the same industry as Mandriva is estimated to be 30%.

Question #19 of 60

Question ID: 1220693

Which of the statements correctly reflect aspects of a carve-out?

A) Statements 1, 4, and 5 only.

B) **Statements 1, 3, and 4 only.**

C) Statements 2, 3, and 4 only.

Explanation

Statement 1:	Correct, although not all the shares will be offered.
Statement 2:	Incorrect because shares are not automatically issued to existing shareholders under a carve-out.
Statement 3:	Correct since the results of the business sector will be more easily identifiable once the sector represents a separate company.
Statement 4:	Correct for all strategies under consideration.
Statement 5:	Incorrect—with a carve-out the "selling" corporation may (usually does) maintain some control of the business that has been split out into a separate company.

For Further Reference:

(Study Session 8, Module 23.4, LOS 23.n)

Question #20 of 60

Question ID: 1220694

If Fedora pays $90 million cash for the purchase of Ubuntu from Debian, what will be the gain to Debian's and Fedora's shareholders?

	Debian's S/H	Fedora's S/H
A)	**$5 million**	**$3 million**
B)	$12 million	$5 million
C)	$12 million	$7 million

Explanation

Debian s/h gain = $\text{gain}_T = TP = P_T - V_T = \$90m - \$85m = \$5m$

Fedora s/h gain = $gain_A$ = S − TP = 8 − 5 = $3m

Synergies are not directly given, but you are given that Fedora's value post merger (after paying the $5m takeover premium) increases by $3 million. Synergies must then be $5m + $3m = $8m.

Alternatively, the change in Fedora's value post merger, ($135m − $132m) = $3m, would give the gains to the acquirer in the case of a cash merger.

Note: The total gains = value of combined entity − value of both companies prior to merger

($135m + $90m) − ($85m + $132m) = $8m

Note: The value of the combined entity in a stock merger must include the $90 million in cash that was paid by Fedora to Debian. For computing the total gains to merger in a cash transaction, we need to add the $90 million that would be paid out to the seller.

For Further Reference:

(Study Session 8, Module 23.4, LOS 23.k)

Question #21 of 60

Question ID: 1220695

If Debian shareholders accept the stock offer by Fedora, the economic impact on them would be *closest* to:

A) a gain of $630,000.

B) **a loss of $630,000.**

C) a loss of $1,612,500.

Explanation

$V_{AT} = V_A + V_T + S – C$

Given V_{AT} = 135 and C = 90. Hence 135 = $V_A + V_T + S – 90$ or $V_A + V_T + S = 225$.

For a stock acquisition, C = 0. $V_{AT} = V_A + V_T + S – C = 225 – 0 = 225$.

Value of Fedora and Ubunta post cash acquisition (given) = $135 million.

Value of Fedora and Ubunta post stock acquisition = $135 million + $90 million cash = $225 million.

Number of shares outstanding post stock acquisition = 5 + 3 = 8 million.

Value of shares received based on their likely post-acquisition price = [(225m) / 8m] × 3m = $84,375,000.

Gain to Debian's shareholders is therefore $84,375,000 − $85,000,000 = –$625,000.

For Further Reference:

(Study Session 8, Module 23.4, LOS 23.k)

Question #22 of 60

Question ID: 1220696

Under Fedora's stock offer, the economic impact on the current shareholders of Fedora is *closest* to:

A) a loss of $7.5 million.

B) **a gain of $8.6 million.**

C) a gain of $1.6 million.

Explanation

New value of their 5m shares = ($225m / 8m) × 5m	= $140,625,000
Old value of their 5m shares	= $132,000,000
Gain	= $8,625,000

For Further Reference:

(Study Session 8, Module 23.4, LOS 23.k)

Question #23 of 60

Question ID: 1220697

Are Arnold's principles 1 and 2 of corporate payout policy correct?

A) Both of these principles are incorrect.

B) Only one of these principles is correct.

C) **Both of these principles are correct.**

Explanation

Stock dividends and splits merely carve stockholders' equity into smaller pieces and do not create wealth for shareholders. Only cash dividends represent a commitment to pay cash to stockholders periodically. Irregular cash dividends, stock splits, and stock dividends do not.

For Further Reference:

(Study Session 7, Module 21.1, LOS 21.a)

Question #24 of 60

Question ID: 1220698

Using the data collected by Andrews, the target takeover price per share of Mandriva under the comparable company analysis and under the comparable transaction analysis is *closest* to:

	Comparable company	Comparable transaction
A)	$24	$48
B)	$24	$50
C)	**$48**	**$48**

Explanation

Using comparable company analysis:

Using P/E ratio: 25 × 1.50 =	37.50
Using P/B ratio: 2 ×18 =	36.00
Average	36.75
Add: 30% premium	11.03
Estimated takeover price	$47.78

Using comparable transaction analysis:

Using P/E ratio: 30 × 1.50 =	$45.00
Using P/B ratio: 2.80 × 18 =	50.40
Average	$47.70

Note: No additional premium is applied for comparable transactions.

For Further Reference:

(Study Session 8, Module 23.3, LOS 23.j)

Questions #25-30 of 60

Questions 25 through 30 relate to Equity Valuation.

Global Drug World Case Scenario

Carl Warner, CFA, has been asked to review the financial information of Global Drug World (GDW) in preparation for a possible takeover bid by rival competitor Consolidated Drugstores International (Consolidated). GDW has produced impressive results since going public via an initial public offering in 2008. Through a program of aggressive growth by acquisition, GDW is currently seen as a major player and a threat to Consolidated's own plans for growth and profitability. In preparation for his analysis, Warner has gathered the following financial data from GDW's year-end statements.

GDW Statement of Income for Year Ended May 31, 2018	
Sales	4,052,173
Expenses	
Cost of goods sold, general and operating expenses	3,735,397
Noncash charges	56,293
Interest on long-term debt	20,265
Other interest	5,223
	3,817,178
Income before income taxes	234,995

Income taxes	70,499
Net income	164,497
Earnings per share	0.72

Partial GDW Balance Sheet on May 31, 2018	
Assets	
Current assets (excluding cash)	
Accounts receivable	284,762
Inventories	490,755
Prepaid expenses	23,743
Total current assets (excluding cash)	799,260
Property, plant, and equipment	687,890
Other assets	236,417
Liabilities	
Current liabilities (excluding notes payable)	
Accounts payable and accrued liabilities	296,564
Other	100,039
Total current liabilities (excluding notes payable)	396,603
Long-term debt	262,981
Other liabilities	15,484

Additional Information	
Risk-free rate	4.5%
WACC	7.5%
2018 working capital investment	$7,325
2018 dividends	$82,248
Beta	1.10
Investment in fixed capital in 2018	$143,579
Market risk premium	5%
Total equity May 31, 2017	$1,019,869
Principal repayment of long-term debt in 2018	$33,275
Notes payable issued in 2018	$5,866
2018 change in liabilities	$27,409

Tax rate	30%

As part of his analysis, Warner needs to forecast the free cash flow to the firm (FCFF) for 2019. The best information he has points to an increase in sales of 6%. The earnings before interest and tax (EBIT) margin is not expected to change from the rate of 6.4% achieved in 2018. Fixed capital spending is expected to be $36,470. Investment in net working capital is expected to be $24,313. Moreover, Warner notes that the only noncash charge is depreciation, which he estimates will be $60,000.

Warner has been asked to analyze the effect each of the following corporate events, if taken during 2019, would have on GDW's free cash flow to equity (FCFE):

- 20% increase in dividends per share.
- Repurchase of 25% of the firm's outstanding shares using cash.
- New common share offering that would increase shares outstanding by 30%.
- New issue of convertible bonds that are not callable for five years and would increase the level of debt by 10%.

Question #25 of 60

Question ID: 1220707

The 2018 free cash flow to the firm (FCFF) for Global Drug World (GDW) in dollars is *closest* to:

A) $87,728.

B) $95,374.

C) $102,378.

Explanation

Free cash flow to the firm can be calculated in various ways. One approach to calculate FCFF is to start with net income:

FCFF = NI + NCC + Int(1 − tax rate) − FCInv − WCInv	
NI = $164,497	(income statement)
NCC = noncash charges = $56,293	(income statement)
Int = interest = $20,265 + $5,223 = $25,488	(income statement)
FCInv = fixed capital investment = $143,579	(additional information)
WCInv = working capital investment = $7,325	(additional information)

Putting it all together:

$$FCFF = \$164,497 + \$56,293 + \$25,488(1 - 0.3) - \$143,579 - \$7,325 = \$87,728$$

For Further Reference:

(Study Session 11, Module 28.4, LOS 28.d)

Question #26 of 60

Question ID: 1220708

By how much (in dollars) does GDW's FCFF exceed its free cash flow to equity (FCFE) in 2018?

A) $9,567.

B) **$45,251.**

C) $52,897.

Explanation

FCFE can be expressed in terms of FCFF as follows:

FCFE = FCFF − Int(1 − tax rate) + net borrowing

Therefore, the amount by which FCFF exceeds FCFE can be written as:

FCFF − FCFE = Int(1 − tax rate) − net borrowing

Int = $25,488

Net borrowing = $5,866 − $33,275 = –$27,409 (additional information)

Therefore: FCFF − FCFE = $25,488(1 − 0.3) − (–$27,409) = $45,251

For Further Reference:

(Study Session 11, Module 28.4, LOS 28.d)

Question #27 of 60

Question ID: 1220709

The cost of equity and the sustainable growth rate (using beginning equity) are *closest* to:

	Cost of equity	Sustainable growth rate
A)	6%	16%
B)	**10%**	**8%**
C)	10%	16%

Explanation

The cost of equity can be determined from the capital asset pricing model. We get:

r = R_f + beta[market risk premium] = 4.5% + 1.10[5%] = 10%.

The sustainable growth rate can be found from: g = ROE × b

$$\text{ROE} = \frac{\text{net income}}{\text{beginning total equity}} = \frac{\$164{,}497}{\$1{,}019{,}869} = 0.16129$$

b = retention rate = 1 − ($82,248.50 / $164,497) = 0.5

g = 0.16129 × 0.5 = 0.0806 = 8.06%

For Further Reference:

(Study Session 10, Module 27.3, LOS 27.o)

Question #28 of 60

Question ID: 1220710

The 2019 estimate of FCFF is *closest* to:

A) $191,646.

B) $210,329.

C) $215,329.

Explanation

When depreciation is the only noncash charge, FCFF can be estimated from:

FCFF = EBIT(1 − tax rate) + Dep − FCInv − WCInv

$EBIT_{2019}$ = $4,052,173 × 1.06 × 0.064 = $274,899

Therefore: $FCFF_{2019}$ = $274,899 (1 − 0.3) + $60,000 − $36,470 − $24,313 = $191,646

For Further Reference:

(Study Session 11, Module 28.4, LOS 28.d)

Question #29 of 60

Question ID: 1220711

Warner determines that on a per-share basis, the FCFE for GDW in 2018 is $0.19. Further analysis suggests that FCFE per share will grow by $0.02 in each of the next two years before leveling off to a long-term growth rate of 5%. The current value of one share of GDW's equity is *closest* to:

A) $4.37.

B) $7.15.

C) $13.49.

Explanation

This is a two-stage FCFE model. The required return on equity is 10% (from previous problem), and the long-term growth rate after 2 years is 5%.

$$\begin{aligned}\text{value of equity} &= \frac{\$0.21}{1.1} + \frac{\$0.23}{1.1^2} + \left(\frac{\$0.23 \times 1.05}{0.1 - 0.05} \times \frac{1}{1.1^2}\right) \\ &= \frac{\$0.21}{1.1} + \frac{\$0.23}{1.1^2} + \left(\$4.83 \times \frac{1}{1.1^2}\right) = \$4.37\end{aligned}$$

Financial calculators can perform this calculation more quickly and accurately. The appropriate keystrokes are:

CFO = 0; C01 = $0.21; C02 = $0.23 + $4.83 = $5.06; I = 10.0; CPT → NPV = $4.37

Notice that the second cash flow combines the FCFE for the second year with the present value of the series of constantly growing FCFE terms that begin at the end of the third year. This approach is valid since the timing of these two cash flows is the same (i.e., the end of the second year).

For Further Reference:

(Study Session 11, Module 28.5, LOS 28.j)

Question #30 of 60

Question ID: 1220712

Which corporate event that Warner is analyzing is *likely* to have the largest effect on FCFE in 2019?

A) Share repurchase.

B) Share offering.

C) **Convertible bond issue.**

Explanation

Dividends, share repurchases, and changes in the number of shares outstanding do not have an effect on either FCFE or FCFF. Therefore, only the new convertible debt offering will have a significant influence on the current level of FCFE because net borrowing changes FCFE.

For Further Reference:

(Study Session 11, Module 28.5, LOS 28.i)

Questions #31-36 of 60

Questions 31 through 36 relate to Equity Valuation.

Lee Nguyen Investments Case Scenario

Marie LeBlanc, CFA, is an analyst at Lee Nguyen Investments, an international equities investment firm. LeBlanc has been asked to value two European cosmetics companies, Schön AG and Hermosa S.A.

The beauty products industry is a mature industry with few competitors. One segment that is growing is luxury skin care; while the cosmetics industry is expected to grow at a steady rate of 3.5%, the luxury skin care segment is expected to grow at 5.5%.

Schön AG, based in Frankfurt, Germany, is the largest company in the luxury skin care segment of the cosmetics industry. Schön is considered a very stable company within the cosmetics industry and the luxury skin care segment. Schön's equity beta is 1.00.

LeBlanc collects selected financial information from Schön's income statement and cash flow statement (for the last fiscal year) and from Schön's balance sheet (for the last two fiscal year ends). The information is shown in Exhibit 1. Negative numbers are indicated in parentheses. There is no preferred stock, and no long-term asset sales occurred in 20X9.

Exhibit 1: Selected Schön Financial Information (€ millions except for rates and ratios)

Income Statement	20X9	Balance Sheet	20X8	20X9
Revenue	4,250	Total current assets	2,408	2,577
EBITDA	1,461	Net PPE	3,794	4,150
Operating income	1,169	Notes payable	600	644

Interest expense	150	Long-term debt	2,020	2,070
Income tax rate	30%	Total liabilities	3,210	3,378
Dividends	357	Total equity	2,992	3,349

Other Information	20X9
CF from operations	1,042
CF from investing	(648)
Risk-free rate	2.50%
After-tax cost of debt	4.50%
Cost of equity	8.50%
Target D/E ratio	1.00

Hermosa S.A., based in Barcelona, Spain, is the third largest company in the luxury skin care segment of the cosmetics industry. Hermosa is considered a growth company within the cosmetics industry and the luxury skin care segment. Hermosa has not issued bonds and all of Hermosa's debt is considered short and intermediate term. For the fiscal year 20X9, FCFF is €143 million and FCFE is €136.23 million. Hermosa pays no dividends. Hermosa's earnings are expected to grow at 14.0% for three years and then at the expected overall rate of growth in the luxury skin care segment. Hermosa's equity beta is 1.20. The risk-free rate is 2.5%. Hermosa's target weight for debt is 25.0%.

LeBlanc gathers additional information on the various companies in luxury skin care industry as shown in Exhibit 2.

Exhibit 2: Luxury Skin Care Stocks

Company	Price Per Share	Shares Outstanding (in Millions)	Earnings (trailing 12 Months) (in Millions)
Schön	€15.42	1,000	€713
Epiderm	€14.95	500	€345
Hermosa	€22.78	200	€193
Radiance	€18.50	100	€75
Bello	€24.78	50	€24

The trailing price-to-earnings ratio for the luxury skin care segment is 22.9X.

Elizabeth Nguyen, one of the partners at Lee Nguyen Investments, approaches LeBlanc about a client interested in buying Hermosa S.A. Nguyen asks LeBlanc about the different methods LeBlanc used to value Hermosa as a buyout possibility.

LeBlanc states that she used three different approaches in her report:

Approach 1:	Dividend discount model.
Approach 2:	Free cash flow to the firm model.
Approach 3:	Trailing price-to-earnings multiples.

Question #31 of 60

Question ID: 1220714

The free cash flow to equity for Schön AG for 20X9 is *closest* to:

A) €439 million.

B) **€488 million.**

C) €499 million.

Explanation

FCFE = CFO − FCInv + net borrowings

CFO = 1042 (given), net borrowings is change in long-term debt and notes payable

FCInv = CF from investing = 648

FCFE = 1042 − 648 + [(2,070 + 644) − (2,020 + 600)] = €488 million

Please note that CF from investing activities and FCInv may not be always the same, but in the curriculum (and for this question), they are treated as same.

For Further Reference:

(Study Session 11, Module 28.4, LOS 28.d)

Question #32 of 60

Question ID: 1220715

Assuming that the growth rate of Schön earnings is equal to the overall cosmetics industry growth rate, the value of the firm is *closest* to:

A) **€17.2 billion.**

B) €33.6 billion.

C) €49.9 billion.

Explanation

FCFF = CFO + Int(1 − tax rate) − FCInv = 1042 + 150(0.7) − 648 = €499

Overall growth rate for cosmetics industry = 3.5%

	Percentage	Cost
Debt	50%	4.50%
Equity	50%	8.50%
WACC		6.50%
Cosmetics industry growth rate		3.50%

$$\frac{€499\times(1+0.035)}{0.065-0.035}=€17{,}216\text{ million}$$

For Further Reference:

(Study Session 11, Module 28.5, LOS 28.i, 28.j)

Question #33 of 60

Question ID: 1220716

The estimated value of Hermosa stock using FCFE valuation is *closest* to:

A) €19.70.

B) **€21.40.**

C) €22.10.

Explanation

To value Hermosa stock, use the following information and apply the two-stage growth model. FCFE for the fiscal year is €136 million. Growth rate for the first 3 years is 14.0%; growth rate after 3 years is 5.5%. For CAPM, expected return on market = 8.5% (since Schön with a beta of 1 should have the same expected rate of return as the market).

Cost of equity (Hermosa) = 0.025 + 1.2 × (0.085 − 0.025) = 9.70%.

	Yr 1	Yr 2	Yr 3
FCFE (in € millions)[1]	155.3	177.0	201.8
Terminal value			5,069[2]
Total cash flow (in € millions)	155.3	177.0	5,270.8
Cost of equity		9.70%	

[1]$FCFE_1 = FCFE_0(1 + g) = 136.23(1 + 0.14) = 155.3$

[2]$$\text{Terminal value} = \frac{201.8(1.055)}{(0.097-0.055)} = 5{,}069$$

For the calculator inputs for NPV function, CF0 = 0, CF1 = 155.3, CF2 = 177.0, CF3 = 5,270.5, I/Y = 9.7.

Estimated value is €4,281.26 million. Divide this value by 200 million shares for €21.40 per share.

For Further Reference:

(Study Session 11, Module 28.5, LOS 28.j)

Question #34 of 60

Question ID: 1220717

If the estimated value of Schön's equity based on free cash flow to equity is €17.1 billion, then based on current market price, Schön's stock is:

A) overvalued.

B) **undervalued.**

C) fairly valued.

Explanation

Free cash flow to equity values Schön's stock at €17,100,000,000 / 1,000,000,000 or €17.10 per share. This is greater than the market price per share of €15.42; the stock is selling at a price below the implied value which means the stock is undervalued.

For Further Reference:

(Study Session 11, Module 28.5, LOS 28.m)

Question #35 of 60

Question ID: 1220718

Using the luxury skin care P/E ratio as the benchmark, Hermosa is *best described* as:

A) overvalued.

B) undervalued.

C) fairly valued.

Explanation

The luxury skin care segment's price-to-earnings ratio is 22.9X. The trailing P/E ratio for Hermosa is €22.78 divided by the earnings per share of €193 / 200 or €0.97. Trailing P/E = €22.78 / €0.97 = 23.6X. Hermosa seems to be slightly overvalued relative to the segment.

For Further Reference:

(Study Session 11, Module 29.1, LOS 29.a)

Question #36 of 60

Question ID: 1220719

The best approach to valuing Hermosa for a potential acquirer is *most likely*:

A) Approach #1—Dividend discount model.

B) Approach #2—Free cash flow to the firm model.

C) Approach #3—Trailing price-to-earnings multiples.

Explanation

Approach #2 is the best. The free cash flow to firm approach takes a control perspective in valuation as is appropriate in a buyout. Dividend discount models take a minority perspective, and Hermosa does not pay dividends so Approach #1 is unsuitable. Relative valuation approaches, such as trailing P/E, also focus on market price and hence are based on minority investor perspective.

For Further Reference:

(Study Session 11, Module 28.1, LOS 28.a)

Questions #37-42 of 60

Questions 37 through 42 relate to Equity Valuation.

Amie Lear Case Scenario

Amie Lear, CFA, is a quantitative analyst employed by a brokerage firm. She has been assigned by her supervisor to cover a number of different equity and debt investments. One of the investments is Taylor, Inc. (Taylor), a manufacturer of a wide range of children's toys. Based on her extensive analysis, she determines that her expected return on the stock, given Taylor's risks, is 10%. In applying the capital asset pricing model (CAPM), the result is a 12% rate of return.

For her analysis of the returns of Devon, Inc. (Devon), a manufacturer of high-end sports apparel, Lear intends to use the Fama-French model (FFM). Devon is a small-cap growth stock that has traded at a low market-to-book value in recent years. Lear's analysis has provided a wealth of quantitative information to consider. The return on a value-weighted market index minus the risk-free rate is 5.5%, the small-cap return premium is 3.1%, the value return premium is 2.2%, and the liquidity premium is 3.3%. The risk-free rate is 3.4%. The market, size, relative value, and liquidity betas for Devon are 0.7, –0.3, 1.4, and 1.2, respectively. In estimating the appropriate equity risk premium, Lear has chosen to use the Gordon growth model.

Lear's assistant, Doug Saunders, presents her with a report on macroeconomic multifactor models that includes the following two statements:

Statement 1:	Business cycle risk represents the unexpected change in the difference between the return of risky corporate bonds and government bonds.
Statement 2:	Confidence risk represents the unexpected change in the level of real business activity.

Lear is also attempting to determine the most appropriate method for determining the required return for Densmore, Inc. (Densmore), a closely held company that is considering a debt issue within the next year. The company has not previously issued debt securities to the public, relying instead on bank financing. She realizes that there are a number of models to consider, including the CAPM, multifactor models, and build-up models.

Question #37 of 60

Question ID: 1220700

Based on Lear's analysis, Taylor's stock is *most likely* to be:

A) correctly valued.

B) **overvalued.**

C) undervalued.

Explanation

Since the required return (12%) as determined by CAPM is greater than Lear's expected return (10%), then Taylor's stock is overvalued.

For Further Reference:

(Study Session 9, Module 25.1, LOS 25.a)

Question #38 of 60

Question ID: 1220701

According to the FFM, the estimate of the required return for Devon is *closest* to:

A) 9.4%.

B) 11.8%.

C) 13.4%.

Explanation

Required return under FFM = risk-free rate + market beta (equity risk premium) + size beta (small-cap return premium) + value beta (value-return premium)

= 3.4% + 0.7(5.5%) + –0.3(3.1%) + 1.4(2.2%) = 9.4%

Note: The liquidity factor is only applicable to the Pastor-Stambaugh (PS) model. The PS model is otherwise the same as the FFM, save for the addition of the liquidity factor.

For Further Reference:

(Study Session 9, Module 25.1, LOS 25.d)

Question #39 of 60

Question ID: 1220702

Lear's choice of the Gordon growth model is an example of which of the following types of estimates of the equity risk premium?

A) Historical estimate.

B) Forward-looking estimate.

C) Macroeconomic model estimate.

Explanation

The Gordon growth model is a popular method to generate forward-looking estimates using current information and expectations concerning economic and financial variables.

A historical estimate of the equity risk premium consists of the difference between the historical mean return for a broad-based equity market index and a risk-free rate over a given time period.

A macroeconomic model estimate of the equity risk premium is based on the relationships between macroeconomic variables and financial variables.

For Further Reference:

(Study Session 9, Module 25.1, LOS 25.b, 25.c, 25.d)

Question #40 of 60

Question ID: 1220703

Which of the following approaches/methods is *most appropriate* for Lear to consider in determining the required return for Densmore?

A) Build-up method.

B) Risk premium approach.

C) Bond-yield plus risk premium method.

Explanation

The build-up method is usually applied to closely held companies (such as Densmore) where betas are not readily obtainable.

The risk premium approach requires betas for its calculations; betas are generally not readily available for closely held companies.

The bond-yield plus risk premium method is appropriate only if the company has publicly traded debt. The method simply adds a risk premium to the yield to maturity of the company's long-term debt.

For Further Reference:

(Study Session 9, Module 25.1, LOS 25.d)

Question #41 of 60

Question ID: 1220704

Are Saunders's statements regarding the macroeconomic multifactor models correct?

A) Both statements are incorrect.

B) Only Statement 1 is correct.

C) Only Statement 2 is correct.

Explanation

Neither of Saunder's statements is correct. *Confidence risk* represents the unexpected change in the difference between the return of risky corporate bonds and government bonds. *Business cycle risk* represents the unexpected change in the level of real business activity.

For Further Reference:

(Study Session 9, Module 25.1, LOS 25.d)

Question #42 of 60

Question ID: 1220705

Which of the following statements regarding the models used to estimate the required return is *most accurate*?

A) A strength of the capital asset pricing model (CAPM) is that it usually has high explanatory power.

B) A strength of multifactor models is their relative simplicity and ease of calculation.

C) A weakness of build-up models is that they typically use historical values as estimates that may not be relevant to current market conditions.

Explanation

A weakness (not strength) of the CAPM is its low explanatory power in some cases. Multifactor models usually have higher explanatory power than the CAPM since they use more than one factor, whereas CAPM uses only one factor.

A weakness (not strength) of multifactor models is that they are typically more complex to use.

For Further Reference:

(Study Session 9, Module 25.1, LOS 25.f)

Questions #43-48 of 60

Questions 43 through 48 relate to Fixed Income.

Apex Bank NA Case Scenario

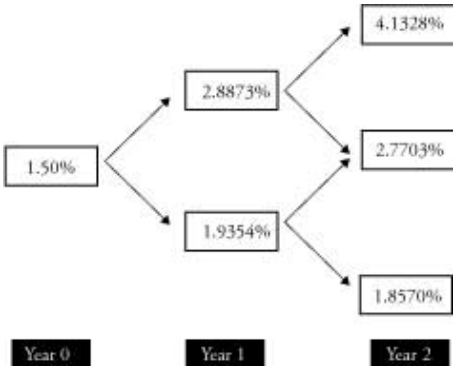
Ranjit Dhami has just joined Apex Bank NA as an intern in the bond trading department. Sue Jorgenson, Dhami's immediate supervisor, provides him with the current par rate curve for government bonds shown in Exhibit 1.

Exhibit 1: Selected Par Rates

Maturity	Par Rate
1	1.50%
2	2.00%
3	2.25%

A binomial interest rate tree with a 20% volatility assumption is shown in Exhibit 2.

Exhibit 2: Binomial Interest Rate Tree



Paul Stamper, one of the bond traders at Apex, shows Dhami information about several trades currently being evaluated. Exhibit 3 shows information on two of the bonds.

Exhibit 3: Selected Information on Potential Trades

Characteristic	Bond A	Bond B
Maturity	3 years	2 years
Option	Callable at par at t = 1 year	Putable at par at t = 1 year
Coupon	2%	1.50%
Par Value	$100	$100

Stamper asks Dhami the following questions:

Question 1: Which bond in Exhibit 3 is most likely to exhibit negative convexity?

Question 2: For a given decline in interest rate, which bond is most likely to have lower upside potential?

Question #43 of 60

Question ID: 1220721

Using the information in Exhibit 1, the three-year spot rate is *closest* to:

A) 2.26%.

B) 2.56%.

C) 2.62%.

Explanation

We have to bootstrap the three-year spot rate (S_3) given the par curve.

S_1 = par rate for a one-year bond = 1.50%.

$$\text{Value of two-year (par) bond} = 100 = \frac{2}{(1+S_1)} + \frac{102}{(1+S_2)^2}$$
$$= \frac{2}{(1.015)} + \frac{102}{(1+S_2)^2}$$

Hence, $(1 + S_2)^2 = 102 / 98.03 = 1.04$ and $S_2 = 2.005\%$

$$\text{Value of a three-year (par) bond} = 100$$
$$= \frac{2.25}{(1+S_1)} + \frac{2.25}{(1+S_2)^2} + \frac{2.25}{(1+S_3)^3}$$
$$= \frac{2.25}{(1.015)} + \frac{2.25}{(1.02005)^2} + \frac{102.25}{(1+S_3)^3}$$

Hence, $(1+S_3)^3 = 102.25 / 95.62 = 1.0693$ and $S_3 = 2.259\%$

For Further Reference:

(Study Session 12, Module 32.1, LOS 32.c)

Question #44 of 60

Question ID: 1220722

Using the information in Exhibit 1, the one-year forward rate two years from now is *closest* to:

A) 2.25%.

B) 2.39%.

C) 2.77%.

Explanation

From the earlier computations, we know that $S_2 = 2.005\%$ and $S_3 = 2.259\%$.

$[1+f(2,1)]^1 = (1 + S_3)^3 / (1 + S_2)^2$

$[1+f(2,1)]^1 = (1.02259)^3 / (1.02005)^2 = 1.0277 \rightarrow f(2,1) = 2.77\%$

For Further Reference:

(Study Session 12, Module 32.1, LOS 32.c)

Question #45 of 60

Question ID: 1220723

If the three-year forward price of a three-year zero-coupon bond is $0.9151 (per $1 par), the price today of a six-year zero-coupon bond should be *closest* to:

A) $0.7899.

B) **$0.8558.**

C) $0.9311.

Explanation

$F_{(3,3)} = \$0.9151$ (given)

$P_3 = 1 / (1 + S_3)^3 = 1 / (1.02259)^3 = \$0.9352$

$P_6 = F_{(3,3)} \times P_3 = 0.9151 \times 0.9352 = \$0.8558$

For Further Reference:

(Study Session 12, Module 32.1, LOS 32.b)

Question #46 of 60

Question ID: 1220724

The price of bond A in Exhibit 3 is *most accurately* described as being sensitive to shifts in:

A) the one-year par rate only.

B) the three-year par rate only.

C) **both the one-year and three-year par rates.**

Explanation

Bond A is a three-year bond, callable in one year. Callable bonds are sensitive to par rates corresponding to their call date (particularly if their coupon rate is relatively high) and to the par rates corresponding to their maturity date (especially if the coupon rate is relatively low).

For Further Reference:

(Study Session 13, Module 34.6, LOS 34.k)

Question #47 of 60

Question ID: 1220725

The *most accurate* answers to Stamper's questions are:

Question 1	Question 2

A)	**Bond A**	**Bond A**
B)	Bond A	Bond B
C)	Bond B	Bond A

Explanation

Callable bonds exhibit negative convexity due to price compression that occurs when the call option is in the money. Hence, bond A would exhibit negative convexity. Also, the upside potential for a callable bond (that is realized when interest rates fall) is limited due to the embedded short call.

For Further Reference:

(Study Session 13, Module 34.6, LOS 34.k, 34.l)

Question #48 of 60

Question ID: 1220726

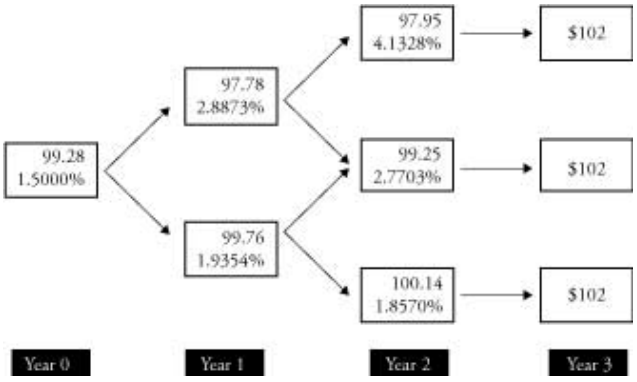
Using the rates in Exhibit 2 and the information in Exhibit 3, the value of bond A is *closest* to:

A) $90.63.

B) $95.68.

C) **$99.28.**

Explanation



$$V_{2,UU} = \frac{102}{(1.041328)} = \$97.95$$

$$V_{2,UL} = \frac{102}{(1.027703)} = \$99.25$$

$$V_{2,LL} = \frac{102}{(1.01857)} = \$100.14$$

$$V_{1,L} = 0.5\left(\frac{99.25+2+100.14+2}{(1.019354)}\right) = \$99.76$$

$$V_{1,U} = 0.5\left(\frac{99.25+2+97.95+2}{(1.028873)}\right) = \$97.78$$

$$V_0 = 0.5\left(\frac{99.78+2+99.76+2}{(1.015)}\right) = \$99.28$$

Note that the option was never exercised.

For Further Reference:

(Study Session 13, Module 34.2, LOS 34.c)

Questions #49-54 of 60

Questions 49 through 54 relate to Derivatives.

Zion Investments, LLC, Case Scenario

Randy Carson is the chief information officer of Zion Investments, LLC, an independent investment company. Carson has asked Jane Walsinzki, a senior derivatives analyst for Zion, for information on several outstanding contract positions. Walsinzki prepares a report outlining relevant information about the various derivatives.

Walsinzki's report first identifies that the firm has a payer positon in a two-year, semiannual, 3.25% fixed interest rate swap with a notional of $15 million. The second settlement just occurred. Current 180-day and 360-day LIBOR are 3.25% and 3.50%, respectively.

The report also identifies a two-year, semi-annual USD-for-EUR currency swap with a notional of €1 million. When the swap was initiated, the USD and EUR fixed rates were 3% and 2%, respectively. The exchange rate has changed from €/$ 0.9091 at inception to €/$ 0.8929 currently.

Furthermore, the report outlines that the firm holds a call option on a Eurodollar futures contract. This position was established to hedge another position of the firm, but Walsinzki could not identify the position that was being hedged.

Finally, the report identifies a long position in a forward contract on 10,000 shares of Specialty Retail, Inc.

Carson and Walsinzki then discuss the mechanics of forward pricing and the possibility of arbitrage involving foreign currencies. Walsinzki uses the Hungarian forint (Ft) versus the euro (€) as an example. The spot rate is Ft/€ 325.61 while the 90-day forward price is Ft/€ 329.40. Exhibit 1 provides additional information.

Exhibit 1: Hungary and eurozone outlook over the next 90 days (rates are annualized)

	Hungary	Eurozone
Expected inflation	2.30%	0.25%
Risk-free interest rate	3.45%	1.25%

Question #49 of 60

Question ID: 1220728

The value of the interest rate swap is *closest to:*

A) $31,600.

B) $47,500.

C) $63,300.

Explanation

new 180-day discount factor = 1 / [1 + (0.0325 × 180 / 360)] = 1 / 1.01625 = 0.9840.

new 360-day discount factor = 1 / [1 + (0.035 × 360 / 360)] = 1 / 1.035 = 0.9662.

sum of the discount factors = 0.9840 + 0.9662 = 1.9502

new SFR = [(1 – 0.9662) / 1.9502] × (360/180) = 3.47%

value (payer) = (0.0347 – 0.0325) × (180 / 360) × (1.9502) × ($15,000,000) = $31,639.

For Further Reference:

(Study Session 14, Module 37.7, LOS 37.d)

Question #50 of 60

Question ID: 1220729

The fixed USD payment in the currency swap is *closest to*:

A) $16,500.

B) $17,900.

C) $33,000.

Explanation

USD notional = EUR 1,000,000 / 0.9091 = 1,099,989

USD fixed rate = 3% (semiannual). USD payment = 0.03 / 2 × 1,099,989 = $16,500

For Further Reference:

(Study Session 14, Module 37.8, LOS 37.c)

Question #51 of 60

Question ID: 1220730

The call option on Eurodollar futures is *most likely* being used to hedge:

A) a floating rate liability.

B) a long position in a floating rate note.

C) a long position in a fixed rate bond.

Explanation

Eurodollar futures contracts are cash settled contracts on LIBOR. Futures prices are inversely related to LIBOR. Call options on Eurodollar futures increase in value when interest rates fall, and hence, can be used to hedge a floating rate asset.

For Further Reference:

(Study Session 14, Module 38.6, LOS 38.i)

Question #52 of 60

Question ID: 1220731

Regarding the long forward position in Specialty Retail, Inc., the position is *most likely* to lose value as a result of:

A) an increase in the risk-free rate.

B) an increase in the current stock price of Specialty Retail.

C) **an extra dividend payment during the contract interval.**

Explanation

Long forward contract positions increase in value when the forward price increases. Forward price is positively related to the spot price, time to maturity, and risk-free rate. Equity forward price is negatively related to dividend yield. An extra dividend payment during the contract interval would reduce the forward price and lead to a decline in the value of a long forward position.

For Further Reference:

(Study Session 14, Module 37.2, LOS 37.a, 37.b)

Question #53 of 60

Question ID: 1220732

Regarding the forint/euro forward contract, an arbitrage profit:

A) cannot be earned.

B) can be earned by lending forint.

C) **can be earned by borrowing forint.**

Explanation

Using CIP, the forward price of the euro should be $= 325.61 \times \left[\frac{1.0345}{1.0125}\right]^{90/365} = 327.34$

The EUR is overpriced in the forward market (quoted at 329.40), and hence, we sell EUR forward and buy EUR at the spot—using borrowed forint.

For Further Reference:

(Study Session 14, Module 37.6, LOS 37.b)

Question #54 of 60

Question ID: 1220733

Regarding Carson's question about mechanics of forward pricing, Walsinzki would *most accurately* state that forward prices are set such that:

A) **the market value of the contract at inception is 0.**

B) the forward price is higher than the spot price by the expected return on the underlying.

C) the forward price is lower than the spot price by the dividend yield on the underlying.

Explanation

Forward prices are set so the market value of the contract at inception is zero. Using the cost of carry model, forward price equals spot price plus net cost of carry. For an equity forward contract, net cost of carry equals risk-free rate minus dividend yield.

For Further Reference:

(Study Session 14, Module 37.2, LOS 37.a)

Questions #55-60 of 60

Questions 55 through 60 relate to Derivatives.

Stan Loper Case Scenario

Stan Loper is unfamiliar with the Black-Scholes-Merton (BSM) option pricing model and plans to use a two-period binomial model to value some call options. The stock of Arbor Industries pays no dividends and currently trades for $45. The up-move factor for the stock is 1.15, while the down factor is 0.87, and the risk-free rate is 4%. He is considering buying two-period European style options on Arbor Industries with a strike price of $40. The delta of these options over the first period is 0.83.

Loper is curious about the effect of time on the value of the calls in the binomial model, so he also calculates the value of a one-period European style call option on Arbor stock with a strike price of 40.

Loper is also interested in using the BSM model to price European and American call and put options. He is concerned, however, whether the assumptions necessary to derive the model are realistic. The assumptions he is particularly concerned about are:

- The volatility of the option value is known and constant.
- Stock returns are lognormally distributed.
- The continuous risk-free rate is known and constant.

Loper would also like to value options on Rapid Repair, Inc., common stock, but Rapid pays dividends, so Loper is uncertain what the effect will be on the value of the options. Loper uses the two-period model to value long positions in the Rapid Repair call and put options without accounting for the fact that Rapid Repair pays common dividends.

Question #55 of 60

Question ID: 1220735

The value of a two-period 40 call on Arbor Industries stock is *closest* to:

A) $6.65.

B) **$8.86.**

C) $9.21.

Explanation

For two up-moves, $45(1.15)^2 = \$59.51$. For two down-moves, $45(0.87)^2 = 34.06$.

For two up-moves, the intrinsic call value is \$59.51 − \$40 = \$19.51.

For two down-moves, the call is out-of-the-money, intrinsic value = \$0. For an up and a down-move the stock price is unchanged at 45, so the intrinsic value of the calls is \$45.00 − \$40.00 = \$5.

The risk neutral probabilities for the decision tree: $\pi_U = \frac{1.04-0.87}{1.15-0.87} = 0.607$ and $\pi_D = 1 - \pi_U = 0.393$.

The probability weighted present value of the option payoff if there are two up-moves is $\frac{0.607^2(19.51)}{1.04^2} = \$6.65$.

For up-down and down-up (which are equal probabilities), the probability weighted present value of the payoff is $\frac{(2)(0.607)(0.393)(\$5.00)}{1.04^2} = \$2.21$.

Sum these to get the option value, \$8.86.

For Further Reference:

(Study Session 14, Module 38.2, LOS 38.b)

Question #56 of 60

Question ID: 1220736

The position in calls necessary to hedge a long position in 1,000 shares of stock over the first period is *closest* to:

A) short 830 calls.

B) short 1,150 calls.

C) **short 1,205 calls.**

Explanation

To form a delta neutral portfolio Loper needs to write $\frac{1,000}{0.83}$ = 1,204.82, or 1,205 calls.

For Further Reference:

(Study Session 14, Module 38.7, LOS 38.l)

Question #57 of 60

Question ID: 1220737

The value of the one-period 40 call on Arbor stock is *closest* to:

A) \$6.65.

B) **\$6.86.**

C) \$7.15.

Explanation

The payoff is zero for a down-move and 11.75 for an up-move. Since the probability of an up-move is 0.607, the present value is $\frac{(0.607)11.75}{1.04} = \$6.86.$

For Further Reference:

(Study Session 14, Module 38.1, LOS 38.b)

Question #58 of 60

Question ID: 1220738

The difference in value between the European 40 calls and otherwise identical American 40 calls is *closest* to:

A) –$1.43.

B) **$0.00.**

C) $1.92.

Explanation

The possibility of early exercise is not valuable for call options on non-dividend paying stocks, so the value of the American call is the same as the value of the European call, and the difference in value is zero.

For Further Reference:

(Study Session 14, Module 38.3, LOS 38.b)

Question #59 of 60

Question ID: 1220739

Are the BSM assumptions listed correctly?

A) No, because stock prices are assumed to be normally distributed.

B) No, because the expected return on the stock is assumed to be known and constant.

C) **No, because the volatility of the return on the underlying stock is assumed to be known and constant.**

Explanation

The first assumption listed in the vignette should read, "The volatility of the return on the underlying stock is known and constant." The other listed assumptions are correct.

For Further Reference:

(Study Session 14, Module 38.6, LOS 38.f)

Question #60 of 60

Question ID: 1220740

When Loper failed to account for Rapid Repair dividends, did he *likely* overvalue the calls or the puts?

A) The calls and the puts are overvalued.

B) Only the calls are overvalued.

C) Only the puts are overvalued.

Explanation

Dividends on the underlying stock decrease the value of call options and increase the value of put options, all else equal. By ignoring them in his valuation, Loper will likely overvalue a long call option and undervalue a long put.

For Further Reference:

(Study Session 14, Module 38.6, LOS 38.h)