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GOLDEN FUTURE

2024 年 CFA 二级百题预测

1. **Quantitative Methods**
2. **Economics**
3. **Financial Statement Analysis**
4. **Corporate Issuers**
5. **Equity Valuation**
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8. **Alternative Investment**
9. **Portfolio Management**
10. **Ethics**

近年来，CFA 考试的难度在逐步提高。针对 2024 年的考试，考生对于占比较高的几门科目需要引起充分重视，如：财务报表分析、固定收益和权益。此外，机考的出题具有较大随机性，这要求考生们全面地掌握所有知识点。百题中的题目紧密贴合考纲，力求完整覆盖所有知识点，帮助学员无死角的掌握一切考点。为了全面应对考试，我们推出了的各种学习服务平台，如金程网校平台、手机 APP 平台以及学员群服务，请各位考生们充分利用。如有学术问题，请至金程网校进行提问。祝各位二级考生们顺利通过考试！

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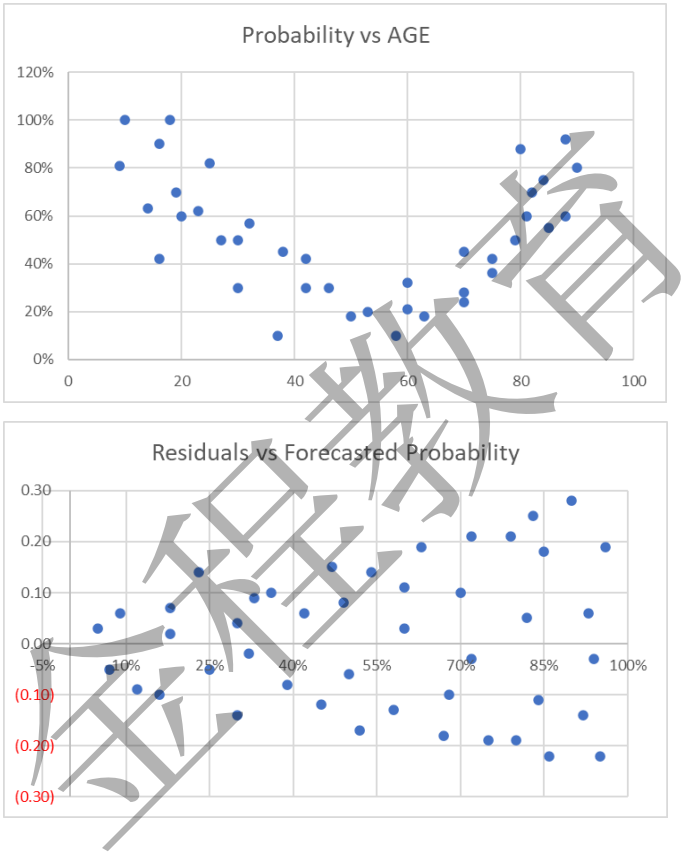
1. Quantitative Methods

Case 1: Laurant Davidson

Laurant Davidson, CFA a quantitative analyst, works for Hengrui, a pharmaceutical company. He is asked to forecast sales of one of their products. He collects data on the relationship of individual's activity levels and age have with the probability of developing Disease X in 2022. Before beginning his analysis, Davidson first ensures that the five main assumptions of multiple linear regression are met. Then, he judges activity levels by using a 0-10 scale, runs a regression and develops the following model:

$Y_{PROB} = 0 - 0.04X_{ACT} + 0.008X_{AGE}$



1. Which of the following is least likely an assumption of multiple linear regression?

A. There is no exact linear relation between two or more of the independent variables or combinations of the independent variables.

B. The variances of the regression residuals are normally distributed.

C. The observations are independent of one another, meaning the regression residuals are uncorrelated across observations.

2. Based on the regression model, which of the following statements is most likely correct?

A. The probability of developing Disease X is positively correlated with an individual's activity

levels.

B. A one unit increase in X_{AGE} results in Y_{PROB} increasing by 0.008 unit.

C. Y_{PROB} is more sensitive to a one-unit change in X_{ACT} than it is to a one-unit change in X_{AGE}.

3. Based on the scatter plots, which of the following assumptions is least likely violated?

A. Homoskedasticity

B. Linearity

C. Normality

4. Regarding with Davidson's regression analysis, which of the following statements is most likely correct?

A. The assumption of independence of errors is violated by the relationship between Y_{PROB} and X_{AGE}.

B. The assumption of normality is violated by the relationship between Y_{PROB} and X_{AGE}.

C. The residual terms exhibit heteroskedasticity by the relationship between forecasted probability and residuals.

Case 2: Abu Rock

Abu Rock, CFA, works for Ubiquant, a Beijing-based hedge fund with significant equity investments in technology companies in China, Singapore and Japan. Ubiquant is concerned about the recent poor performance of one of the fund's Japan investments, Fujitsu, an assembler of telecommunications equipment. Ubiquant's chief of information technology (IT) is Sean Molly.

Yesterday, Fujitsu's IT office sent Molly data related to the assembly process and a printout of an analysis of the number of defective assemblies per hour. Fujitsu's IT people believe that the number of defective assemblies per hour is a function of the outside air temperature and the speed (production rate) of the assembly lines. Molly recalls that Rock has had substantial training in statistics while working on his MBA. She asks Rock to help her interpret the regression results supplied by Fujitsu.

Exhibit 1: Regression Results: $D_t = b_0 + b_1 Air_t + b_2 R_t + \varepsilon_t$

	Coefficient	Standard Error
Constant (b_0)	0.0160	0.0942
Outside air temperature (b_1)	0.0006	0.0010
Assembly line speed (b_2)	0.5984	0.3000
Number of observations in the regression	350	
Critical *t* value at 5% significance	1.96	

R-squared	Std. Error of Estimate	F	Significance of F
0.564	0.098	96.20	0.000

Rock tests the hypothesis that the coefficients for outside air temperature and assembly line speed are significantly different from zero, using a significance level of 5%. He tires to add the third independent variable "average assembly time" to the model, and calculates the AIC and BIC of the original model and the new one.

Exhibit 2: AIC and BIC for different model.

	AIC	BIC
Outside air temperature, Assembly line speed	36.79	38.57
Outside air temperature, Assembly line speed and Average assembly time	42.67	45.25

1. Based on Exhibit 1, the regression coefficient(s) most likely significantly different from zero is (are) with respect to the coefficient(s) for:

A. outside air temperature (b_1) only.

B. assembly line speed (b_2) only.

C. both outside air temperature (b_1) and assembly line speed (b_2).

2. The results given in Exhibit 1 is least likely imply that:

A. the variations in the independent variables explain half of the variation in the number of defective assemblies per hour.

B. the predicted model has only a 50% probability of being correct.

C. the F-statistic is significant.

3. Which of the following is least likely a limitation of R-squared?

A. The R^2 does not change when we add independent variables to the model.

B. The R^2 cannot provide information on whether the coefficients are statistically significant.

C. The R^2 cannot provide information on whether there are biases in the estimated coefficients and predictions.

4. Based on the result from the Exhibit 2 only, which model is better?

A. The model that adds “average assembly time” as the third independent variable.

B. There is no difference between two models.

C. The original model is more appropriate.

Case 3: Carol Smith

Carol Smith, a quantitative analyst, works for Blackstone which is considering selling one of its investments, Mitsubishi Electric. Mitsubishi Electric designs and produces high-quality electric components. Lately there has been a decline in the company's profitability due to an increasing number of defective components. Smith is asked to write a research report on Mitsubishi and give his recommendations. Consequently, Smith approaches the company and analyzes the data relating to the defective components sent by them. Using his knowledge of statistics, Smith runs a regression involving the number of defective components per hour as a function of the air resistance and voltage. The regression results are given in Exhibit 1:

Exhibit 1: Regression Results: $D_t = b_0 + b_1 Air_t + b_2 V_t + \varepsilon_t$

		Coefficient	Standard Error
Constant (b_0)		0.0580	0.2467
Air resistance (b_1)		0.0034	0.0456
Voltage (b_2)		1.8984	0.5677
Number of observations in the regression		390	
Critical *t* value at 5% significance		1.96	
R-squared		0.511	
F-statistic	67.16	Significance of F	0.0001
VIF_{AIR}	3.08	VIF_{VOL}	1.89

Breusch-Godfrey F-statistic	Critical F value
3.4578	2.7561

Smith determines whether there is serial correlation, multicollinearity or conditional heteroskedasticity in the data. Smith discusses his analysis with his colleague, Tim Zhou, who makes the following comment regarding the consequences of serial correlation: "The presence of serial correlation in the error terms will affect the validity of coefficient estimation, when one of the independent variables is a lagged value of the dependent variable. Positive serial correlation will impact our ability to conduct reliable statistical tests, since both the F-statistic and t-statistics values will likely be underestimated."

1. Assume that the pairwise correlation between the independent variables is 0.13, and based on Exhibit 1, which of the following statement is incorrect:

A. the consistency of coefficient estimates.

B. the regression coefficients have inflated standard errors.

C. multicollinearity does not exist.

2. The Breusch-Godfrey test statistic most likely indicates that:

A. the null hypothesis of no serial correlation should be rejected.

B. the null hypothesis of no serial correlation should not be rejected.

C. the results are inconclusive regarding the presence of serial correlation in the regression model.

3. Conditional heteroskedasticity most likely occurs when the variance of the error term is correlated with:

A. the dependent variable only.

B. both the dependent and the independent variables.

C. the independent variable only.

4. Zhou's comment regarding the consequences of serial correlation is most likely:

A. correct.

B. incorrect with respect to validity of tests.

C. incorrect with respect to validity of estimates.

Case 4: Alex Tang

Alex Tang, CFA, is analyzing the monthly returns on the local stock market index, the CSI 500 Index. This index designed to reflect the overall performance of medium-sized companies with relatively smaller market capitalizations in the Chinese A-share market. Alex gathers monthly data on these 500 companies, using 25 years of data, as well as the price volatility and GDP for each month. As part of his analysis, he also collects information regarding survey of investor sentiment. Alex has designed three types of emotion: optimistic (type A), neutral (type B), and pessimistic (type C). Alex wants to further his analysis by investigating the relationship between the monthly returns of the index and volatility. He introduces interaction terms between volatility and the sentiment type, to see how the relationship differs with different market sentiment. Data is shown in Exhibit 1.

Exhibit 1

Table 1

	Dummy Variables	
Market Sentiment Type	Type A	Type B
Type A	1	0
Type B	0	1
Type C	0	0

Table 2

	Coefficient
Intercept	0.036
VOLA	-0.235
GDP	0.724
TYPA	0.052
TYPB	-0.047
VOLA_TYPA	0.004
VOLA_TYPB	-0.001

As part of his analysis, Alex seeks to identify any influential data points. He calculates the studentized residuals and Cook's D for each data point. Selected data is shown in Exhibit 2.

Exhibit 2

Table 3

Observation	Studentized Residual	Cook's D
Observation 51	0.563	0.004
Observation 52	3.751	0.079

Observation 53	-1.397	0.037
Observation 54	0.998	0.028
Observation 55	-2.004	0.093

1. Based on Table 1 in Exhibit 1, the control group is most likely:

A. Type A.

B. Type B.

C. Type C.

2. Given the data in Table 2, which of the following statements is least likely correct?

A. The value 0.724 is a slope coefficient.

B. TYPB is an interaction term.

C. VOLA_TYPB is a slope dummy variable.

3. Which of the following is least likely a correct interpretation of the data in Exhibit 1?

A. If market sentiment is neutral and VOLA and GDP are both zero, then the monthly return on CSI 500 index would be -1.1%.

B. If market sentiment is optimistic, the slope coefficient for VOLA would be -0.231.

C. The monthly return on the CSI 500 index is generally higher when market sentiment is neutral compared to when market sentiment is optimistic.

4. Using the information in Exhibit 2 and a critical t-value of +/-1.960, which of the observation is least likely influential based on the studentized residuals?

	Studentized residuals
Option A	Observations 53
Option B	Observations 52
Option C	Observations 55

A. Option A

B. Option B

C. Option C

Case 5: Eduardo DeMolay

Eduardo DeMolay, a research analyst at Mumbai Securities, is studying the time series behavior of price/earnings (P/E) ratios computed with trailing 12-month earnings ($E_{trailing}$). He and his assistant, Deepa Kamini, are reviewing the results of the ordinary least squares time series regression shown in Exhibit 1.

Exhibit 1

Results of Regression of P/E on Lagged P/E

$P/E_t = b_0 + b_1 * P/E_{t-1} + \varepsilon_t$

	Coefficient	Std. Error	t	Significance of t
Constant (b_0)	0.143	0.15294	0.935	0.176
Lagged P/E (b_1)	0.991	0.00338	292.958	0.000
R Square	Std. Error of the Estimate	Durbin-Watson	F	Significance of F
0.982	0.7428	1.200	85,825.180	0.000

Upon reviewing the results of Exhibit 1, DeMolay states: "The value for b_0 is close to zero and the value of b_1 is close to one. Those values suggest that the time series is a random walk." Kamini replies: "I'm convinced the P/E series based on trailing earnings truly is a random walk."

Kamini and DeMolay next examine the behavior of P/E ratios calculated using forward 12-month Earnings ($E_{forward}$). Kamini estimates another AR (1) model, but this time using the forward P/E values. She denotes the errors from this second regression as η_t and Exhibit 2 shows the results of testing whether the errors are ARCH (1).

Exhibit 2

Results of Regression of Squared Residuals, η_t^2,

On Lagged Squared Residual, η_{t-1}^2,

$\eta_t^2 = c_0 + c_1\eta_{t-1}^2 + u_t$

	Coefficient	Std. Error	t	Significance of t
Constant (c_0)	0.339	0.039	8.768	0.000
Lag1 (c_1)	0.273	0.024	11.405	0.000
R Square	Std. Error of the Estimate	Durbin-Watson	F	Significance of F
0.075	1.48978	2.094	130.066	0.000

After further discussion, DeMolay suggests that he and Kamini incorporate more variables into the analysis. He suggests they use a variation of the Fed Model, in which the Earnings/Price

(E/P) ratio is regressed on long-term interest rates.

DeMolay cautions Kamini, "Remember that when we analyze two time series in regression analysis, we need to ensure that,

1. Neither the dependent variable series nor the independent variable series has a unit root, or that,

2. Both series have a unit root and are not cointegrated.

Unless condition (1) or condition (2) hold, we cannot rely on the validity of the estimated regression coefficients."

Kaimini responds, "What about using simulations instead of regression model?"

1. If Kamini is correct regarding the trailing P/E time series, the best forecast of next period's trailing P/E is most Likely to be the:

A. Current period's trailing P/E.

B. average P/E ratio of the time series

C. Forecast derived from applying the AR (1) model depicted in Exhibit1 to the data.

2. The results depicted in Exhibit 2 are best described as consistent with a regression that has ARCH (1) errors because:

A. c_0 is significantly different from 0.

B. c_1 is significantly different from 0.

C. c_1 is significantly different from 1.

3. Based on the results depicted in Exhibit 2, DeMolay and Kamini should most likely:

A. Model the forward P/E data using an AR(1) model.

B. Model the forward P/E data using a random walk model.

C. Use generalized least squares to model the forward P/E data.

4. With DeMolay's caution in condition (1), which of the following models can be used to test for unit roots in time series?

A. $X_t=b_0+b_1X_{t-1}+\varepsilon_t$

B. $X_t-X_{t-1}=b_0+(b_1-1)X_{t-1}+\varepsilon_t$.

C. $X_t-X_{t-1}=b_0+(b_1-1)(X_{t-1}-X_{t-2})+\varepsilon_t$

5. DeMolay's caution given in condition (2) is best described as:

A. Correct.

B. incorrect, because the regression results are valid whether cointegration exists or does not

exist.

C. incorrect, because if both series have unit roots, they must exhibit cointegration for the results of the regression to be valid.

6. Which of the following is least likely to represent an advantage of using simulations in decision making? Simulations:

A. promote higher input quality.

B. result in better decisions.

C. provide a distribution of expected values.

Case 6: Vincent Holmes

Vincent Holmes, CFA, has been assigned the task of predicting sales for KAIKAI group, a manufacturer of semiconductor. Vincent finds that sales have been increasing at a fairly constant rate over time and decides to estimate the linear trend in sales for the company using quarterly data over the past 10 years, starting with Quarter 1 of 2011 and ending with Quarter 4 of 2020. On January 1, 2021, Vincent estimates the following model:

$sales_t = b_0 + b_1 t + e_t$ (1)

where:

sales = quarterly sales (measured in $ millions) for KAIKAI group

b_0 = intercept term

b_1 = slope

t = time variable (quarter number)

e = random error

Exhibit 1 provides the results of the linear trend regression.

Exhibit 1: Linear Trend Regression		
	Coefficient	Standard Error
Intercept	6.2	3.25
Trend	9.8	5.40

Vincent also estimates an autoregressive model of order one, AR(1), using the changes in quarterly sales data for the company from the first quarter of 2011 through the fourth quarter of 2020. He obtains the following results for his AR(1) model:

$\Delta sales_t = b_0 + b_1 \Delta sales_{t-1} + e_t$

Exhibit 2: AR(1) model for Changes in Company Sales		
	Coefficient	Standard Error
Intercept	18.00	2.55
Lag 1	0.10	0.08

The autocorrelations for the first four lags from Vincent's AR(1) model are provided in Exhibit3:

Exhibit 3: Autocorrelations from the AR(1) Model		
Lag	Autocorrelation	p-Value
1	-0.032	0.38
2	-0.200	0.23
3	-0.065	0.56
4	0.470	0.02

Vincent's also derives a regression using the residuals from the AR(1) model. He

regresses the squared residuals (or estimated errors) against the lagged squared residuals.

The results of this regression are reported in Exhibit 4.

Exhibit 4: Squared Residuals Regression			
	Coefficient	Standard Error	p-Value
Intercept	3.00	0.577	0.01
Lagged residual squared	0.28	0.185	0.31

Quarterly sales for KAIKAI group during 2020 were:

Exhibit 5: 2020 Quarterly Company Sales	
Quarter	Sales (in millions)
Quarter 1, 2020	365
Quarter 2, 2020	380
Quarter 3, 2020	390
Quarter 4, 2020	405

1. Vincent's supervisor expresses concern that equation (1) might be misspecified. Based on "sales have been increasing at a fairly constant rate over time." Which of the following data transformations should be applied to the dependent variable in equation (1) to best address this concern?

A. Lagged transformation.

B. First difference transformation.

C. Logarithmic transformation.

2. Using the results for the linear trend equation in Exhibit 1, the company sales forecast for Quarter 1 of 2021 is closest to:

A. $198.12 million.

B. $408 million.

C. $414.8 million.

3. Assuming the AR(1) model in Exhibit 2 is appropriate, Vincent should conclude that the Quarter 1, 2021, change in sales is most likely to:

A. fall from Quarter 4, 2020, change in sales.

B. rise from Quarter 4, 2020, change in sales.

C. remain unchanged from Quarter 4, 2020, change in sales.

4. Regarding to seasonality, given a 5% level of significance, Vincent should conclude which of the following lag should be added back to his autoregressive model:

A. None of them.
B. the 3rd lag.
C. the 4th lag.

5. From the data provided in Exhibit 4, for a 5% level of significance, Vincent should conclude his AR(1) model exhibits:
A. no autoregressive conditional heteroskedasticity (ARCH).
B. no autocorrelation.
C. no multicollinearity.

6. Using the historical data provided in Exhibit 5 and equation in Exhibit 2, the two-period-ahead forecast of the change in industry sales is closest to:
A. $19.5 million.
B. $19.95 million.
C. $20.15 million.

Case 7: Miller Yin

Miller Yin, CFA, is the managing partner at Star Equity, a private equity firm based in Hongkong. Miller has decided to revise the model which firm uses to identify attractive investment opportunities by supplementing the model with big data analysis. Miller sets up a meeting with Mike, the lead analyst in the department.

During the meeting, Mike makes the following statements about exploratory data analysis (EDA) involved in big data analysis.

Statement 1: The data exploration step is critical; it includes exploratory data analysis, feature selection, and engineering.

Statement 2: Feature selection in data exploration step need clarification only from data administrators and basic intuition.

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

Mike 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 Mike provides for illustration.

Exhibit 1: 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

The current model B fits well to in-sample data, but when applied to the validation data set, model's performance dropped significantly.

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

Exhibit 2: 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.

1. Regarding Mike'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.

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

A. accuracy score.
B. F1 score.
C. precision.

3. 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

4. Which of the following best described the model B's current problem?

A. Overfitting, high bias error, low variance error.
B. Underfitting, high bias error, low variance error.
C. Overfitting, low bias error, high variance error.

5. Based on information in Exhibit 2, the value of the hyperparameter specified in Step 1 in Data Analysis is:

A. 10.
B. 50.
C. 2,000.

6. 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.

Case 8: Alice Cohen

Alice Cohen runs a regression of the monthly return for an energy equity index for the previous 181 months against the monthly returns for FTSE100 and short-term interbank borrowing rate. The results of the regression are given in Exhibit 1.

Exhibit 1: Cohen's Regression Results Excerpts

Variable	Coefficient	t-statistic	p-value
Constant	-0.0041	-0.570	0.46
FTSE100	0.8882	4.415	<0.01
Interbank borrowing rate	1.5926	5.423	<0.01

R^2		0.61	
General linear F-test		5.29	
Durbin-Watson statistic		0.82	
Breusch-Godfrey F-statistic	3.65	P-value	0.0406
Correlation between FTSE100 and Interbank borrowing rate		0.29	
Breusch-Pagan statistic	0.36	P-value	0.3722

Cohen reviews the data and concludes that there is no evidence of multicollinearity. She also tests for serial correlation and heteroskedasticity, using a level of significance of 5%.

1. Cohen's conclusion that multicollinearity is not a problem, which of the following is least likely to be used as evidence:

A. correlation between FTSE100 and Interbank borrowing rate is low.

B. model R^2 is relatively high.

C. model F-value is high and the p-values for the FTSE100 and Interbank borrowing rate are low.

2. Using the information in Exhibit 1, the residuals of the model are most likely:

A. homoskedastic

B. heteroskedastic

C. neither homoskedastic nor heteroskedastic

3. The best conclusion about serial correlation in the regression model is that the regression residuals have:

A. significant serial correlation.

B. no significant serial correlation.

C. inconclusive results regarding serial correlation.

4. Which of the following is most likely a limitation of using the Durbin-Watson test to detect serial correlation?

A. It does not incorporate the squared differences of successive residuals.

B. It only applies to first-order serial correlation.

C. It does not measure autocorrelation.

Case 9: Alex Johnson

Alex Johnson is an analyst of Maxus Co., and he wants to build a model with structured financial data. He starts with cleansing and wrangling the raw structured financial data. Exhibit 1 presents a small sample of the raw dataset before cleansing:

Exhibit 1 Sample of Raw Structured Data Before Cleansing

ID	Ticker	IPO Date	Industry (NAICS)	EBIT	Interest Expense	Total Debt
1	ABC	4/6/17	44	9.4	0.6	10.1
2	BCD	November 15, 2004	52	5.5	0.4	6.2
3	KLM	14-Mar-15	72	5.7	1.5	0.0

After cleansing the data, Alex then preprocesses the dataset. He creates two new variables: an "Age" variable based on the firm's IPO date and an "Interest Coverage Ratio" variable equal to EBIT divided by interest expense. He also deletes the "IPO Date" variable from the dataset.

Susi, the CEO of LanLan Inc. is meeting with Alex. Susi's company already uses some of Alex's machine learning (ML) methods to better screen loan applicants. She provides the following excerpts from two loan applications (Exhibit 2).

Exhibit 2 Selected Text-Based Data from a Few Credit Applications

1	While the past year has been wonderful living in our new house, the furnace has been acting up recently and I need to borrow $4,000 to replace it. I make a point of paying all my bills on time.
2	Humbly stated, I'm in sheer need of your kind aid. I am really needing $2,000 riteaway to fix the roof which has started to leak into the bedroom of my oldest daughtter. PLEASE HELP!

Susi tells Alex that she has heard a little about text mining and recalls that text preparation must be carried out by removing such items as HTML tags, punctuation, numbers, and stop words and eliminating the distinction between uppercase and lowercase words by lowercasing them all.

Susi uses logistic regression to train the model: Defaulting loans are classified as Class 1, and non-defaulting loans are classified as Class 0. After tuning, the threshold p-value of 0.65 (for Class 1) is used to predict the outcome for each loan application. Exhibit 3 shows the result.

Exhibit 3 Result for a Selected Credit Applicant in Test Data

Applicant's Cleansed and Preprocessed Text	Actual Outcome	p
honest person face unusu cash_flow issu earli graduat wed present trip Nevada hous truli winner promot prosper sure futur after term like borrow tuition final	Defaulted (Class 1)	0.48

1. During the preprocessing of the data in Exhibit 1, what type of data transformation did Alex perform during the data preprocessing step?

A. Extraction

B. Conversion

C. Aggregation

2. After the cleansed textual data are normalized, the tokens added to the bag of words (BOW) arising from Applicant 2 (Exhibit 2) are most likely to include:

A. bedroom and kind.

B. really and needing.

C. HELP and daughtter.

3. Susi's recollection about the preparation of the textual data is most accurate with respect to:

A. numbers.

B. stop words.

C. lowercasing.

4. Based on Exhibit 3, the most appropriate statement about the model's performance for the selected credit applicant is that it results in:

A. a Type I error.

B. a Type II error.

C. the correct classification.

Case 10: Max Porter

Max Porter is an analyst of Ultra Co., a famous hedge fund in Japan. She has excellent skill in machine learning and big data analysis.

Project 1

Recently, Max expressed her views at a conference about how to apply ML techniques to enhance their investment performance.

Subject: Investment Process Reorganization

What I propose is that we continue managing a portfolio of 120 global small-cap stocks but restructure our process to benefit from machine learning (ML). Specifically, I suggest following the four steps which would be repeated every quarter.

Step 1 We apply ML techniques to a model including fundamental and technical variables (features) to predict next quarter's return for each of the 120 stocks currently in our portfolio. Then, the 20 stocks with the lowest estimated return are identified for replacement.

Step 2 We utilize ML techniques to divide our investable universe of about 10,000 stocks into 20 different groups, based on a wide variety of the most relevant financial and non-financial characteristics.

Step 3 For each of the 20 different groups, we use labeled data to train a model that will predict the best stock (in any given group) that is most likely to become acquisition targets in the next one year.

Step 4 These 20 "high-conviction" stocks will be added to our portfolio (in replacement of the 20 relatively underperforming stocks to be sold in Step 1).

Additional comment related to above:

"As time passes, we expect to find additional ways to apply ML techniques to refine Ultra Co. processes."

Project 2

A few days latter, Max met her friends, Caroline. Caroline recently has conducted an exploratory data analysis that revealed dataset about market sentiment of most frequent tokens. Max told her that she can conduct a collection frequency analysis, then computes TF–IDF (term frequency–inverse document frequency) for words in the collection. And related statements are shown below:

Statement 1: Higher TF–IDF values indicate words that appear more frequently within a smaller number of documents.

Statement 2: TF at the collection level is multiplied by IDF to calculate TF–IDF.

Statement 3: IDF is equal to log of inverse of the document frequency measure.

Project 3

Max uses a supervised learning approach to train the logistic regression model in predicting market sentiment. After completed document term matrix analysis. Max wants to start model training, she splits the DTM into three datasets, which are training, cross-validation, test datasets. Max applied the receiver operating characteristics technique and area under the curve metrics, listed down the AUC for different threshold p-values.

Exhibit 1 AUC for Different Threshold p-values		
Threshold *p*-Value	Training Set	Cross-Validation Set
p=0.63	54.1%	53.3%
p=0.70	65.8%	67.1%
p=0.81	77.4%	61.0%

1. The target variable for the labelled training data to be used in Step 3 is most likely which one of the following?

A. A continuous target variable.

B. A categorical target variable.

C. An ordinal target variable.

2. Regarding Max's addition comment, she has been thinking about the applications of neural networks (NNs) and deep learning (DL) to investment management. Which statement(s) best describe(s) the application of NNs and DL?

Statement I Backward propagation is the process of adjusting weights in a neural network, to reduce total error of the network in NNs.

Statement II NNs and DL are well-suited for developing single variable ordinary least squares regression models.

Statement III NNs and DL are well-suited for modelling non-linearities and complex interactions among many features, such as image and speech recognition, and natural language processing.

A. Statement II only.

B. Statements I and III.

C. Statements I, II and III.

3. Which statement regarding TF, IDF, and TF-IDF is incorrect?

A. Statement 1.

B. Statement 2.

C. Statement 3.

4. What conclusion can be drawn from Exhibit 1?

A. Threshold *p*-value of 0.63 is the best fitting model.

B. To improve model performance at the threshold *p*-value of 0.7, LASSO regularization should be applied to the logistic regression.

C. Model with threshold *p*-value of 0.81 seems to be overfitted.

Case 11: Beena Sharma

Beena Sharma, is an analyst examining the likelihood of a food processing company to go bankrupt. He gathers data on 180 companies from the past 25 years and identifies which companies have filed for bankruptcy. He also looks at data regarding the PE ratios and product price points relative to those of competitors. He comes up with the following logit model, where bankrupt = 1 and not gone bankrupt = 0, and the log likelihood statistics are shown in Exhibit 1.

Bankrupt = 0.783 + 0.534PE – 1.948PRICE

Exhibit 1	
Model	Log-likelihood
Restricted: Intercept only	-178.69
Unrestricted: Intercept, PE, PRICE	-171.53

Sharma performs an LR test on his model using a critical chi-square value of 6.21. Theresa May, an intern who is shadowing Sharma, asks he about the LR test. Sharma makes the following statements:

Statement 1: The LR test is a joint test of unrestricted coefficients.

Statement 2: Rejecting the null hypothesis is a rejection of the smaller, restricted model in favor of the larger, unrestricted model.

Statement 3: The less negative of the value of Log-likelihood, the better fitting model.

While looking at Sharma's data, May commented on a data point that seemed extreme compared to the others. Sharma responded by saying he had noticed the outlier as well, but it was not an issue.

1. Which of the following statements is least likely correct?

A. The intercept of 0.783 is the log odds of the probability of bankruptcy if PE and PRICE are both zero.

B. A one-unit change in PRICE results in a 16% increase in the probability of bankruptcy, all other variables held constant.

C. The coefficient of 0.534 for PE implies odds of 1.706.

2. Regarding his decision for the LR test, Sharma should most likely:

A. not reject the null hypothesis.

B. neither reject nor fail to reject the null hypothesis because she does not have enough information to make an accurate decision.

C. reject the null hypothesis.

3. Which of the Sharma's statements regarding the LR test is least likely correct?

A. Statement 1

B. Statement 2

C. Statement 3

4. Which of the following is most likely the reason why the extreme data point is not an issue?

A. It is an outlier, not a high-leverage point which has no influence on regression line.

B. This point does not tilt the regression line.

C. This point does not close to the regression line.

2. Economics

Case 1: Tremblay

Louise Tremblay is a portfolio manager for a global equity fund domiciled in the United States. She wants to add positions in foreign stocks from Canada and stocks from either Brazil or Ecuador. Tremblay calls Hal Baroque, the firm's economist, to arrange a meeting to discuss his outlook for these economies and issues related to foreign exchange relations and international asset pricing. During the meeting, Baroque presents the information he gathered in preparation for their discussion, as shown in Exhibit 1.

Exhibit 1: Selected Currency Exchanges and Market Rates.

Country	Currency	Spot Exchange Rate	One Year Risk-free Rate	Expected Annual Inflation Rate
United States	US$	NA	4.80%	2.30%
Canada	C$	1.2138–1.2259	4.10%	1.90%
Brazil	Real (BRL)	2.3844–2.4082	8.80%	6.30%
Ecuador	US$	NA	6.40%	4.50%
Number of foreign currency units per one U.S. dollar.				
Ecuador uses the U.S. dollar as its official currency.				

Baroque begins his discussion by reviewing some basic relations that are useful in understanding the interplay between exchange rates, interest rates, and inflation.

He remarks: Theoretically, the nominal yield spread between two countries should be equal to the expected inflation rate differential over the term of the interest rates.

1. Using Exhibit 1, the mid-market forward premium (discount) for a 90-day contract for CAD/USD is *closest* to:

A. +0.0021236.

B. –0.0021094.

C. –0.0085389.

2. According to the relative version of purchasing power parity (PPP) and based on the spot rate bid quote in Exhibit 1, the expected spot exchange rate for the Canadian dollar per U.S. dollar is *closest* to:

A. C$1.2187.

B. C$1.2089.

C. C$1.2053.

3. If a dealer's bid-side quote for the CAD/BRL is C$0.5250, Tremblay's profit on a US$1,000,000 initial investment in the triangular arbitrage opportunity is *closest* to:

A. US$31,315.

B. US$31,328.

C. US$21,135.

4. The specific relationship referred to in Baroque's remarks at the beginning of his discussion with Tremblay *most accurately* describes:

A. Purchasing power parity.

B. The international Fisher effect.

C. Interest rate parity.

Case 2: AnaKonda

AnaKonda Investment Managers (AIM) manages private client portfolios for high-net-worth individuals investing in stocks, bonds, and currencies. During their weekly meeting, the management team at AIM (Adam Bergman, chief investment officer, Elena Medeva, equity strategist, and Venkat Rajan, currency trader) discusses a wide range of items pertaining to investment research and management, such as measures of economic activity, country growth rates, and economic policies.

After examining the recent data on measures of economic activity, the team members make the following comments:

Rajan: Cross-country comparisons of gross domestic product (GDP) should be based on the current market exchange rates because the exchange rate movements correctly reflect the growth in the country's economy.

Medeva: For equity investing, we need to predict the change in stock market value and that requires three inputs: expected changes in corporate earnings to GDP, GDP, and the price-to-earnings multiple. Of these inputs, the growth rate of GDP must dominate in the long run.

Bergman: From the standpoint of our fixed-income holdings, we should be very concerned if the expected GDP growth rate is less than the potential growth. In that case, there will be an upward pressure on interest rates and a decline in bond prices.

Bergman then suggests that for making investment decisions, it is important to assess the steady state rate of growth of a country using the neoclassical growth model. He presents the data in Exhibit 1, which is needed for computations.

Exhibit 1: Economic Data by Country

Country	Real GDP Growth (%)	Labor Cost in Total Factor Cost (%)	Total Factor Productivity (TFP) Growth (%)	Long-Term Labor Force Growth (%)	Long-Term Growth Rate in Labor Productivity (%)
X	2.5	68.9	2.25	2	0.8
Y	2	50.3	3.5	0.5	2.4
Z	3.4	41.5	1.15	1.25	1.75

Medeva says, "I'm glad to see the data in Exhibit 1. However, I would be more interested in measuring the growth rate in potential GDP using the labor productivity growth accounting equation. It will help me to consider increasing equity exposure to the country with the highest growth rate in potential GDP."

Rajan responds, "I too like examining a country's steady state rate of growth, but I prefer to go deeper by examining the impact of various factors on a country's economy from the standpoint

of the neoclassical model. Based on my readings and analysis of the macro-economic data, I came up with the following conclusions for the three countries where we hold significant positions."

Country X: It is experiencing a higher level of capital accumulation. This development indicates a higher growth rate of output and potential GDP.

Country Y: Its government is investing in advanced technologies and initiating measures to achieve growth in total factor productivity. Even though the country is experiencing diminishing marginal returns to capital, I believe it will be able to sustain growth in per capita GDP.

Country Z: Its data show increasing trends in the rate of savings, growth rate of the labor force, and the depreciation rate that, I believe, will result in a permanent improvement in the growth rate of output per worker.

1. In regard to the measures of economic activity, the comment by which one of the research team members is *most accurate*?

A. Bergman.
B. Rajan.
C. Medeva.

2. Using the data presented in Exhibit 1, Country X's steady state rate of growth is *closest* to:

A. 5.77%.
B. 5.27%.
C. 5.63%.

3. Using the approach suggested by Medeva and the data in Exhibit 1, which of the three countries *most likely* indicates the highest growth rate in potential GDP?

A. Country X.
B. Country Z.
C. Country Y.

4. Which of Rajan's conclusions regarding the neoclassical model is *most accurate*? His conclusions pertaining to Country:

A. Z.
B. Y.
C. X.

Case 3: Robert Williams

Robert Williams is a junior analyst at Anderson Brothers, a large Wall Street brokerage firm. He reports to Will McDonald, the chief economist for Anderson Brothers. McDonald provides economic research, forecasts, and interpretation of economic data to all of Anderson's investment departments, as well as to the firm's clients. McDonald has asked Williams to analyze economic trends in the country of Bundovia. Bundovia has strict capital controls limiting the flow of capital into and out of the country. The currency of Bundovia is the Bunco (BUN).

McDonald believes that the Bundovian economy is experiencing a hyper-inflationary environment and that the Bundovian government is poised to follow a restrictive monetary and fiscal policy to combat high inflation.

Williams receives the following forward rate quotes from the bank:

- 30-day forward rate: USD/GBP = 2.0045 – 55
- 60-day forward rate: USD/GBP = 2.0075 – 85

Williams decides to go long 1 million GBP (and short USD) in the 60-day forward contract. 30 days after the initiation of the USD/GBP forward contract, the exchange rate and interest rates are as follows:

Quotes	USD/GBP	
Spot	2.0086 / 2.0089	
30-day forward	+7.6 / +8	
60-day forward	+8.7 / +9.1	
90-day forward	+9.2 / +9.8	
Interest rates	USD	GBP
30 day	4.00%	3.00%
60 day	4.25%	3.00%
90 day	4.29%	3.00%

William spots another potential arbitrage opportunity in the foreign exchange markets. The current spot rate is $2.00 per BUN. The Bundovian risk-free interest rate is 3%, the one-year forward rate is $2.10 per BUN, and the U.S. risk-free rate is 5%.

1. Based on McDonald's beliefs about Bundovian government monetary and fiscal policies, under the Mundell-Fleming model the Bunco is *most likely* expected to:

A. Depreciate.

B. Appreciate.

C. remain unchanged in value.

2. Under neoclassical growth theory, the Bundovian growth rate per capita output is *most likely* to increase due to:

A. capital depending.
B. technological growth.
C. either capital deepening or technological growth.

3. 30 days after initiation of the USD/GBP forward contract, the mark-to-market value of the contract is *closest* to:

A. USD 858.
B. USD 1,195.
C. USD 2,190.

4. The maximum profit available from covered interest arbitrage in the USD/BUN market by borrowing $1,000 or the BUN equivalent is *closest* to:

A. $19.05.
B. $31.50.
C. $72.50.

Case 4: Teresa Young

Teresa Young, CFA, is the head of research for a large financial services firm based in New York City. The company's clients include pension funds, endowments, and large foundations. Members of the research department include economists that perform short- and long-range forecasting, as well as analysts who follow industry trends and the various individual companies within the industry.

Many of the firm's clients have globally diversified portfolios, one of the European equities managers approaches Young for assistance with a longtime client based in Dallas, Texas. The client is unhappy with the portfolio's recent performance and is convinced that there is too much exchange-rate exposure because of the large foreign allocation. The portfolio manager would like to provide evidence to the contrary to the client and believes the client is lacking a fundamental understanding of foreign exchange parity relations.

Young compiles some basic information regarding the theoretical relationships among exchange rates, interest rates, and inflation rates. She also obtains information on some of the client's key non-U.S. holdings. Young observes that the client currently has a large position in Banyo, a Japanese manufacturer and distributor of consumer electronics with a strong global market share. The client also has a substantial investment in Seine Industries, a French producer of paper products whose primary market is Western Europe.

Current spot rates:

- 1.3200 USD ($) per EUR (€).
- 95 JPY (¥) per USD ($).

Expected inflation rates:

- United States: 4.00%.
- Euro: 6.50%.
- Japan: 8.00%.

Young is concerned about changes in Japanese monetary and fiscal policies. Japan has been well integrated in global capital markets, and she expects that the policymakers in Japan will tighten monetary policy while adopting an expansionary fiscal policy for the coming three to five years. She is also concerned about changes in the regulatory environment in Japan:

Young's analysis of Japanese budgets leads her to conclude that Japan is increasing funding to primary education, while the United States is increasing funding for post-secondary education. Young then directs her attention to the French economy. She collects several macroeconomic variables for the past 20 years. The information is provided in Figure 1.

Figure 1: The French Economy: Historical Data	
GDP growth rate	1.8%
Labor cost / total factor cost	0.36

Growth rate of labor	1.2%
Growth rate of capital	1.67%

Young then collects projections for France as follows:

- The rate of technological change is expected to be lower by 0.1% going forward.
- The growth rate of labor will be similar to historical values.
- The growth rate of capital will increase by 0.1% going forward.

1. When Young discusses the International Fisher Relation with her client, she should explain that it is based on real interest rate parity, which implies that:

A. rates already reflect any difference in expected real interest rates between countries.
B. any expected inflation differential between countries will be brought back to equilibrium by consumers' demands for the least expensive goods and services.
C. any difference in real interest rates between countries will result in capital flows that cause real interest rates in those countries to converge to the same level.

2. Regulations are least likely to be needed in the presence of:

A. externalities.
B. informational frictions.
C. symmetrical information.

3. Compared with the impact of the incremental spending on primary education in Japan, the planned incremental spending on post-secondary education in the United States is most likely to result in:

A. a higher growth in GDP.
B. a lower growth in GDP.
C. a similar growth in GDP.

4. Using the Cobb-Douglas production function, France's growth rate of potential GDP is closest to:

A. 1.76%.
B. 1.80%.
C. 1.92%.

Case 5: Summit Consulting

Jill Surratt, CFA, and Elizabeth Castillo, CFA, are analysts for Summit Consulting. Summit provides investment advice to hedge funds and actively managed investment funds throughout the United States and Canada.

Surratt and Castillo have a client, Tom Carr, who is interested in increasing his returns from foreign currency positions. Carr currently has a position in Japanese yen (¥) that he wishes to convert to Taiwanese dollars (NT$) because he thinks the Taiwanese currency will appreciate in the near term. He does not have a quote for yen in terms of the NT$ but has received quotes for both currencies in terms of the U.S. dollar. The quotes are $0.008852-56 for the yen and $0.02874-6 for the Taiwanese dollar. He would like to purchase NT$10 million.

In discussing these quotes, Surratt notes that the bid-ask spread is affected by many factors. She states that if an economic crisis were expected in the Asian markets, then the bid-ask spread of the currency quotes should widen. Castillo states that if a dealer wished to unload an excess inventory of yen, the typical response would be to lower her ask for the yen, thereby narrowing the bid-ask spread.

Another of Summit's clients is Jack Ponder. Ponder would like to investigate the possibility of using covered interest arbitrage to earn risk-free profits over the next three months, assuming initial capital of $1 million. He asks Surratt to gather information on the inflation rates, interest rates, spot rates, and forward rates for the U.S. dollar and the Swiss franc (SF). Surratt has also used technical analysis to obtain a projection of the future spot rate for the two countries' currencies. The information is presented as follows.

Spot rate	$0.85 / SF
Three-month forward rate (as of today) for	SF $0.80 / SF
Expected spot rate three months from now	$0.60 / SF
Three-month inflation rate in Switzerland (annualized)	2.0%
Three-month inflation rate in the U.S. (annualized)	6.0%
Three-month interest rate for SF (annualized)	12.0%
Three-month interest rate for U.S. dollars (annualized)	18.0%

Ponder has a carry trade open involving the Bun (the currency of Bundovia). Ponder notices that Bundovia has a current account deficit and asks Surrat about the impact of such a deficit on the value of the Bun. Surrat states that the impact on the Bun depends on three factors:

Factor 1: The expected size of the current account deficit in the future.

Factor 2: The influence of exchange rates on domestic prices.

Factor 3: The response of import and export demand to changes in import and export prices.

1. The yen cost to Carr of buying NT$10 million is closest to:

A. ¥3,077,000.

B. ¥32,453,000.

C. ¥32,490,000.

2. Are Surratt and Castillo correct with regard to their statements concerning the currency bid-ask spreads?

A. Only Surratt is correct.

B. Only Castillo is correct.

C. Both Surratt and Castillo are correct.

3. Which of the following best describes the covered interest arbitrage that Ponder should execute? Borrow in:

A. Swiss francs to make an arbitrage profit of $80,313.

B. U.S. dollars to make an arbitrage profit of $80,313.

C. Swiss francs to make an arbitrage profit of $75,588.

4. How many of the factors identified by Surrat regarding Bundovia's current account deficit are accurate?

A. One factor only.

B. Two factors only.

C. All three factors.

Case 6: Angela Bobo

Angela Bobo was recently hired as an analyst at CapFX Partners, a US-based currency trading firm that maintains offices in major financial centers around the world. Bobo assists CapFX foreign currency strategist Robert. The firm executes trades for clients and manages a foreign currency investment fund. Bobo is meeting with Robert to discuss the characteristics of the foreign exchange markets.

Robert explains that knowing what establishes a currency's real long-term equilibrium value helps investors manage risk exposure:

"To better serve our clients and maximize the performance of our investment fund, we need to be able to filter out the short-term noise in exchange rates so that we can better understand their likely direction over the long term."

He notes that current account trends influence the path of exchange rates over time through several mechanisms:

"Of the three mechanisms that economists identify, I have the most confidence in the one that assumes there are long-run limits on current account deficits."

Bobo has concerns about the firm's experiences during currency crises. She recalls reading a study produced by the IMF that an impending currency crisis is signaled by numerous economic variables. She makes the following statements with regard to some of these variables:

1. The terms of trade exhibit substantial increase prior to the crisis.
2. A country has distinctive economic growth patterns ahead of the crisis.
3. Inflation is significantly higher in the pre-crisis period.

Then Bobo asks the following questions related to a recent article she read concerning monetary policy and macroeconomy.

Question 1： "The article states that the government of Canada has decided to loosen its monetary policy by expanding its monetary base to lower domestic interest rates in order to encourage investments by the private sector. What impact will this have on exchange rates in the short and long term?"

Question 2： "The government has identified the infrastructure redevelopment and investment in technology as vital for accelerating economic growth and improving social mobility. Further, the government has decided to tighten its immigration policy. Which policy decision will least likely improve economic growth?"

1. The mechanism about which Robert is most confident as an explanation for the long-run equilibrium value of exchange rates is best described as the:

A. debt sustainability channel.

B. flow supply/demand channel.

C. portfolio balance channel.

2. Which of Bobo's statements regarding a currency crisis is the most accurate?

A. Statement 3

B. Statement 2

C. Statement 1

3. Based on the findings of the Dornbusch modified monetary model, what is the best possible response to Bobo's Question 1?

A. The CAD will appreciate in both the short term and long term.

B. The CAD will appreciate in the short term, then depreciate in the long term.

C. The CAD will depreciate in the short term, then appreciate in the long term.

4. What is the best possible response to Bobo's Question 2?

A. investment in technology.

B. infrastructure development.

C. tightened immigration policy.

Case 7: Vincent Lin

Vincent Lin, Head of compliance at Global Invest. Corp., an asset management company based in New York, U.S.A., is conducting an interview with Johnny Fang, CFA, for the position of a compliance officer. During the interview, Lin asks Battley the following questions:

Lin: "The U.S. SEC allocates some regulatory responsibilities to Financial Industry Regulatory Authority (FINRA), which is an organization that both represents and regulates its members, whose mission is to protect America's investors by making sure the securities industry operates fairly and honestly. How would you classify FINRA?"

Fang: "FINRA is a self-regulating organization (SRO)."

Lin: "What is regulatory capture?"

Fang: "This is when regulation arises to enhance the interests of the regulated."

Lin: "In the U.S., the Dodd-Frank Act called for centralized clearing for the settlement of derivatives transactions by July 2011, whereas the G-20 called for action by member nations by end of 2012. This difference in timeline was a cause of concern for U.S. Why?"

Fang: "This is because of regulatory competition."

Lin: "Due to globalization of capital markets which negative externalities do we need to be worried about?"

Fang: "I am not sure."

Lin: "Costs and benefits of regulation are important but often difficult to assess; what are the two 'unintended costs' of regulation?"

Fang: "They are direct and indirect costs of management."

1. Based on Lin's question regarding FINRA and regulatory capture, Fang is most likely correct with respect to:

A. only FINRA.
B. both FINRA and regulatory capture.
C. only regulatory capture.

2. Regarding Lin's question about the timeline difference between the U.S. derivative transactions centralized clearing by July 2011 and G-20 nations action by 2012, the most likely reason for U.S. firms' concerns is:

A. informational friction.
B. regulatory arbitrage.
C. regulatory competition.

3. Negative externalities that may affect capital markets around the world due to increased globalization, are most likely:

A. Financial contagion and regulatory capture.

B. Regulatory competition and global warming.

C. Regulatory competition and financial contagion.

4. Regarding Lin's question about regulation's "unintended costs", Fang is most likely:

A. incorrect, they are implementation costs and indirect costs.

B. correct.

C. incorrect, they are monitoring costs and supervision costs.

Case 8: Daltonia

Daltonia is a medium sized developing country. Government policies have gradually opened the borders for international trade and the flow of capital. Trade is now substantial with members of the EU and is often denominated in Euros (€). During the early 2000s, privatization of some publicly owned industries, creation of a new free-floating currency, the Dornan (DRN), and sound policies implemented at the central bank put the economy on a track for steady growth and stability. Foreign currency reserves are sizable in comparison to the average daily turnover of the DRN.

Naim Birol, Minister of Finance for Daltonia, is preparing his annual report on the state of the economy and currency markets for the legislative branch of government. He will examine the long- and short-term trends in GDP growth, per capita income, inflation, and exchange rates. He is also responsible for recommending policy initiatives for the legislature to consider in order to promote overall economic prosperity for Daltonian citizens.

In order to estimate long-term GDP growth, Birol examines the data in Exhibit 1 intending to use Solow's growth accounting equation.

Exhibit 1: Long-Term Trends of Daltonian Economy

Growth due to capital deepening	2.3%
Labor growth	3.4%
Growth rate of total factor productivity	−0.6%
Growth in labor productivity	1.7%
Growth in capital	6.1%
Share of GDP paid to labor	65%

Birol consults his colleague Ziya Pamuk to review the policy choices facing the Daltonian government and the possible effects on economic growth and per capita income.

Pamuk states: "Daltonia's politicians are debating the effects of growth rate policies focused on three outcomes:

- higher rates of saving and investment
- importing more technological innovations
- greater investment in research and development (R&D)

I conclude that the impact from these policies will cause a long-term increase in the economy's growth rate and our standard of living. Furthermore, if we emphasize R&D spending, then higher rates of saving and investment are unlikely to encounter diminishing marginal returns."

Birol believes Daltonia needs to address a recent increase in inflation and appreciation in the exchange rate. Should these trends accelerate, the country's present prosperity could be threatened. Birol and Pamuk discuss policy alternatives.

- Birol states: "Since Daltonia allows capital to flow freely, the clearest choice is to implement expansionary monetary and fiscal policies to stop the appreciation of the currency according to the Mundell–Fleming model."
- Pamuk replies: "The long run solution to the problem, at least according to the portfolio balance approach, would be a policy choice by the Daltonian government to run large budget deficits on a sustained basis."
- Birol adds: "There is also a timing dimension to consider. According to Dornbusch, with inflexible domestic prices in the short run, any decrease in nominal money supply will induce an increase in the domestic interest rate. This will encourage capital inflows and cause the exchange rate to overshoot to the upside in the short run, until domestic prices have a chance to react."

In examining the currency markets, Birol is concerned that local currency dealers are being taken advantage of by arbitrageurs from Europe. He analyzes the rate quotes in Exhibit 2 for evidence of triangular arbitrage and carry trade opportunities by European hedge funds attempting to exploit the DNR currency.

Exhibit 2: Interbank and Dealer Currency Quotes and Rates

Currency Pair	Bid (spot)	Offer (spot)	Projected Spot in one year	One-Year Libor Rates
Interbank Market:				
EUR/USD	0.8045	0.8065	0.8200	EUR 0.8%
DNR/USD	1.2050	1.2100	1.2280	USD 0.9%
Daltonian Dealer:				
DNR/EUR	1.5140	1.5190		DNR 3.0%

1. Using the specified growth accounting equation, which is the most appropriate conclusion Birol can make from his data on trends in the economy?

A. Daltonia's economy is performing at a steady state rate of growth

B. Output per worker is falling.

C. GDP growth is primarily driven by labor.

2. Pamuk's conclusion regarding the growth policy debate is most consistent with which model of economic growth?

A. Classical
B. Endogenous
C. Neoclassical

3. Which of the statements regarding policy alternatives discussed between Birol and Pamuk in response to Daltonia's recent increase in inflation and deterioration in exchange rate is least accurate?

A. Birol's statement regarding Dornbusch
B. Pamuk's statement regarding the portfolio balance approach
C. Birol's statement regarding Mundell–Fleming

4. Based on the exchange rate quotes in Exhibit 2, an opportunistic European hedge fund interested in triangular arbitrage between the dealer and interbank markets is most likely to:

A. discover that no triangular arbitrage opportunity exists
B. buy EUR in the interbank market and sell EUR to the Daltonian dealer.
C. buy EUR from the Daltonian dealer and sell EUR in the interbank market.

Case 9: Warren Buffett

Warren Buffett, CFA, is the chairman and CEO of Berkshire Hathaway, a massive holding company for a multitude of businesses. Insurance subsidiaries represent a large part of Berkshire Hathaway's holdings. However, the company also manages hundreds of diverse businesses all over the world.

Prior to the annual shareholders meeting, Buffet meets Charlie Munger, Vice president of Berkshire Hathaway, to discuss their global transactions. Munger provides two justifications for adding Brazilian stocks rather than Ecuadoran stocks to his portfolio. He believes: Brazil is sufficiently developed to be considered part of the group of developed nations but Ecuador is not. Investing in countries with lower per capita incomes that are members of the developed nations group should, over long periods, provide a higher rate of return than investing in countries with higher per capita income. Buffet states: Some studies have found that emerging markets central banks tend to be more effective in using exchange rate intervention than developed markets central banks, primarily because of one important factor.

In the annual shareholders meeting, Buffet wants to be on the lookout for situations which might trigger a currency crisis. He and Munger discuss recent economic developments that might provide potential warning signs.

- Buffett: "Moving from fixed exchange rate to a floating exchange rate has reduced the susceptibility to a currency crisis."
- Munger: "Banking crises often precede currency crises, but our banking sector has grown and strengthened substantially by offering foreign denominated savings accounts to foreign investors and lending those funds for domestic infrastructure investments."
- Munger: "I'm concerned that the ratio of exports to imports has been increasing recently and the ratio of M2 to bank reserves has been falling."

In the letter to Berkshire shareholders, Buffet makes the following statement:

I have been investing for 80 years – about one-third of our country's lifetime. Berkshire had a good year in 2022. The company's operating earnings set a record at $30.8 billion, this is partly due to the outstanding equity return we made. The Grinold-Kroner decomposition method helped a lot with equity markets analysis.

1. Munger's justifications for preferring Brazilian stocks to Ecuadoran stocks are *most consistent* with which economic growth model?

A. Neoclassical.

B. Endogenous.

C. Classical.

2. The factor that Buffet is most likely referring in his Statement is:

A. FX reserve levels.

B. domestic demand.

C. the level of capital flows.

3. Which of the recent economic developments discussed by Buffett and Munger is most likely to lead to a currency crisis?

A. The banking sector

B. The exchange rate system

C. The trend in terms of trade and monetary ratios

4. Using the Grinold-Kroner framework, equity market returns can be attributed to:

A. dividend yield and expansion/contraction of the price-to-earnings ratio

B. dividend yield, expansion/contraction of the price-to-earnings ratio and nominal GDP growth only.

C. dividend yield, expansion/contraction of the price-to-earnings ratio, nominal GDP growth and change in shares outstanding.

Case 10: Charlie Munger

Charlie Munger, CFA, is the vice president of Berkshire Hathaway, a massive holding company for a multitude of businesses. Insurance subsidiaries represent a large part of Berkshire Hathaway's holdings. However, the company also manages hundreds of diverse businesses all over the world.

Munger is responsible for the fixed income strategy and is exploring the possibility of investing in the sovereign bonds of a region which has been the site of military conflict. Munger has narrowed his search down to three countries in the region: Russia, Ukraine and Belarus. To determine the potential GDP growth prospects of the region, Munger uses the firm's financial services terminal to obtain data for a cross sectional analysis. The raw data obtained is summarized below:

Exhibit 1

Economic Statistic	**Russia**	**Ukraine**	**Belarus**
Actual economic growth (2016-2021)	4.7%	3.4%	2.3%
GDP/Capita, 2021	USD12,200	USD4,835	USD7,302
Annual dividend yield (2016-2021)	5%	5.5%	6%
Annual changes to the P/E ratios (2016-2021)	1.1%	0.7%	1.3%

Munger also obtains the 5-year forecasts for GDP growth for the three countries from IMF's latest economic report on the region. The IMF expects potential GDP growth rates of 2.9%, 4.0% and 2.0% for Russia, Ukraine and Belarus respectively. The report also reveals information about the labor dynamics of the three countries. Munger summarizes the key findings believed to impact the potential GDP growth rate of the economies over the next 5 years.

Exhibit 2

* The intelligentsia and professionals who fled Russia to the West Europe due to the military draft are unlikely to return over the next decade.
* The labor force of Russia has been significantly affected by the casualties suffered during the war comprising mostly of enlisted youth between the ages of 18 – 35 years.
* Ukraine has an extensive welfare program with a particular focus on improving the livelihood of rural women through the support from US and Western Europe.
* The government of Ukraine has offered unconditional amnesty to the rebel youth groups involved in the conflict and hopes to employ them in the large-scale infrastructure reconstruction projects.

Three days later, during the annual shareholders meeting, Warren Buffett, the chairman and CEO of Berkshire Hathaway, applies the Grinold–Kroner decomposition to estimate the expected equity returns for the various markets under consideration. Buffet makes the following statements:

Statement 1: Dilution effects tend to focus on both net buybacks and the relative dynamism of the economy.

Statement 2: Earnings growth per share can be expressed as a function of real interest rate, real economic growth, and change in the number of shares traded in the market.

Statement 3: The primary impact of the repricing term is the volatility in the market's P/E ratio over market cycles.

1. Assuming that the actual GDP growth rates remain unchanged (refer to Exhibit 1) and based on the IMF's growth forecasts, which country is least likely to experience an increase in inflation over the next five years?

A. Russia.
B. Ukraine.
C. Belarus.

2. Over time, the dividend yield of Ukraine tends to be:

A. stable.
B. rising.
C. decreasing.

3. Based upon Munger's observations in Exhibit 2, growth rate of potential GDP over the next five years is most likely to be:

A. higher for Russia, lower for Ukraine.
B. higher for Ukraine, lower for Russia.
C. lower for both Country.

4. Which of the following statements made by Buffett is incorrect?

A. Statement 1.
B. Statement 2.
C. Statement 3.

Case 11: Yao Min

Yao Ming is the chief economist at an investment management firm. He is entrusted with the job of making economic forecasts on countries across the world.

Countries A and B

Yao compares the economic attributes of countries A and B, both located in Europe. He finds that Country A has a much higher per capita GDP than does Country B. Also, Country A has a very high capital-to-labor ratio. However, GDP growth is much faster in Country B relative to Country A.

Country C

Country C is in Central Asia and has the following attributes: Its elasticity of output to capital is 0.2, its annual growth in capital is 2%, and its annual growth in labor is 3%. The annual rate of technological change for Country C is estimated at 2%. Yao forecasts the potential GDP growth for Country C using this information.

Yao believes that if Country C were to adopt a more open trade policy, it would result in increased competition from foreign companies and force less efficient domestic companies to exit and the more efficient ones to innovate, raising the efficiency of the overall national economy.

Countries D and E

Finally, Yao analyzes two low-income countries in Africa with differing levels of per capita output, Country D and Country E. He believes that Country D will eventually catch up with Country E in terms of its per capita output as a result of the countries having the same saving rate, population growth rate, and production function.

1. Relative to Country B, Country A would most likely achieve the greatest increase in its per capita GDP by:

A. attracting foreign capital investment.
B. investing in technological development.
C. developing financial markets and intermediaries.

2. Based on the growth accounting equation, the potential GDP growth of Country C is closest to:

A. 2.8%.
B. 4.8%.
C. 5.4%.

3. Regarding Country C's potential benefit from a more open trade policy, Yao is most likely referring to a:

A. scale effect.

B. selection effect.

C. backwardness effect.

4. With respect to countries D and E, which type of convergence is Yao most likely referring to?

A. Club convergence

B. Absolute convergence

C. Conditional convergence

3. Financial Statement Analysis

Case 1: AdOre

Albert Strong, a junior metals analyst at Goodson Funds, was reviewing the history of AdOre Ventures, a Peruvian gold mining company. Cupernico, Inc., Strawberry Mines Corp., and Glace, S.A., were global gold mining companies. Cupernico and Strawberry were both headquartered in the United States and complied with US GAAP. Glace was a French company that followed International Financial Reporting Standards (IFRS). All companies' fiscal years ended on 31 December.

On 1 January 2011, the three companies combined their Peruvian operations into a separate company, AdOre Ventures. The fair value of assets contributed by each company was in proportion to its ownership interest as shown in Exhibit 1. Cupernico was considered to have control over AdOre because of its ownership interest and representation on AdOre's board of directors. Both Strawberry Mines and Glace were considered to have significant influence. At the time the operations were combined, the fair value of each company's assets was equal to their respective reported (book) values.

Exhibit 1: AdOre Ownership Structure		
Cupernico: 50%	Strawberry Mines: 32%	Glace: 18%

On 1 January 2012, Glace acquired Strawberry Mines. Given AdOre's relatively brief operating history, Glace determined that the fair value of assets remained equal to the value at which they were carried on AdOre's books. Because the merger left Glace and Cupernico with equal economic interests in AdOre, the two companies negotiated a joint control agreement.

Selected financial data related to AdOre is presented in Exhibit 2. Because gold prices are set globally in US dollars, AdOre's functional currency is the US dollar.

Exhibit 2: Selected Financial Results for AdOre		
($ thousands)	2012	2011
Revenue	103,448	63,546
Net income	30,000	18,182

Strong wondered how the 2012 merger might have affected Cupernico's financial statements and ratios. He compared its actual ratios with what they would have been had the merger not taken place.

On 1 January 2013, anticipating much higher gold prices in the future, Kinkaid Gold purchased 80% of AdOre's shares in exchange for its own shares. Kinkaid Gold complies with IFRS. Details of the acquisition are shown in Exhibit 3.

Exhibit 3: Details of Acquisition of AdOre by Kinkaid Gold, 1 January 2013	
Percent of shares acquired	80%
Consideration paid ($ thousands)	$50,000
Fair value of AdOre's net assets ($ thousands)	$68,000
Fair value of AdOre's identifiable net assets ($ thousands)	$60,000
Book value of AdOre's net assets ($ thousands)	$61,378
Note: The difference between the fair value and book value of AdOre's net assets is because of its inventory being understated as well as a patent for a new gold extraction technique for low-grade	

ores.

1. For the year 2011, the most appropriate method for Glace to use to account for its investment in AdOre was:

A. FVPL.
B. The equity method.
C. The acquisition method.

2. Based on exhibit 1 and exhibit 2, the profits attributes to minority shareholders on I/S sheet of Cupernico resulting from investing AdOre during 2012 is closed to :

A. $15,000.
B. $13,200.
C. $12,618.

3. The best conclusion can make about the effect of the fact that Cupernico change consoidation method to equity method is:

A. Lower return on assets (ROA).
B. Lower net profit margin.
C. Higher return on equity (ROE).

4. The value difference of using full goodwill and parital goodwill recognized by Kinkaid Gold in its 2013 acquisition of AdOre is closest to (in $ thousands):

A. 500.
B. 600.
C. 300.

Case 2: Engineered Packaging, Inc.

Engineered Packaging, Inc., (EPI) is a manufacturer of industrial and consumer packaging products. The company's products include composite and plastic rigid packaging, flexible packaging, as well as metal and plastic ends and closures. In January 2018, EPI entered into a joint venture with BMI Enterprises. EPI contributed ownership of five plants, while BMI contributed a new manufacturing technology. The joint venture is known as EP/BM LLC. EPI owns 50% of EP/BM LLC and uses the equity method to account for its investment. The following information for 2018 is provided:

In Millions, Year-End 2018	EPI	EP/BM LLC
Revenue	$3,115	$421
Cost of goods sold	$2,580	$295
SG&A	$316	$50
Interest expense	$47	$8
Equity in earnings of EP/BM	$22	
Pretax income	$194	$68
Income tax	$60	$24
Net income	$134	$44
In Millions, December 31, 2018		
Assets		
Cash	$118	$13
Accounts receivable	$390	$50
Inventory	$314	$41
Property	$1,007	$131
Investment	$38	
Total	$1,867	$235
Liabilities and Equity		
Accounts payable	$274	$35
Long-term debt	$719	$125
Equity	$874	$75
Total	$1,867	$235

1. Had EPI used the proportionate consolidation method instead of the equity method to account for its investment, which of the following statements is the most accurate?

A. Net profit margin would be the same.
B. Return on assets would be the same.
C. Return on equity would be the same.

2. Had EPI used the acquisition method instead of the equity method to account for its investment, EPI's long-term debt-to-equity ratio would have been:

A. higher.
B. lower.
C. the same.

3. For this question only, assume that EP/BM LLC sold inventory to EPI for $50 million during

2018. Of that inventory, $20 million was unsold at the end of the year. Compared to the equity method, the acquisition method would result in:

A. higher net income.
B. higher ending inventory.
C. lower net income.

4. For this question only, assume that EPI accounts for its investment in EP/BM LLC using the acquisition method with partial goodwill. As compared to the acquisition method, the return on ending equity under proportionate consolidation will most likely be:

A. lower.
B. the same.
C. higher.

Case 3: Jim Loris

Jim Loris is the Food and Beverage analyst at Eastern Trust & Investments. Jeremy Paul is an intern under Loris's supervision. Loris is planning to review the financial statements of Atlantic Preserves, Inc., in the next few days. The company has recently signed a new collective agreement with its workers, and Loris is interested in seeing how the company's employment costs have been affected. The company prepares its financial statements in accordance with US GAAP, and the new collective agreement became effective 1 January 2014.

Paul extracts portions of the new collective agreement related to the pension plan and mentions to Loris that there have been two changes related to the plan:

The benefit formula has been changed to 1.75% × Final year's salary × Number of years of service under the plan. Previously, the same formula was used, but with a factor of 1.65%.

The vesting period has been changed from four years to three years.

Paul makes the following two comments about these changes to the pension plan:

1. The new formula will have a big impact on income because the past service costs that arise will be expensed immediately.
2. The change to a shorter vesting period will give rise to an actuarial gain.

Loris responds: "The past service costs that arise will be reported in other comprehensive income and amortized on the profit and loss statement over the average service lives of the employees." Loris provides Paul with the information in Exhibit 1 about John Smith, an employee who has just started working for Atlantic and had six years until retirement, and other information taken from the company's pension plan disclosures. Loris asks Paul to calculate the pension liability arising from Smith.

Exhibit 1: Assumptions Relating to the Liability Arising from John Smith's Pension	
Estimated final salary	$71,261
Discount rate	7.50%
Estimated years in retirement	25
Annual payments are paid at year end and continue for the remainder of the retiree's life	

Following his calculation of the pension plan liability, Paul asks Loris two questions about the discount rate that is used:

1. Exhibit 1 does not mention how you determined the discount rate that was used. What rate is the most appropriate rate to use?
2. What would be the effect of using a higher discount rate on various components of the company's pension plan obligation?

1. In regard to Loris and Paul's discussion about the changes in the pension plan arising from the new collective agreement, which comment is most accurate?

A. Paul's first comment about the impact on income
B. Loris's response about past service costs
C. Paul's second comment about the actuarial gain

2. At the end of Smith's second year of service, the estimated defined-benefit obligation arising from his employment is closest to:

A. $20,092.

B. $27,802.
C. $20,818.

3. The best answer to Paul's first question is to use the:
A. company's before-tax cost of debt.
B. yield on high quality corporate bonds.
C. company's overall cost of capital.

4. The least appropriate answer to Paul's second question is that the:
A. interest cost may either increase or decrease.
B. opening obligation would decrease.
C. current service cost would increase.

Case 4: GF Co. Ltd

GF Co. Ltd is an US-based manufacturing company that reports under US GAAP. The company disclosed the following information in one of its financial statements' footnotes titled "Share-Based Compensation."

Under its Share Incentive Plan, GF grants restricted stock units ("RSUs") to its employees of up to 57,000,000 ordinary shares. RSUs vest 30% on the first anniversary year from the grant date and the remaining 70% vest in 8 substantially equal quarterly instalments. RSU activity for the two years ended 31 December 20X3 was as follows.

	Number of Shares	Weighted Average Grant Date Fair Value per Share (USD)
Unvested at 31 December 20X1	3,953,875	11.33
Granted	7,302,177	19.07
Vested and settled	-1,011,095	12.57
Forfeited	-651,333	15.13
Unvested at 31 December 20X2	9,593,624	17.23
Granted	6,089,111	25.19
Vested and settled	-2,315,799	18.25
Forfeited	-895,147	21.45
Unvested at 31 December 20X3	12,471,789	20.21

Share-based compensation expense for RSUs is measured based on the fair value of GF's ordinary shares on the date of grant. GF accounts for forfeitures as they occur. Unrecognized share-based compensation expense as of 31 December 20X1, 20X2, and 20X3 was USD 44.8 million, USD 165.3 million, and USD 252.1 million, respectively.

1. The amount recognized as operating expense on GF's income statement related to its Share-Based Compensation for the year ended 31 December 20X3 is closest to:

A. USD 23.06 million
B. USD 42.26 million
C. USD 61.46 million

2. The increase in GF's basic shares outstanding in the year ended 31 December 20X3 from its Share-Based Compensation is closest to:

A. 1,420,652
B. 2,315,799
C. 6,089,111

3. If GF reported under IFRS instead of US GAAP, its effective tax rate would likely be:

A. higher
B. lower

C. the same

4. GF reported basic shares outstanding of 251,000,000 and positive net income on its income statement for the year ended 31 December 20X3. Besides unvested RSUs, GF had no other potentially dilutive securities outstanding. Assuming an average share price of USD 17.5 for the year, diluted shares outstanding for the year ended 31 December 20X3 is closest to:

A. 226,602,497
B. 251,546,075
C. 275,397,503

5. An analyst is developing a financial statement model for GF and projects share-based compensation expense to be 15% of revenues next fiscal year. Based on the following assumptions, the analyst's estimated basic share count for GF will increase by how many shares next fiscal year?
   - Revenues FY20X4E = USD 465 million
   - Weighted-average grant-date fair value per share of vesting RSUs = 32.33
   - Forfeitures = 0 shares (the analyst's share-based compensation expense is net of forfeitures).

A. 1.59 million
B. 21.6 million
C. 2.16 million

Case 5: Foster Corporation

Foster Corporation ("Foster") is a Europe-based company that designs, makes, and sells clothing. Foster pays bonuses to employees in management and designing roles in shares in order to motivate and retain employees, as well as improve liquidity.

Under its Share-based Compensation Plan, Foster grants 15 million stock options to executives on 1 January 20X0 that vest over 3 years. The options are granted at the money. The share price and fair value per option on the grant date are EUR 500 and EUR 125, respectively. The options expire seven years after the grant date.

1. The share-based compensation expense to be recognised by Foster on the income statement for the year ended31 December 20X1 will be closest to:

A. 625 million
B. 1,875 million
C. 2,500 million

2. The offsetting entry of the share-based compensation expense is made to:

A. share-based compensation liability on the balance sheet
B. share-based compensation reserve in equity on the balance sheet
C. cash on the balance sheet

3. What will be the effect on the financial statements for the year ended 31 December 20X3 if the share price remains below EUR 500 that year?

A. The balance sheet will be impacted only
B. The income statement will not be impacted only
C. There is no financial statement impact

4. In 20X4, the share price increases to EUR 550 and 5 million options are exercised. Which of the following is least likely the effect on the financial statements that year?

A. The entry made to the share-based compensation reserve account is transferred to paid-in capital on the balance sheet.
B. A cash inflow in operating activities will be recognized.
C. A cash inflow in financing activities will be recognized.

Case 6: WMC

Gary Smith, CFA, has been hired to analyze a specialty tool and machinery manufacturer, Whitmore Corporation (WMC). WMC is a leading producer of specialty machinery in the United States. At the end of 2014, WMC purchased York Tool Company (YTC), an Australian firm in a similar line of business. YTC has partially integrated its marketing functions within WMC but still maintains control of its operations and secures its own financing. Following is a summary of the income statement and balance sheet for YTC (in millions of Australian dollars - AUD) for the past three years as well as exchange rate data over the same period.

Income Statement *(AUD millions)*	2014	2015	2016
Revenues	**765**	**820**	**870**
COGS	**484**	**520**	**580**
SG&A	**171**	**183**	**200**
Depreciation expense	**50**	**50**	**50**
Interest expense	**18**	**17**	**16**
Income before tax	**42**	**50**	**24**
Taxes	**21**	**25**	**12**
Net income	21	25	12

Balance Sheet (*AUD millions*)

	2014	2015	2016		2014	2015	2016
Cash	**22**	**25**	**20**	Current liabilities	**616**	**593**	**584**
Accounts receivable	**400**	**422**	**460**	Long-term debt	**180**	**170**	**160**
Inventories	**20**	**25**	**30**				
Prepaid expenses	**8**	**20**	**25**	Common stock	**50**	**50**	**50**
Net Fixed assets	**500**	**450**	**400**	Retained earnings	**104**	**129**	**141**
Total assets	**950**	**942**	**935**	Total liabilities & equity	**950**	**942**	**935**

Exchange rates (AUD / USD)	**2014**	**2015**	**2016**
Average exchange rate	1.40	1.30	1.45
Year-end exchange rate	1.20	1.40	1.50
Historical exchange rate	1.20	1.20	1.20

Smith has discovered that WMC has a small subsidiary in Ukraine. The subsidiary follows IAS accounting rules and uses FIFO inventory accounting. The Ukrainian subsidiary was acquired ten

years ago and has been fully integrated into WMC's operations. WMC obtains funding for the subsidiary whenever the company finds profitable investments within Ukraine or surrounding countries. According to forecasts from economists, the Ukrainian currency is expected to depreciate relative to the U.S. dollar over the next few years. Local currency prices are forecasted to remain stable, however.

One of the managers at WMC asks Smith to analyze a third subsidiary located in India. The manager has explained that real interest rates in India over the past three years have been 2.00%, 2.50%, and 3.00%, respectively, while nominal interest rates have been 34.64%, 29.15%, and 25.66%, respectively. Smith requests more time to analyze the Indian subsidiary.

1. Calculate the percent change in YTC net income shown on the WMC financial statements from 2015 to 2016.

A. -52.0%.
B. -55.2%.
C. -56.9%.

2. If WMC uses the temporal method, YTC's net monetary liabilities leave WMC exposed to loss in the event of:

A. Currency (AUD) depreciation.
B. Currency (AUD) appreciation.
C. Either currency depreciation or currency appreciation.

3. Determine whether the translated total asset turnover for YTC for 2016 would be higher under the current rate method or under the temporal method.

A. Temporal method.
B. Current rate method.
C. No difference between temporal and current rate methods.

4. For the period 2014-2016, WMC's annual USD revenue growth rate attributable to its Australian subsidiary is *most likely:*

A. 1.85% lower than the local currency revenue growth rate.
B. 3.62% higher than the local currency revenue growth rate.
C. 3.45% lower than the local currency revenue growth rate.

5. Which of the following statements regarding the consolidation of WMC's Ukrainian subsidiary for the next year is *least likely* correct? Compared to the temporal method, the Ukrainian subsidiary's translated:

A. Net income before translation gains or losses would be higher using the current rate method.
B. Debt-to-equity ratio would be higher using the current rate method.
C. Gross profit margin would be lower using the current rate method.

6. Which of the following statements related to the consolidation of WMC's Indian subsidiary is *least likely* correct?

A. The Indian economic environment meets the criteria to be classified as a hyperinflationary

economy.

B. IFRS would allow WMC to translate the inflation-indexed value of nonmonetary assets of the Indian subsidiary at the current exchange rate.

C. WMC can reduce potential translation losses from the Indian subsidiary by issuing debt denominated in U.S. currency and purchasing fixed assets for the subsidiary.

Case 7: Ali Saminder

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 JJI ('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 JJK's approach to calculating regulatory capital. Extracts 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 notes that the convertible bond is 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 that trends if any were actual cause for concern. The trends included in the documents are shown in Exhibit 2.

Exhibit 2: Internal Memo——Three-Year Trends			
$m	20X5	20X6	20X7
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			

1. 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 is accurate.

2. Using forecasted data explicit targets given Exhibit 1, Saminder is *most likely* to conclude that JJK Holdings would:
A. meet its targeted tier 1 ratio total capital ratio.
B. meet its targeted 1 ratio not its targeted total capital.
C. fail to meet either target.

3. 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.

4. Using the data in Exhibit 2, 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.

Case 8: Robert

Robert is preparing a research report on LA, a listed company based in China and compliant with IFRS 9. As part of the analysis, Robert collected financial statement data from the 20X0 annual report. Robert is concerned about the impact of this information on future earnings. As part of the research, Robert is considering the possible impact of LA's fixed income investment accounting classification on the reported income. (All securities were acquired at par value)

Exhibit 1: Financial statement data (¥ Thousands)			
Company	A	B	C
Classification	FVPL	FVOCI	Amortized cost
Cost	50	80	100
Market value, 31 December 20X9	58	76	108
Market value, 31 December 20X0	56	74	110

Robert informs Bevan of a final piece of information relevant to his evaluation. To increase liquidity, LA is considering borrowing €70M against accounts receivable. As an alternative to borrowing, they could securitize the receivables by creating a special purpose entity (SPE) over which they would exercise control. To do so, they would invest €5M in the SPE. The SPE would then borrow €70M, and would buy €75M in receivables from LA. Robert comments that securitization using an SPE would impact LA's reported financial condition in three ways. It would:

1. reduce the cost of borrowing.
2. increase the level of current assets.
3. improve balance sheet ratios.

The STI's finance committee is next on the agenda to review retirement benefits funding and make recommendations to the board. STI's three retirement benefit plans are described as follows:

Plan A

Benefit: Annual payments for life equal to 1% of the employee's final salary for each year of service beyond the date of the plan's establishment. The employer makes regular contributions to the plan in order to meet the future obligation.

Plan B

Benefit: Discretionary retirement withdrawals; amounts depend on the plan's investment performance. Employer makes its agreed-upon contribution to the plan on behalf of the employee in the same period during which the employee provides the service.

Plan C

Benefit: Medical, prescription drug, and dental coverage for the retiree, spouse, and dependents under age 18. Available to all employees on day one of service.

STI offers employees a defined benefit pension plan and stock options as part of its compensation package. Alexander Graham Bell is particularly interested in whether the discretionary assumptions the company is making regarding compensation plans are contributing to the recent earnings growth at STI. He gathers information from the company's regulatory filings regarding the assumptions related to option valuation.

	20X9	20X8	20X7
Risk-free rate	4.4%	3.6%	2.2%
Expected life	4.8	4.3	4.8
Dividend yield	1.0%	0.0%	0.0%
Expected volatility	27%	29%	32%

1. The balance sheet carrying value of Robert's investment portfolio (in ¥ Thousands) at 31 December 20X0 is closest to:

A. 224.
B. 230.
C. 236.

2. The balance sheet carrying value of Robert's investment portfolio (in ¥ Thousands) at 31 December 20X0 would have been higher if which of the securities had been reclassified as FVPL security?

A. A.
B. B.
C. C.

3. If LA creates a special purpose entity rather than borrowing against its receivables, which of Robert' comments is most accurate? Comment:

A. 1
B. 2
C. 3

4. The participant bears the greatest amount of investment risk under which plan?

A. Plan A
B. Plan B
C. Plan C

5. Compared to the reported 20X9 financial statements, if STI had used the 20X7 volatility assumption to value its employee stock options, it would have most likely reported higher:

A. net income.
B. compensation expense.
C. deferred compensation liability.

6. Compared to the assumptions STI used to value stock options in 20X8, earnings in 20X9 were most favorably affected by the change in the:

A. expected life.
B. risk-free rate.
C. dividend yield.

Case 9: John Wesley

John Wesley is an analyst with an international bank. He analyzes SA, a multinational corporation, for a client presentation. SA complies with IFRS, and its presentation currency is the Norvoltian krone (NVK). SA's two subsidiaries, Ngcorp and Cendaró, have different functional currencies: Ngcorp uses the Bindiar franc (₣B) and Cendaró uses the Crenland guinea (CRG).

SA imports inventory from Bindiar under 45-day credit terms, and the payment is to be denominated in Bindiar francs. Wesley notes that SA purchased inventory on 1 June 2017 for ₣B27,000/ton. SA pays for the inventory on 15 July 2017. Exhibit 1 presents selected economic data for Bindiar and Crenland. The spot exchange rates of FB /NVK on June 1, 2017 and July 15, 2017 were 4.1779 ,4.1790.

To complete his assignment, Wesley analyzes selected information and notes from SA's 2017 and 2018 consolidated financial statements. (in NVK millions)

Exhibit 1		
Income statement	2018	2017
Revenue	1,069	1,034
Profit before tax	294	269
Income tax expense	-96	-94
Net profit	198	175
Reconciliation of Income Tax Expense		
Income tax at Ambleu's domestic tax rate	102	92
Effect of tax rates on non-domestic jurisdictions	-14	-9
Unrecognized current year tax losses	8	11
Income tax expense	96	94

In order to learn more knowledge of financial report, Wesley is also studying 2 cases of FRS.

Case 1: There is a Chinese company establishing a subsidary in Japan. This Japanese subsidary, applying IFRS, experience a hyperinflation situation during 2020. At the end of 2020, how does Chinese parent company consolidate its subsidary in Japan?

Case 2: The reconciliation between the statutory tax rate and effective tax rate for two companies (Amco and Bianco) for the year 2020 is provided below.

	Amco	**Bianco**
Statutory tax rate	25.0%	30.0%
Effect of disallowed expenses	3.0%	1.0%
Effect of exempt incom	(2.0%)	(0.5%)
Effect of taxes in foreign jurisdictions	3.4%	(1.2%)
Effect of recognition of prior losses	(0.8%)	(3.0%)
Effective tax rate	28.6%	26.3%

1. What is the foreign exchange gain resulting from Transaction on the 31 December 2017 financial statements?

A. NVK1.70 per ton

B. NVK90.75 per ton

C. NVK248.54 per ton

2. Based on Exhibit 1, the change in SA's consolidated income tax rate from 2017 to 2018 most likely resulted from a:

A. decrease in SA's domestic tax rate.
B. more profitable business mix in its subsidiaries.
C. stronger Norvoltian krone relative to the currencies of its subsidiaries.

3. Considering of case 1, which of following is correct?

A. Non-monetary items need to restate by inflation rate and use current rate to translate
B. Use T-method
C. Either A or B is correct

4. Considering of case 2, Which company benefit from the lowering of tax expense on account of its foreign operations.

A. Amco
B. Bianco
C. Can not tell

Case 10: Ardy Smith

Ardy Smith, CFA, is a new equity analyst at Better Capital. Smith is evaluating financial institutions and preparing a financial institution analysis report with her associate, Miller Sobhani. During the evaluation, Ardy finds there are many special features on financial institutions. Ardy writes down the following statements on her report:

Statement 1. The assets of banks are predominantly loans and securities. Compared to the tangible assets of non-financial companies, banks' assets have less exposure to risks.

Statement 2. Basel III specifies the minimum percentage of its risk-weighted assets that a bank must fund with equity capital. This minimum liquidity requirement ensures that a bank would have enough cash to cover a partial loss of funding sources.

Statement 3. We can use the CAMELS approach to evaluate banks, but it has some limitations. For example, it fails to address a bank's corporate culture and mission of banking entity.

Next, Ardy uses CAMELS approach to analyze banks and gathers some data of SL Bank showing in Exhibit 1. She wants to assess the capital adequacy of SL Bank.

Exhibit 1 SL Bank Capital Adequacy Evaluation		
Details of capital ratios (in millions)	2020	2019
Common equity tier 1 capital	216	217
Additional tier 1 capital	92	108
Tier 2 Capital	112	135
Total capital	420	450
Risk-weighted assets	4,000	4,500

Moreover, Ardy also wants to analyze the liquidity position of SL Bank. SL Bank has two operating entities, one is in the United States, and the other is in Japan. Ardy gathers the data shown in Exhibit 2.

Exhibit 2 SL Banks Liquidity Measures				
	LCR		NSFR	
Operating entities	2020(%)	2019(%)	2020(%)	2019(%)
SL Bank USA	110	93	135	119
SL Bank Japan	189	121	56	49

Ardy discusses the liquidity position of two operating entities of SL Bank with her coworker, Miller. Ardy says that "compared with SL Bank Japan, SL Bank USA has higher level of liquid assets relative to its one-month liquidity needs in a stress scenario in 2020".

Miller puts that "compared with SL Bank Japan, SL Bank USA has more stable funding relative to its required need for stable funding." Ardy follows that "but SL Bank Japan has already meet Basel III target on the stable funding requirement."

After evaluating SL Bank by using the CAMELS approach. Ardy turns her attention to insurance companies. At the beginning of insurance company analysis report, Ardy notes the following differences between P&C and L&H insurance companies:

Difference 1. P&C insurers' policies are usually short term, whereas L&H insurer's policies are usually longer term.

Difference 2. Compared with P&C insurers, L&H insurers often have higher capital requirements following the risk-based global insurance capital standard and seek higher return by investing in riskier securities.

Ardy and Miller want to review key performance ratios for the top three P&C insurers in the industry. The ratios are presented in Exhibit 3.

Exhibit 3 Key Performance Ratios for Top Three P&C Insurers			
	Insurer A	Insurer B	Insurer C
Loss and loss adjustment expense ratio	56%	75%	59%
Underwriting expense ratio	52%	37%	39%
Combined ratio	108%	112%	98%
Dicidents to policy ratio	2%	11%	2%
Combined ratio after dividents	110%	123%	100%

After gathering the data, Ardy analyzes the top three P&C insurers in terms of the quality of underwriting activities, the efficiency of obtaining new premiums and the liquidity of insurers.
In order to study more knowledge about for bank system, Ardy gathered some information about Judith Bank, showing in Exhibit 4.

Exhibit 4 Judith Bank			
	2020	2019	2018
Allowance for loan losses to net charge-off	1.6	1.2	1.1
Provision for loan losses to net charge-off	2.3	2.1	1.9

Ardy sumed up the following conclusion:

Conclusion 1: A loan loss provision is an income statement expense set aside to allow for uncollected loans and loan payments.

Conclusion 2: From 2018 to 2020, Judith Bank become more aggresive in its allowance for loan losses.

Conclusion 3: Net charge-off is a lender's gross charge-offs less recoveries of its delinquent debt.

1. Regarding the statements Ardy writes down on her report, which one is most likely correct?

A. Statement 1
B. Statement 2
C. Statement 3

2. Based on exhibit 1, which is the primary reason for change in SL Bank's capital ratios in 2020?

A. Increase in common equity tier 1 capital.
B. Increase in total tier 1 capital.
C. Decrease in risk-weighted assets.

3. Based on exhibit 2, which of following statements with regard to liquidity measures is most likely correct?

A. Ardy's statement on liquidity needs
B. Ardy's statement on Basel III stable funding requirement
C. Miller's statement on stable funding

4. Which of the differences between P&C insurers and L&H insurers noted by Ardy is most likely correct?

A. Difference 1

B. Difference 2
C. None of them.

5. Based on exhibit 3, Ardy should conclude that:
A. insurer A is most efficient in obtaining new premiums.
B. insurer B has the greatest success in estimating insured risks.
C. the combined ratio is the sum of loss and loss adjustment expense ratio and underwriting expense ratio.

6. How many conclusions that Ardy made for Judith Bank are correct?
A. 1
B. 2
C. 0

Case 11: Timothée Chalamet

Timothée Chalamet, head of research at Atreides Capital, is conducting a training session with Frank Miller and Doris Carter, two newly-hired analysts at the firm.

Chalamet tells the analysts to assess HQ Telecom, a communication and information technology company, in order to evaluate their ability to conduct industry and company analysis. Chalamet provides them with the following financial information presented in Exhibit 1.

Exhibit 1: HQ Telecom Selected Financial Information (in € millions)			
	2014	**2015**	**2016**
Net sales	30.6	33	35.5
Cost of sales	11.9	12	12.5
Gross profit	18.7	21	23
SG&A expenses	12.6	14.7	16.4
Operating income	6.1	6.3	6.6
Interest expense	0.3	0.5	0.4
Income before taxes	5.8	5.9	6.2
Net income	3.9	4	4.2

Chalamet assigns the analysts to forecast the 2017 income statement for HQ Telecom and to mention the key assumptions used in their analysis. Both the analysts are also instructed to incorporate Atreides' economic growth outlook for 2017 in their evaluation. Atreides' research department forecasts nominal GDP growth of 3.2%, based on expectations of real GDP growth of 1.5% and inflation of 1.7%.

Miller and Carter decide to conduct a scenario analysis based on three different sets of assumptions summarized in Exhibit 2. They provide Chalamet with their forecasts and assumptions for her review and approval. Chalamet prepares to question them before selecting the final projections.

Exhibit 2: Key Assumptions used in the Scenario Analysis of HQ 2017 Net Income Forecasts			
Metric	**Scenario 1**	**Scenario 2**	**Scenario 3**
Net sales	Net sales growth rate: average annual growth rate of net sales over 2014 – 2016 period.	HQ will grow at the nominal GDP rate plus 1 percentage point due to an increase in market share. Industry growth rate will be the same as the nominal GDP rate.	Net sales will grow at 75 basis points lower than the nominal GDP rate.
Cost of sales	2017 gross margin = average annual gross margin over 2014 – 2016 period.	2017 gross margin will fall with increase in input costs due to increase in expected inflation	2017 gross margin = 2016 gross margin plus 15 basis points.
SG&A	2017 SG&A/net sales ratio = average ratio over 2014-2016 period.	2017 SG& A growth rate = same as the inflation rate	2017 SG&A/net sales = 2016 ratio plus 10 basis points.

Interest expense	2017 interest expense rate= average interest expense over 2014-2016 /average gross debt over 2014-2016 period.	2017 interest expense = 2016 interest expense.	2017 interest expense rate = effective interest rate of 2016.
Income taxes	2017 effective tax rate = 2016 rate.	2017 tax rate = statutory tax rate.	2017 effective tax rate = average effective tax rate over 2014-2016 period.

As a regular practice, Miller and Carter takes note of their forecasts and later compares them to the actual numbers. This gives them an idea of how accurate their projections are.

1. Based on Exhibits 1 and 2, the scenario 3 forecast for 2017 cost of sales (in € millions) is closest to:

A. 36
B. 13
C. 24

2. Based on Exhibit 2, the forecasted interest expense least likely to reflect changes in HQ's debt level will be under:

A. Scenario 1
B. Scenario 2
C. Scenario 3

3. The balance sheet accounts that can be most reliably forecasted from the income statement are:

A. property plant and equipment.
B. net debt.
C. inventory.

4. By comparing their forecasts to the actual numbers, Miller and Carter are most likely attempting to mitigate which of the following biases?

A. Confirmation bias
B. Illusion of control
C. Overconfidence bias

Case 12: Samuel Warren

Samuel Warren, an analyst at Dorset Investments, is developing sales and expense forecasts of Chesston Chemicals. She collects financial data on Chesston given in the table below.

Income statement	2016 ($ millions)
Sales	9,925
Cost of goods sold (COGS)	5,955
Gross profit	3,970
Selling expenses	2,084
General and administrative expenses (G&A)	350
Depreciation and amortization expenses (D&A)	300
Operating profit	1,236
Interest expense	98
Earnings before taxes (EBT)	1,138
Income taxes (34%)	387
Net profit	751
Average balance sheet items	
Total assets	8,270
Net debt	1,640
Total liabilities	4,570
Total equity	3,700

Using 2016 as the base year, the analyst expects:

- 2017 global GDP growth rate to be at 4.0%
- sales to grow 2% faster than projected nominal global GDP growth
- cost of goods sold ratio to decline 0.55% annually
- selling expenses to remain stable as a percentage of sales
- general and administrative and depreciation and amortization expenses to be fixed
- net debt to decline by USD140 million in 2017

Warren then focuses her attention on another company, Universe Plc. Universe operates in Countries X and Y. The tax rate in Country X is 50%, and the tax rate in Country Y is 20%. Universe generates an equal amount of profit before tax in each country in its first year. Relevant data is given below:

(in € millions)	X	Y	Total
Profit before tax	200	200	400
Effective tax rate	50%	20%	35%
Tax	100	40	140
Net Profit	100	160	260

Warren conducts the smartphone industry analysis using Porter's five forces framework. Excerpts from his analysis are given below (Mainly analyzed one of the companies, HWC):

- Customer switching costs are low.
- HWC holds 21% of world market share; its two main competitors hold 12.5%, and 10.0% respectively.
- A high number of equipment suppliers. Intense competition among suppliers.
- Demand is highly sensitive to the economy.

- Large number of choices available.
- High capital requirement and advanced technologies' cost, customer loyalty towards existing brands, constant push to innovate and launch new products.

HWC's cost of goods sold for last year (2015) was 29% of sales. To forecast HWC's income statement for 2016, Warren assumes an inflation rate of 7% on the cost of goods sold. Warren's forecasts of HWC's price and volume changes are given below:

- Average price increase per unit is 4.00%
- Volume growth is negative 2.00%

1. Based on the data given above and Warren's sales and expense forecasts, Chesston's net profit estimate (in $ millions) for 2017 will be *closest* to:

A. 766.
B. 869.
C. 900.

2. Suppose the tax authorities in Country X allow some costs (e.g., accelerated depreciation) to be taken earlier for tax purposes. Country X, as a result, reports a 50% reduction in taxes paid in the current year but an increase in taxes paid by the same amount in the following year (and each year after that). Assume Country X has stable profit before tax and Country Y shows 12% annual before-tax-profit growth. The combined cash tax rate for the current and next three years is closest to:

A. 35%; 34.2%; 33.3%; 32.5%.
B. 22.5%; 34.2%; 33.3%; 32.5%.
C. 17.5%; 17%; 16.7%; 16.3%.

3. HWC's operating profit margins over the forecast period, given the current competitive environment, will least likely:

A. increase.
B. decrease.
C. stay the same.

4. HWC's 2016 gross profit margin based on the information given above, is closest to:

A. 72%.
B. 70%.
C. 71%.

4. Corporate Issuers

Case 1: Phillip Dunross

Phillip Dunross is the recently appointed chief executive officer of Tetra Corp, a local producer of recycled plastic bottles. Tetra Corp, though a well-established firm, has over the past few years been involved in many controversial managerial decisions and practices resulting in a significant drop in its share price. Consequently, Dunross has been hired to restore investor confidence. After assuming control, Dunross reviews the existing operations of Tetra Corp and schedules a meeting with the firm's chief financial officer, Frank Galt. During the meeting, the conversation turns towards the firm's dividend payout policy. Galt mentions that subsequent to meeting the firm's investment requirements, the remaining earnings are distributed to shareholders in the form of dividends.

Dunross is not convinced about the current dividend payout policy being the most suitable for Tetra Corp. His research reveals that, in the past, the management has overinvested in areas such as hotel services & real estate in which it had no past experience, resulting in failures and negative earnings to shareholders. Dunross also finds that the majority of these projects have been undertaken by the management as pet interests which may have been the reason behind the significant drop in Tetra Corp's share price. Hence, Dunross recommends a constant dividend payout ratio of 80% from the following year onwards.

Galt adds that tax ramifications must be taken into account when changing dividend payout policies, given Tetra Corp.'s diverse clientele. Under the current tax regime, the firm's earnings distributed as dividends are taxed at a lower rate of 12% at the corporate level than earnings that are retained. Dividends are also taxed as ordinary income at a rate of 20% at an individual level.

Dunross asks Galt about the projected investments for the coming year. In response, Galt presents Dunross with a summary of his budgeted estimates for the coming year shown in Exhibit 1:

Exhibit 1:

Budgeted estimates	USD million
Revenue	110
Earnings	30
Total capital budget	20
Total number of shares outstanding = 10 million	
Target debt to equity ratio = 30/70	

Dunross concludes the meeting by asking whether a share repurchase might be more beneficial than dividends, given Tetra Corp's current state of affairs. Galt responds:

Statement 1:

"Yes, a share repurchase has several advantages including potentially favorable tax treatment, lowering a firm's financial leverage and providing more managerial flexibility."

1. Dunross's analysis of share value and overinvestment by the management, is most likely explained by the:

A. Bird in the hand argument.
B. The signaling effect.
C. Jensen's free cash flow hypothesis.

2. Galt's description of the tax structure with respect to dividends most likely resembles a:

A. double taxation system.
B. dividend imputation system.
C. split-rate tax system.

3. Based on Exhibit 1, what will be next year's dividend per share given that the firm achieves its estimated earnings and adopts Dunross's suggestion of a constant dividend payout policy?

A. USD 2.40.
B. USD 2.11.
C. USD 1.69.

4. Based on Galt's comments in Statement 1, what is most likely NOT an advantage of share repurchases:

A. Give potential tax advantages.
B. Decrease financial leverage.
C. Provide managerial flexibility.

Case 2: Barbara Carlyle

Barbara Carlyle is a financial adviser to high-net-worth individuals. She is currently reviewing the analysts' reports. That includes information related to the financial statements of Avignon company.She notes the significant change in cash due to the high sales volume and wonders whether that will prompt a dividend increase. However, most analysts have stated that because the industry is cyclical, the increase in sales is believed to be temporary.

Carlyle asks her assistant, Richard Lee, to investigate whether Avignon might use its surplus cash for a share repurchase rather than for dividends. Lee believes that looking at other companies that have completed share repurchases could be helpful to his analysis. He looks at the history of SpeedyPro Inc. ("SpeedyPro"), a US-based industrial services company whose business depends heavily on the petroleum exploration and production sector. SpeedyPro made its first share repurchase in early 2017 using surplus cash. SpeedyPro's selected financial information just prior to the repurchase is shown in Exhibit 1.

Exhibit 1 SpeedyPro Inc. Financial Information as of Year-end 2016	
Net income	$124 million
EPS	$1.24
Shares outstanding	100 million
Details of share repurchase	
Cash available for repurchase	$836 million
Share price at time of repurchase	$38.00
Premium over current share price for repurchase	10.0%

Lee returns to Carlyle to continue the discussion. Carlyle explains to Lee that a complete analysis of the impact of a share repurchase should also include an evaluation of the effects on leverage. She points out that Avignon's most recent bond issue includes a covenant that limits the company's debt-to-equity ratio to 35%. She asks Lee to prepare an analysis for Avignon, using the information in Exhibit 2, to see if the debt covenant will be violated if the company repurchases shares.

Exhibit 2 Avignon Financial Information as of Year-end 2016	
Book value of equity	C$3,600 million
Shares outstanding	200 million
Cash available for repurchase	C$155 million
Debt-to-equity ratio	30.0%
After-tax cost of debt	5.0%

1. If the analysts' beliefs about the increase in sales are correct, the change in dividend policy that Avignon would most likely make would be to:

A. declare a special dividend.

B. increase the quarterly dividend amount.
C. cut the quarterly dividend in anticipation of next year's sales forecast.

2. If SpeedyPro had used all of its surplus cash to repurchase its shares, based on Exhibit 1, the percentage increase in EPS would have been closest to:
A. 10%.
B. 28%.
C. 25%.

3. Based on Exhibit 1, SpeedyPro most likely repurchased shares using:
A. a negotiated purchase agreement.
B. a fixed-price tender offer.
C. open market purchases.

4. The best answer to Carlyle's question about the potential violation of the debt covenants is that the covenant:
A. will be violated if Avignon uses debt to finance the repurchase.
B. will be violated if Avignon uses the surplus cash to finance the repurchase.
C. is not violated if Avignon repurchases shares.

Case 3: Carey Smith

Carey Smith, treasurer at Heavy Metal Inc., a manufacturer of industrial materials is considering either to use surplus cash or borrow funds to repurchase shares in the open market. Smith wants to know the effect on earnings per share from using each option given as follows:

Option I: The company uses the entire surplus cash of €20 million to repurchase shares at the market price.

Option II: The company borrows funds at the after-tax rate of 5.5% to repur-chase 500,000 shares of stock at the prevailing market price.

Heavy Metal Inc. has 20 million shares outstanding and earnings are €3.00 a share. The company's stock is trading at €40 a share.

Later, Smith's supervisor questions her about the type of dividend policy followed by LIN Inc., one of Heavy Metal Inc.'s competitors. LIN Inc. has been maintaining a dividend of US$ 1.50 for several years despite considerable variability in its earnings due to restructuring costs. Smith recalls from a recent report that he read on LIN Inc., that the company expects no long-term changes in its prospects.

1. If LIN Inc. chooses Option I, the earnings per share is closest to:

A. €2.90.

B. €3.10

C. €3.50

2. If Smith chooses Option II, the earnings per share will most likely:

A. remain the same.

B. decrease

C. increase

3. The most appropriate answer to the supervisor's question about the dividend policy followed by LIN Inc. is: LIN Inc. follows a

A. constant dividend payout ratio.

B. stable dividend policy.

C. neither constant dividend payout ratio nor stable dividend policy.

Case 4: Ouse Inc.

Ouse Inc., based in England, is a private company. Catherine Ferguson and her sister co-founded the company 10 years ago because of their shared interest in developing plant-based products that are not tested on animals. Initially the two sisters owned all the shares, but two years ago they implemented performance-based compensation for the top five senior managers, and as part of this process, the managers now own a combined 10% of the equity.

The company is looking to expand its equity base to help fund a new production facility and support growth plans. Ferguson, who is responsible for the company's financial management, is meeting with Haji Malik, a financial consultant, to explore Ouse's equity financing options. Ferguson asks if they were to go public, could they have a share structure similar to a company like Facebook, where the co-founders could retain voting control of the company through the issuance of multi-voting ordinary (common) shares.

Malik informs her that the dual class shares she has described are not permitted in the United Kingdom. He states that before Ouse considers going public, there are other options available. He suggests they look for private equity investment. He mentions being familiar with a private equity fund that runs a socially responsible investment (SRI) pool that could potentially be interested in Ouse. He says in order to qualify to be included in the SRI pool, a company needs to demonstrate positive attributes in all areas of ESG (environmental, social, and governance) considerations.

Ferguson is very interested in being associated with an SRI fund and asks how Ouse could qualify for the investment. Malik explains that the private equity fund he is thinking of uses data provided by the company and looks for other information from industry organizations, news reports, and environmental groups.

Ferguson explains to Malik that Ouse is implementing a new initiative to reduce the packaging associated with their products. The company will stock the majority of their products in bulk containers in their retail outlets. Customers will purchase refillable bottles, available in three different sizes, to be used for future purchases. This change will attract customers interested in reducing their plastic footprint. The company also expects the change to reduce shipping, packaging, and handling costs, both at the distribution centers and in the retail stores. The numerous individual bottles that would have been packaged for shipping and then unpacked and shelved at the stores will be replaced with larger bulk containers.

1. The change in ownership structure that occurred two years ago most likely addressed which of the following issues associated with family-owned businesses?

A. Poor transparency
B. Interlocking directorships
C. Ability to attract quality management

2. If Ouse were to go public with the share structure similar to Facebook that Ferguson asked

about, which governance issue would most likely arise?

A. Voting cap restrictions
B. Principal–agent problem
C. Principal–principal problem

3. Which of the following approaches to identifying a company's ESG factors best describes the one used by the private equity fund that Malik mentions?

A. ESG data providers
B. Proprietary methods
C. Not-for-profit initiatives

4. Analysts interested in incorporating ESG factors into their analysis will most likely adjust for the announcement of the changes arising from Ouse's new packaging initiative by:

A. increasing the risk premium.
B. increasing the company's fair value.
C. modifying only the qualitative ESG analysis.

Case 5: Lewis Hamilton

Lewis Hamilton is a junior analyst at Benz.Inc. Hamilton meets with his manager to discuss a possible investment in RedBull. Hamilton's manager tasks him with estimating RedBull's cost of debt and equity to arrive at WACC and related valuation. Exhibit 1 presents RedBull's current capital structure and selected information about each capital type.

Exhibit 1		
Capital Type	Current Capital Structure	Additional Information
Debt	30%	Single debt issue: 6% coupon rate; 1000 par value, remaining maturity of seven years; Semi-annualpayments. Straight unsecured debt; BBB credit rating; currently trading at a price of 950.
Preferred Equity	10%	Dividend rate of 6.5%, currently redeemable at par value of 1,000 per share Trades frequently; current share price is $870
Common Equity	60%	Actively Traded

Using the CAPM and the Fama–French five-factor (FF5) model, Hamilton estimates RedBull's cost of equity by regressing RedBull's excess returns on the relevant risk factors using the most recent 60 months of returns. Factor betas from the CAPM and the FF5 model, along with his estimated factor risk premiums, are shown in Exhibit 2. He decides to use the 10-year government benchmark rate of 2.5% as the risk-free proxy.

Exhibit 2		
Factor	Factor Beta	Risk Premium
CAPM Factor Beta and Risk Premium		
Market (ERP)	0.95	4.5%
FFM5 Factor Betas and Risk Premiums		
Market (ERP)	0.95	4.5%
Size (SMB)	0.35	1.5%
Value (HML)	0.13	3.5%
Profitability (RMW)	-0.17	2.9%
Investment (CMA)	0.25	3.1%

Hamilton also estimates RedBull's cost of equity using the BYPRP approach. For this estimate, he assumes a historical risk premium of 3.5% earned by equity investors relative to long-term corporate bond yields.

Jason Button, another analyst at Benz.Inc, has been asked to estimate the CRP for Indian Power Company headquartered in Country X that has 35% of its sales in Country Y. Button gathers the following information on Country X and Country Y:

Country	Sovereign country yield spread	Standard deviation of equity returns	Standard deviation of bond returns
X (Headquarters)	1.2%	1.7%	0.9%
Y (Local)	3.3%	3.7%	2.3%

1. Assuming tax rate of 30%, Palto's after tax cost of debt will be closest to:

A. 5.0%

B. 6.91%

C. 4.84%.

2. RedBull's cost of preferred equity is closest to:

A. 6.50%

B. 7.47%

C. 5.65%.

3. Which of the following may not be a reasonable estimate for the cost of common equity?

A. CAPM

B. FF5 model

C. BYPRP model

4. Based on the Damodaran model (CRP Model), the CRP that the analyst should use for the Indian Power Company would be closest to:

A. 2.1%

B. 3.38%

C. 1.18%.

Case 6: Fernando Alonso

Fernando Alonso, CFA, follows the automobile industry for Armigo Inc. Alonso has asked associate Sergio Perez to evaluate the cost of capital in two countries S and M. Perez collects the information shown in Exhibit 1.

Exhibit 1: Selected Information for Countries S and M		
Factor	**Country S**	**Country M**
Legal system	Common law	Civil law
Capital markets	Developed	Less developed
Volatility of currency value	low	high

Alonso is interested in estimating the cost of capital for automobile company: Aston Martin. Aston Martin is a large-cap company with a rich portfolio of successful racing cars. Exhibit 2 shows selected financial information relevant to Aston Martin.

Exhibit 2: Aston Martin, Selected Data ($ in millions)	
Net revenue	17,942
EBITDA	4,498
EBIT	3,421
Interest expense	814
Income tax	662
Net income	1,945
Total debt	8,671
Cash and cash equivalents	2,400
Stockholders' equity	17,342
Aston Martin's tax rate	34%

After analyzing hundreds of rated securities, Alonso arrives at a matrix for interest coverage (IC) ratios and financial leverage (D/E) ratios by rating class and credit spread relative to the benchmark security (currently yielding 2.3%) as shown in Exhibit 3.

Exhibit 3: Rating Classes, Ratios and Spreads (truncated)			
Rating class	IC	D/E	Spread
AAA	IC>10	D/E<25%	0.25%
AA	7<IC<10	25%<D/E<35%	0.5%
A	5<IC<7	35%<D/E<40%	0.8%
BBB	4<IC<5	40<%D/E<52%	1.2%
BB	3<IC<4	52<%D/E<60%	1.75%
B	2<IC<3	60<%D/E<67%	2.33%
CCC	1<IC<2	67%<D/E<75%	3.2%

While discussing the computation of the equity risk premium, Perez makes the following statements:

Statement 1: the arithmetic mean of historical values of the equity risk premium (ERP) provides the best estimate of terminal value of wealth if invested at ERP.

Statement 2: forward-looking estimated of the equity risk premium (ERP) do not suffer from survivorship bias and do not rely on the ERP being stationary.

Alonso obtains estimates of economic data for use in the calculation of ERP as shown in

Exhibit 4.

Exhibit 4	
Expected dividend yield	1.10%
Forecast P/E growth rate	-0.10%
Forecast real GDP growth	3%
10-year treasury yield	2.67%
10-year TIPS yield	0.33%

1. Based on the information in Exhibit 1, Perez should conclude that relative to Country S, Country M's cost of capital would be most likely be:

A. higher.

B. lower.

C. approximately the same.

2. Based on information provided in Exhibits 2 and 3 and elsewhere, the after-tax cost of debt for Aston Martin should be closest to:

A. 2.31%.

B. 3.50%.

C. 4.05%.

3. Which statements made by Perez regarding the equity risk premium are correct?

A. Statement 1 only.

B. Statement 2 only.

C. Neither statement is correct.

4. Using information in Exhibit 4, the estimate of equity risk premium (ERP) consistent with the Grinold-Kroner model is closest to:

A. 2.44%.

B. 3.44%.

C. 3.66%.

Case 7: Titan.Inc

Titan.Inc, is a German multinational hunting and fishing company. Titan's primary areas of business include fishing equipment, hunting products and high value safari service. The company is a component of Euro Stoxx 50 stock market index. Eren Jaeger, CFO and Levi Ackerman, CEO are discussing the fair acquisition price for Marley & Co., a company specializing in hunting gear business. Marley's stock is currently trading at €33 per share. Jaeger plans to estimate the acquisition price based on several approaches, and Ackerman agrees with him.

Jaeger guides Mikasa, CFA, one of Jaeger's assistants, to identify three recent takeover transactions which are similar to the acquisition of Marley under consideration. Mikasa finds three companies –Maria, Rose, and Sina– as the most recent takeovers. Jaeger believes that price-to-earnings, price-to-cash flows, and price-to-book value per share of these companies could be used to estimate the takeover value of Marley. Mikasa compiles the relevant data regarding the acquisition prices and the relevant variables which is presented in Exhibit 1.

Exhibit 1: Selected information of the three comparable companies & Marley				
Valuation Variables	Maria	Rose	Sina	Marley & Co.
Acquisition price (€)	47.00	25.00	54.00	
Stock price pre-takeover (€)	43.90	23.10	50.15	
Earnings/share (€)	2.55	1.75	3.06	2.01
Cash flow/share (€)	4.20	2.75	4.79	3.55
Book value/share (€)	16.19	7.80	11.81	10.67

Jaeger was also contemplating comparable company analysis with three similar companies including DSK, Ellergan, and Astral trading at enterprise value-to-EBITDA multiples of 19, 17, and 13, respectively. Marley is currently trading at an enterprise value of €601 million, or an EV/EBITDA multiple of 15.

During an internal meeting, Ackerman asks Jaeger the following questions regarding this approach:

Question 1: "What happens if the comparable companies are overvalued?"

Question 2: "Does this method provide a fair estimate of the takeover price?

1. Using data provided in Exhibit 1, an equally weighted estimate of takeover value for Marley is closest to:

A. €34.50

B. €38.00

C. €36.37

2. Which of the comparable transactions took place at the highest takeover premium?

A. Maria

B. Rose

C. Sina

3. Based on the peer median EV/EBITDA multiples, Marley's estimated enterprise value is closest to:

A. €681.19 million

B. €654.34 million

C. €601.0 million.

4. Regarding Ackerman's second question, the comparable company analysis does :

A. not provide an estimate of the fair stock price.

B. not provide the fair takeover price.

C. provide the fair takeover price.

5. Equity Valuation

Case 1: Arnaud Aims

Arnaud Aims is assisting with the analysis of several firms in the retail department store industry. Happy Shopping (HS) is one of the industry leaders whose shares are currently selling for $80, with TTM EPS and dividends per share of $1.2 and $0.72, respectively. The company's ROE is 20%, and the forward profit margin on sales is 10.0%. The Treasury bond rate is 4.5%, the equity risk premium is 6%, and HS's beta is 1.2.

Aims used a constant growth DDM to establish a justified P/E ratio based on forecasted fundamentals. One of his associates asked Aims whether he could easily establish a justified price-to-sales (P/S) ratio and price-to-book (P/B) ratio from his justified P/E ratio. Aims replied, "I could do this fairly easily. If I multiply the trailing P/E ratio times the net profit margin, the ratio of net income to sales, the result will be the P/S ratio. If I multiply the leading P/E ratio times the return on equity, the ratio of net income to beginning book value of equity, the result will be the P/B ratio."

Aims's associate likes to use the price-earnings-to-growth (PEG) ratio because it appears to address the effect of growth on the P/E ratio. For example, if a firm's P/E ratio is 20 and its forecasted 5-year growth rate is 10%, the PEG ratio is 2.0. The associate likes to invest in firms that have an above-industry- average PEG ratio. The associate also says that he likes to invest in firms whose leading P/E is greater than its trailing P/E. Aims tells the associate that he would like to further investigate these two investment criteria.

Finally, Aims makes two comments to his associate about valuation ratios based on EBITDA and on dividends.

Comment 1: EBITDA is a pre-interest-expense figure, so I prefer a ratio of total equity value to EBITDA over a ratio of enterprise value to EBITDA.

Comment 2: Dividend yields are useful information because they are one component of total return. However, they can be an incomplete measure of return, because investors trade off future earnings growth to receive higher current dividends.

1. Based on the forward-looking sales margin and current values of dividend payout, the justified P/S ratio of HS is closest to:

A. 1.62

B. 1.75

C. 1.08

2. Is Aims correct in describing how we could transform a justified P/E ratio into a P/S ratio or a P/B ratio?

A. Yes.

B. No. He is correct about the P/S ratio but incorrect about the P/B ratio.

C. No. He is correct about the P/B ratio but incorrect about the P/S ratio.

3. When Aims further investigates the two investment criteria (the PEG ratio and the comparison between the trailing and leading P/E ratio), should he find his colleague's use of them to be appropriate?

A. No.

B. The PEG ratio criterion is appropriate, but the P/E ratio criterion is not.

C. The P/E ratio criterion is appropriate, but the PEG ratio criterion is not.

4. Are Aims's two comments about the dividend yield and EBITDA ratios correct?

A. Yes.

B. No. The comment about EBITDA ratios is correct, but the comment about dividend yields is incorrect.

C. No. The comment about dividend yields is correct, but the comment about EBITDA ratios is incorrect.

Case 2: Mendosa

Miranda Mendosa, equity analyst at San Antonio Investment Research Group (SIRG), begins valuing Premier Riverboats, Inc. (PRBI), a thinly and infrequently traded stock on a regional stock exchange.

Because of the recent expansion and beautification of the San Antonio Riverwalk along with a substantial growth in tourism, PRBI has been experiencing double-digit growth rates in revenues and cash flows and high growth is expected to persist for 10 more years. Considering these facts, Mendosa decides to first determine PRBI's present value of growth opportunities (PVGO). Next, she estimates the value of its stock using the two-stage discounted dividend model. The data and estimates she has compiled for this purpose are in Exhibit 1.

Exhibit 1. PRBI's Data and Estimates for PVGO and two-stage Models

Required return on equity	12.40%
Weighted average cost of capital (WACC)	10.60%
Dividend payout ratio	60%
Most recent earnings per share	$5.33
Dividends and earnings growth rate over next 5 years (i.e., Years 1 to 5)	15.00%
Dividends and earnings growth rate after Year 5	6.00%
Current stock price	$70.00

Mendosa and Raman have a discussion about other approaches that might be appropriate for valuing PRBI's stock. They make the following statements:

Statement 1—Raman: Because PRBI's management is actively seeking opportunities to be acquired, the guideline public company method (GPCM) would be most appropriate. It establishes a value estimate based on pricing multiples derived from the acquisition of control of entire public or private companies. Specifically, it uses a multiple that relates to the sale of entire companies.

Statement 2—Mendosa: We could also value PRBI using the free cash flow to equity (FCFE) model. But in order to support its rapid growth, the company is expected to significantly increase its net borrowing every year for the next three to five years, and during those years, it could have a significant dampening effect on the company's FCFE and thus a lower value for its equity.

Statement 3—Raman: I agree. The residual income (RI) model, also called the "excess earnings method," does not have the same weakness as the FCFE approach because residual income is an estimate of the profit of the company after deducting the cost of all capital: debt and equity. Furthermore, it makes no assumptions about future earnings and the justified P/B is directly related to expect future residual income.

Raman collects additional data for valuing PBRI using the multistage RI model. For this model, he assumes an annual growth rate of 15% during the forecast horizon of 5 years (Years 1 to 5) and discounts the terminal year's residual income as a perpetuity. Other inputs are found in Exhibit 2.

Exhibit 2. Data for Residual Income Model

Most recent year's net income	$8.0 million	Cost of equity capital	12.40%
Interest expense	$1.2 million	WACC	10.60%
Beginning equity capital book value in the most recent year	$20.97 million	Tax rate	40%

1. Using the data in Exhibit 1, the estimate of PRBI's present value of growth opportunities (PVGO) is closest to:

A. $27.02.

B. $40.34.

C. $20.57.

2. Using the data in Exhibit 1, the estimate of PRBI's stock according to the two-stage discounted dividend model is closest to:

A. $73.20.

B. $76.57.

C. $66.74.

3. In regard to the discussion on other approaches between Mendosa and Raman, which of the following statements that they make is most accurate? Statement:

A. 1

B. 3

C. 2

4. Using the data in Exhibit 2, Raman's estimate of the contribution that the terminal value of the residual income stream in 5 years will contribute to the current value of equity is closest to:

A. $42.25.

B. $61.91.

C. $48.82.

Case 3: Amy Liu

Amy Liu, M&A analyst at BOD Investment, is evaluating Silk Inc., a small privately owned clothing company using the capitalized cash flow method (CCM). Liu takes the following steps:

First, estimating the required rate of return on equity using the build-up method.

Second, computing the firm's weighted average cost of capital (WACC). Since current market value of debt figures are not available, Liu uses the book values of debt assuming the total debt value in the capital structure to be optimal.

The following tables contain Silk Inc.'s recent year-end financial data and other inputs compiled by Liu.

Table 1	
Pre-tax cost of debt	9%
Total debt value weight in capital structure	25%
Tax rate	30%

Table 2:	
10-year government bond yield	4.7%
Beta of publicly traded firms in the fish farming industry	0.81
Equity risk premium	7.0%
Small stock risk premium	2.0%
Industry risk premium	-1.2%
Silk's company-specific risk premium	1.0%
Long-term growth rate after 2017	6.0%

Kevin Baker, a senior equity analyst, reviews Liu's analysis and based on a research report on industry peers suggests 12.3% as an estimate of Silk Inc.'s WACC. Liu uses this rate to calculate Silk Inc.'s equity value. Baker makes the following statements:

Statement 1: CCM is occasionally used for the valuation of large public companies, and rarely for valuing private companies, such as Silk Inc.

Statement 2: The excess earnings method is feasible for private company valuation because it provides an estimate of the value of intangible assets by capitalizing future earnings remaining after deducting required returns to working capital and fixed assets.

Liu later makes the following three statements regarding the GTM approach for valuation:

Statement 1: The GTM approach is based on a multiple that specifically relates to sales of entire companies.

Statement 2: Generally, appraisers accept the valuation from GTM approach because the transactions data is readily available.

Statement 3: In the market approach, determination of MVIC for a private company will give the value of equity by deducting the value of debt. Therefore, this approach is useful even for highly leveraged or significantly volatile companies.

1. Based on the method used by Liu for calculating the cost of equity and the data in Tables 1 and 2, Silk's WACC is closest to:

A. 9.14%

B. 11.70%

C. 13.50%

2. Based on the WACC suggested by Baker, and the data given in Table 2, Silk's capitalization rate is closest to:

A. 5.7%

B. 6.3%

C. 7.5%

3. Regarding Baker's two statements, he is most likely correct with respect to:

A. Statement 1 only.

B. Both Statements 1 and 2.

C. Statement 2 only.

4. Which of Liu's statements regarding the GTM approach is most accurate ?

A. Statement 1.

B. Statement 2.

C. Statement 3.

Case 4: Cuyahoga River Navigators, Inc.

Cuyahoga River Navigators, Inc. (CRN), based in Cleveland, Ohio, has a fleet of 30 watercraft consisting of riverboats, yachts, barges, and ships navigating the Cuyahoga River and Lake Erie. CRN is a high-beta stock, and its market liquidity is quite low. Insiders own more than 50% and institutions own less than 30% of the firm's common stock. The company pays dividends and follows a constant payout ratio policy. The company's management is confident of a huge increase in revenue growth over the next four to five years. To meet the capital needs for growth opportunities, CRN's management is contemplating the issuance of debt or common stock.

Abhishek Alahtab is a junior equity analyst at Cleveland Investment Research, LLC, and follows regional small-cap stocks trading in the over-the-counter market. Amit Jatin, a senior equity analyst at Cleveland Investment Research, asks Alahtab to evaluate CRN and prepare a research report for updating the firm's recommendation about the stock. He gives Alahtab CRN's financial data, which are shown in Exhibits 1 and 2.

Exhibit 1 Income Statement Excerpts, Years Ending 31 December ($ millions)		
	2013	2012
EBITDA	275	250
Depreciation expense	82.5	75
Operating income	192.5	175
Interest expense	16	14.9
Income before taxes	176.5	160.2
Income taxes	56.5	48
Net income	120	112.1
Common dividend	48	44.8

Exhibit 2 Selected Balance Sheet Data, Years Ending 31 December ($ millions)		
Net investment in fixed capital		165.3
Net increase in working capital		-1.80
Ratios are calculated using year-end values	2013	2012
Current assets	354.2	322
Accumulated depreciation	257.5	175
Notes payable	20	15
Long-term debt	157.5	150
Common stock (50 million shares outstanding)	800	800
Retained earnings	159.3	87.3
Total liabilities and equity	1,265.00	1,150.00

Alahtab uses the Gordon growth model to estimate CRN's intrinsic value. He uses the firm's sustainable growth rate for 2013 as a measure of dividend growth. Using the capital asset pricing model (CAPM), he arrives at 11% as the required rate of return on the stock.

Jatin disagrees with Alahtab's preference for the Gordon growth model. He thinks that CRN's stock should be valued using sophisticated techniques that correctly account for the huge increase in revenues expected over the next four to five years. In particular, he suggests a couple of two-stage valuation models: the H-model and the free cash flow to equity (FCFE) model. Upon a closer examination of the data and expectations of high growth from the increased tourism and transportation on the revitalized Cuyahoga River, Jatin suggests that Alahtab incorporate the following as inputs into his H-model and FCFE model computations:

- A growth rate of 20% per year over the next four years (2014 through 2017) and a 6% constant growth rate beyond 2017
- An estimate of FCFE of $0.96 per share for 2014
- The addition of a small-firm risk premium of 2% to the rate of return on the stock
- A tax rate of 35%

Additionally, Jatin makes the following statements concerning the valuation models that he prefers:

1. The H-model assumes that the dividend 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.

2. The FCFE model ignores a company's investment and financing policies as well as its dividend policy. This model would be appropriate because free cash flow is not affected by the firm's dividend payout policy, but any stock issuance in the future can have a significant impact on cash flow available to common stockholders.

3. An increase in leverage will lead to a decrease in FCFE in the year the debt is issued, thereby potentially reducing the value per share.

1. Using the H-model, the information in Exhibits 1 and 2, and Jatin's estimates for growth and required return on the stock, the intrinsic value of CRN's stock as of 2013 is closest to:

A. $22.22.

B. $17.55.

C. $18.38.

2. Using the data in Exhibits 1 and 2 and the tax rate suggested by Jatin, CRN's FCFE per share for 2013 is closest to:

A. $0.85.

B. $0.82.

C. $0.92.

3. Using Jatin's 2014 estimate for FCFE per share and his other suggested inputs for growth and required return on the stock, the intrinsic value of CRN's stock as of 2013 is closest to:

A. $21.27.

B. $19.15.

C. $17.37.

4. In regard to Jatin's three statements concerning valuation models, he is most accurate with respect to statement:

A. 3

B. 1

C. 2

Case 5: Tom Pit

Tom Pit is valuing ENDA, an automobile private manufacturer and supplier based in US. Pit is using the EV multiple approach and after a thorough research finds that PGO, a publicly traded company and a close competitor of ENDA, is currently valued at an EV/EBITDA (earnings before interest, taxes, depreciation, and amortization) multiple of 6.7. Pit further makes an upward adjustment of 20% in the EV/EBITDA multiple to reflect higher growth of ENDA compared to PGO. Pit compiles ENDA's financial data given below and estimates 2023 EBITDA of $130.00 million.

$ millions	**31 December 2022**
EBITDA	120.0
Cash and short-term investments	62.5
Net fixed assets	63.0
Total assets	200.0
Accounts payable	12.5
Notes payable	10.0
Long-term debt	37.5
Common equity	140.0

Pit's supervisor feels that since one of their clients is considering a non-controlling ownership interest in ENDA, a discount for lack of control should be applied to the computed entity value. Pit estimates a control premium of 25% for privately owned firms similar to ENDA. Then they discusses methods to quantify discount of lack of marketability (DLOM).

1. Using the data given above, Pit's research, estimate and adjustment, ENDA's value of equity based on the EV/EBITDA approach is closest to:

A. $1,060 million.
B. $1,045 million
C. $1,015 million.

2. The discount for lack of control, based on Pit's control premium is closest to:

A. 33%.
B. 20%.
C. 80%.

3. Which one of the following statements about methods to quantify discount of lack of marketability (DLOM) is least likely correct?

A. The sale of blocks of restricted stock may be the most comparable data for quantifying a DLOM.
B. The relationship of stock sales prior to initial public offerings is another source of

marketability discounts.

C. Option-based approaches seek to quantify DLOMs using the right to buy shares as captured by a call option premium.

Case 6: Chan Mei Yee

Chan Mei Yee is valuing McLaughlin Corporation common shares using a free cash flow approach. Yee assembled information about McLaughlin from several sources. She begins her analysis by determining free cash flow to the firm (FCFF) and free cash flow to equity (FCFE) for the 2012 fiscal year, using the financial statements in Exhibits 1 and 2. McLaughlin's fiscal year ends 31 December.

Exhibit 1 McLaughlin Corporation Selected Financial Data (in millions, except per share amounts)	
For Year Ending 31 December	2012
Revenues	$6,456
Earnings before interest, taxes, depreciation, and amortization (EBITDA)	1,349
Depreciation expense	243
Operating income	1,106
Interest expense	186
Pretax income	920
Income tax (32%)	294
Net income	$626
Number of outstanding shares (millions)	411
2012 Earnings per share	$1.52
2012 Dividends paid (millions)	$148
2012 Dividends per share	$0.36
2012 Fixed capital investment (millions)	$535
Cost of equity	12.0%
Weighted average cost of capital	9.0%

Exhibit 2 McLaughlin Corporation Consolidated Balance Sheets (in millions)		
	as at 31 December	
	2012	2011
Cash and cash equivalents	$32	$21
Accounts receivable	413	417
Inventories	709	638
Other current assets	136	123
Total current assets	1,290	1,199
Current liabilities	$2,783	$2,678
Long-term debt	2,249	2,449
Common stockholders' equity	1,072	594

Total liabilities and stockholders' equity	$6,104	$5,721

Yee plans to perform valuations of McLaughlin. Critical assumptions are given in the following lists.

Yee's valuation assumptions

- 2013 earnings per share (EPS) will be $1.80.
- EPS will grow forever at 6 percent annually.
- For 2013 and beyond:
  - Net capital expenditures (fixed capital expenditures minus depreciation) will be 30 percent of EPS.
  - Investments in working capital will be 10 percent of EPS.
  - 60 percent of future investments will be financed with equity and 40 percent will be financed with debt.

Yee is also concerned about the effects on McLaughlin's 2013 FCFE of the following three possible financial actions by McLaughlin during the year 2013.

- Increasing common stock cash dividends by $110 million.
- Repurchasing $60 million of common shares.
- Reducing its outstanding long-term debt by $100 million.

1. McLaughlin's FCFF ($ millions) for 2012 is closest to:

A. $418.

B. $485.

C. $460.

2. Assuming 2012 FCFF equals $500 million, McLaughlin's FCFE ($ millions) for 2012 is closest to:

A. $574.

B. $174.

C. $114.

3. Using Yee's valuation assumptions and the FCFE valuation approach, the year-end 2012 value per share of McLaughlin's common stock is closest to:

A. $24.17.

B. $18.00.

C. $22.80.

4. The most likely combined effect of the three possible financial actions identified by Yee will reduce McLaughlin's 2013 FCFE ($ millions) by:

A. $100.

B. $270.

C. $160.

Case 7: Tom Baker

Tom Baker, director of equity investments at Private Wealth Fund, instructs his recently hired junior equity analysts Ida Paschel and Lyle Covey to review and evaluate opportunities in the automotive parts industry for a possible addition to the equity portfolio. Baker encourages the two analysts to consider Wadgett Manufacturing Inc., a rapidly growing maker of what it calls "smart mirrors."

Covey and Baker also discuss the impact of dividends, share repurchases, and leverage on Wadgett's free cash flow. Baker tells Covey the following:

- **Statement 1:** Changes in leverage do not impact free cash flow.
- **Statement 2:** Transactions between the company and its shareholders, such as the payment of dividends or share repurchases, do affect free cash flow.

Next, Baker is considering a possible acquisition of Wadgett. Since Wadgett has no plan to begin paying a dividend, Baker asks the analysts to calculate the free cash flow to the firm (FCFF). The two analysts discuss how to go about it, and they make the following comments:

Paschel: If we begin with cash flow from operations (CFO), we do not have to make adjustments for working capital.

Covey: We should begin with earnings before interest, taxes, depreciation, and amortization (EBITDA) but will have to add in all the non-cash charges on the income statement.

Paschel: Regardless of whether we start with net income, CFO, or EBITDA, we will have to add in net borrowing.

Wadgett's ambitious growth projections will likely require a substantial investment in manufacturing facilities. In order to finance the project, Wadgett expects to borrow substantially more than it has in the past and intends to retire the debt within the next 10 years. During a discussion of how this debt may influence the valuation, the analysts make the following statements:

Statement 1 Because the capital structure seems very likely to change significantly, it would be best to use free cash flow to equity (FCFE) because the value to equity is more direct.

Statement 2 I would select FCFF over FCFE. When we look forward, the required return on equity may be more sensitive to changes in financial leverage than just the changes in weighted average cost of capital (WACC).

Statement 3 With either model, we should discount future cash flows by the required return on equity because we are considering buying the stock.

Next, Baker asks Paschel to evaluate a small private company, Lulumango, in the garment industry. Paschel needs to make adjustments to the company's prior valuation according to updated information. Lulumango's update is given below:

Company Stage	Mature
Investment Objective	Minority interest

Last year Lulumango was being considered for a synergistic acquisition. Therefore, while

reviewing Lulumango's data and previous valuation, Paschel notes that since the investment objective has changed, he needs to incorporate a discount for lack of control and a discount for lack of marketability in Lulumango's new valuation.

1. Which of Baker's statements regarding free cash flow is (are) correct?

A. Statement 1 only
B. Statement 2 only
C. Neither Statement 1 nor Statement 2

2. In regard to calculating Wadgett's FCFF, the comment that is most appropriate is the one dealing with:

A. working capital adjustments.
B. treatment of all non-cash charges.
C. treatment of net borrowing.

3. In discussing Wadgett's growth projections and the influence they may have on the FCFE and FCFF valuation process, which of the analysts' statements is most accurate?

A. Statement 1
B. Statement 3
C. Statement 2

4. According to Paschel, the adjustments required in the new valuation of Lulumango is best described as:

A. correct.
B. incorrect with respect to the discount for lack of control.
C. incorrect with respect to the discount for lack of marketability.

Case 8: Edward Jenner

Edward Jenner, CFA, heads equities desk at Smart Invest, a brokerage firm specializing in buy-side analysis and wealth management. After the recent resignation of one of the firm's equity analysts, Jenner prepares the following case study as part of an interview she sets up with potential candidates. Consequently, Jenner short lists Amy Miller and arranges an interview with her the following day. The topic of discussion is market based valuation and the extracts from the case study and the interview are presented below.

Case study – Cerulean Plantations

Cerulean Corp is involved in the cultivation of tea and rubber destined for export markets. Because the firm's product is agricultural, the firm's revenue and earnings are cyclical. An extract from the firm's financial performance for the last five years is presented below in Exhibit 1.

Exhibit 1					
Year	**2008**	**2009**	**2010**	**2011**	**2012**
EPS($)	-1.43	2.34	-0.86	2.89	1.56
BVPS($)	6.23	8.24	8.00	9.38	10.40
ROE(%)	N/M	28%	N/M	31%	15%

Many investors interested in taking a long position in Cerulean Plantations stock pay close attention to the price-to-earnings (P/E) ratio to determine whether the firm's price multiples are justified or not. Jenner states that Cerulean Plantations performance can be compared with the plantations index which has a median P/E of 11.3 and an expected earnings growth of 8%. Based on her computations and using Jenner's benchmark for the stock Miller makes the following recommendation:

"I expect Cerulean Plantations to fetch a good price for its produce next year and hence record a higher than the industry average earnings growth of 15%. Further, the firm has low leverage in comparison with its peer group and hence faces lower financial risk than the median peer company. Therefore I expect Cerulean Plantations to trade at higher P/E multiples than the benchmark P/E."

Turning to book value multiples, Jenner states that for the plantations sector, she is more inclined to use the price to book value (P/BV) multiple because unlike earnings book value is less likely to be negative. She further adds that the book value is less volatile than earnings and is a useful metric for comparing firms with different levels of assets. In response to Jenner's arguments, Miller makes the following observation:

"The justified P/BV multiple is primarily determined by the return on equity, growth rate of earnings and the required rate of return. Based on the residual income valuation approach, I've determined that the present value of the expected residual income of Cerulean Plantations is $30 per share."

The discussion then turns to cash flow multiples and its drawbacks as most firms in the plantations sector face difficulties due to cash flow mismanagement. Jenner asks Miller the following question: "If the numerator is the equity value of a firm, what can be used as a proxy for

cash flow in the denominator?"

Jenner concludes the interview by questioning Miller about the central tendency, to which she responds as follows:

"I feel we should mitigate the effect of large outliers, but not the impact of small outliers (i.e., those close to zero), when calculating the beverage sector P/E. What measure of central tendency would you suggest we use to address this concern?"

1. Given a current price of $8.50 for Cerulean Plantations stock, the trailing P/E ratio with an adjusted EPS based on the method of historical average EPS is closest to:

A. 7.8
B. 9.4
C. 10.6

2. Miller's justification for Cerulean Plantation's P/E ratio to be higher than the benchmark is most likely :

A. correct given the higher earnings growth and lower financial risk.
B. correct given the higher earnings growth only.
C. incorrect given the lower financial risk.

3. Jenning's arguments for her preference for the P/BV ratio over the P/E ratio is least likely correct with respect to the fact that:

A. book value is seldom negative.
B. book value is less volatile than earnings.
C. book value is more useful for comparing firms with different levels of assets.

4. Based on Jenning's analysis of the residual income, Cerulean Plantations justified P/B ratio at the start of 2013 would be closest to:

A. 0.6
B. 1
C. 3.9

5. In response to Jenner's question about cash flow multiples, which of the following is the least appropriate proxy for cash flow?

A. Cash flow from operations (CFO).
B. Earnings plus non-cash charges.
C. Free cash flow to firm (FCFF).

6. The measure of central tendency that Ritter will most likely recommend is the:

A. median.

B. harmonic mean.

C. arithmetic mean.

Case 9: Timothée Chalamet

Timothée Chalamet, head of research at Atreides Capital, is conducting a training session with Frank Miller and Doris Carter, two newly-hired analysts at the firm. Chalamet makes the following statements:

"An active manager tries to achieve investment returns that exceed the risk-adjusted returns. He seeks to identify mispricing which is not easy to detect; hence, it is important to understand the possible sources of perceived mispricing."

Chalamet then asks Miller, "Although asset-based valuation is an absolute valuation model, it values a company differently than the free cash flow model. Can you explain how a company is valued using each model?" Miller responds, "Asset-based valuation is on the basis of a company's market value of assets or resources it controls, whereas in free cash flow to firm, future cash flows net of debt payments are discounted to obtain the firm's intrinsic value."

Next Chalamet tells the analysts to assess HQ Telecom, a communication and information technology company. The competition in the industry is high and it has been growing at the GDP rate for several years. HQ Telecom has achieved success in the rapidly growing 5G communication category. The company has expanded rapidly in recent years with profit margins rising above the level of its competitors. Miller predicts short-term earnings growth of 18% in 2023 for HQ Telecom, with the growth rate linearly declining over the next four years. In Year 5, the long-term growth rate will be equivalent to the current industry sustainable growth rate.

Chalamet asks the analysts about the issues should be considered while computing price multiples of companies in the transportation industry, which is cyclical. Carter replies with the following three statements:

1) No adjustments are necessary for business cycle influences as its impact on this industry should be minimal.
2) The accounting methods used by these companies may have differences and adjustments need to be made.
3) The companies that provide core earnings have already incorporated the necessary adjustments for nonrecurring items.

1. Regarding Chalamet's statement, the two sources of perceived mispricing are most likely:

A. true mispricing and error in the intrinsic value estimate.
B. observable market value and error estimate.
C. estimated intrinsic value and true intrinsic value.

2. Miller's response regarding the valuation models is most likely:

A. correct with respect to both models.

B. incorrect regarding asset-based models and correct regarding free cash flow to firm model.

C. correct regarding asset-based models and incorrect regarding free cash flow to firm model.

3. Which of the following growth stages best applies to HQ Telecom?

A. Growth.

B. Transition.

C. Mature.

4. Which of Carter's notes regarding the computation of price multiples is most accurate ?

A. The note regarding the business cycle.

B. The note regarding the accounting method.

C. The note regarding the nonrecurring items.

6. Fixed income

Case 1: Natalia Berg

Natalia Berg, CFA, has estimated the key rate durations for several maturities in three of her equally weighted bond portfolios, as shown in Exhibit 1.

Exhibit 1: Key Rate Durations for Three Fixed-Income Portfolios

Key Rate Maturity	Portfolio 1	Portfolio 2	Portfolio 3
2-year	2.45	0.35	1.26
5-year	0.20	0.40	1.27
10-year	0.15	4.00	1.23
20-year	2.20	0.25	1.24
Total	5.00	5.00	5.00

At a fixed-income conference in London, Berg hears a presentation by a university professor on the increasing use of the swap rate curve as a benchmark instead of the government bond yield curve. When Berg returns from the conference, she realizes she has left her notes from the presentation on the airplane. However, she is very interested in learning more about whether she should consider using the swap rate curve in her work.

As she tries to reconstruct what was said at the conference, she writes down two statements about the swap rate curve:

Statement 1: The swap rate curve typically has yield quotes at more maturities than government bond markets have.

Statement 2: Retail banks are more likely to use the government spot curve as a benchmark as they have minimal exposure to swap markets.

Exhibit 2: Selected Information on Salant Enterprises Bonds

Label	A	B	C
Bond type	Callable	Puttable	Extendible
Option type	European	European	
Exercise date	2 years	3 years	
Maturity	3 years	4 years	3 years
Extension period	-	-	1 year
Coupon Rate	5%	5%	5%
Value	$99.50	$100.69	

Berg also obtains information on several bonds issued by Salant Enterprises as shown in Exhibit 2.

Berg determines that to obtain an accurate estimate of the effective duration and effective convexity of a callable bond using a binomial model, the specified change in yield (i.e. Δy) must

be equal to the OAS.

1. If the 5- and 10-year key rates increase by 20 basis points, but the 2- and 20-year key rates remain unchanged:

A. all three portfolios will experience the same price performance.
B. Portfolio 1 will experience the best price performance.
C. Portfolio 2 will experience the best price performance.

2. Are the two observations Berg records after the fixed income conference accurate?

A. Both statements are accurate.
B. Only Statement 1 is accurate.
C. Only Statement 2 is accurate.

3. Based on the information in Exhibit 2, the value of Bond C is *most likely:*

A. $99.50.
B. between $99.50 and $100.69.
C. $100.69.

4. Is Berg correct about the specified change in yield needed to obtain an accurate estimate of the effective duration and effective convexity of a callable bond using a binomial model?

A. No, because the specified change in yield must be larger than the option-adjusted spread (OAS).
B. No, because the specified change in yield must be smaller than the OAS.
C. No, because the specified change in yield can be larger than, smaller than, or equal to the OAS.

Case 2: Nicholas Lee

Nicholas Lee, a fixed income analyst at Sunrise Security, has been given the task of analyzing a newly issued, US Treasury bond with a four-year maturity and an annual coupon of 7.00%. The bond was issued at a price of 100.65 to yield 6.8%. Based on whole fixed income department analysis, the forward rates are unbiased estimation for future spot rate. Nicholas is evaluating this bond for investors who will buy this bond with the intention of holding it to maturity. Current spot rates and one year forward rates are provided in Exhibit 1.

Exhibit 1: Spot and Forward Interest Rates

Year	Spot Rate	Forward Rate
1	4.0%	
2	5.0%	6.0%
3	6.0%	8.0%
4	7.0%	10.1%

Another colleague Tracy asked Nicholas, "Suppose an investor purchases this four-year US Treasury bond at its issued price, with yield to maturity 6.8%. He expects hold the bond for two years, and at that time 1 year and 2-year spot interest rates are equal to 8.40% and 10.25% respectively. Is this Treasury bond be overvalued or undervalued?"

Nicholas proposes to review spread indicators that measure credit and liquidity risk for money market securities and risk of default on interbank loans. He offers the following statements about measures of risk:

Statement 1 The TED spread represents the difference between Libor and overnight bank lending rates.

Statement 2 The Libor–OIS spread represents the difference between Libor and corporate bond spreads.

Statement 3 The Z-spread represents the constant basis point spread that is added to the implied spot yield curve to measure the price of credit risky bonds.

Recently, UK. is going through a period of turbulence, investors are selling off higher-risk asset classes such as stocks and commodities in favor of default-risk-free government bonds, leading long-term rates fall by more than short-term rates. Nicholas holds several UK. bond as a bullet portfolio and considering whether to change his position.

1. Based on Exhibit 1, assuming fixed income department analysis materializes, and each coupon can be reinvested by forward rate, the annual realized return for the US Treasury bond if held to maturity is closest to:

A. 6.72%.

B. 6.98%.

C. 7.13%.

2. Based on Exhibit 1, and investor's expectation who buys the four-year US Treasury bond and is likely sell it after two years, it is best to conclude that the bond is:

A. Undervalued.

B. Fair valued.

C. Overvalued.

3. Which of Nicholas's statements regarding measures of credit and liquidity risk is most likely correct?

A. Statement 2

B. Statement 3

C. Statement 1

4. Which statement is most likely correct under currently UK market condition?

A. Nicholas should switch his bond portfolio from bullet to barbell.

B. The yield curve can be described as bearish flattening.

C. Nicholas will suffer severe losses if he does nothing on his portfolio.

Case 3: William Rogers

William Rogers, a fixed-income portfolio manager, needs to eliminate a large cash position in his portfolio. He would like to purchase some corporate bonds. Two bonds that he is evaluating are shown in Exhibit 1. These two bonds are from the same issuer, and the current call price for the callable bond is 100. Assume that the issuer will call if the bond price exceeds the call price.

Rogers is also concerned about increases in interest rates and is considering the purchase of a puttable bond. He wants to determine how assumed increases or decreases in interest rate volatility affect the value of the straight bonds and bonds with embedded options. After Rogers performs some analysis, he and his supervisor, Sigourney Walters, discuss the relative price movement between the two bonds in Exhibit 1 when interest rates change significantly.

During the discussions, Rogers makes the following statements:

Statement 1: If the volatility of interest rates decreases, the value of the callable bond will increase.

Statement 2: The noncallable bond will not be affected by a change in the volatility or level of interest rates.

Statement 3: When interest rates decrease, the value of the noncallable bond increases by more than the callable bond.

Statement 4: If the volatility of interest rates increases, the value of the putable bond will increase.

Walters mentors Rogers on bond concepts and then asks him to consider the pricing of a third bond. The third bond has five years to maturity, a 6% annual coupon, and pays interest semiannually. The bond is both callable and puttable at 100 at any time. Walters indicates that the holders of the bond's embedded options will exercise if the option is in-the-money.

Rogers obtained the prices shown in Exhibit 1 using software that generates an interest rate lattice. He uses his software to generate the interest rate lattice shown in Exhibit 2.

Exhibit 1: Bond Descriptions

	Noncallable	Callable Bond
Price	99.77	98.21
Time to maturity (years)	5	5
Time to first call date (years)	n/a	4
Annual coupon	6.00%	6.00%
Interest payment	Semiannual	Semiannual
Yield to maturity	6.0542%	6.4227%

Exhibit 2: Interest Rate Lattice (Annualized Interest Rates)

15.44%

117-226

								14.10%	
							12.69%		12.46%
						11.85%		11.38%	
					9.75%		10.25%		10.05%
				8.95%		9.57%		9.19%	
			7.91%		7.88%		8.28%		8.11%
		7.35%		7.23%		7.74%		7.42%	
	6.62%		6.40%		6.37%		6.69%		6.54%
6.05%		5.95%		5.85%		6.25%		5.99%	
	5.36%		5.17%		5.15%		5.40%		5.28%
		4.81%		4.73%		5.05%		4.83%	
			4.18%		4.16%		4.36%		4.26%
				3.82%		4.08%		3.90%	
					3.37%		3.52%		3.44%
						3.30%		3.15%	
							2.84%		2.77%
								2.54%	
									2.24%
	Years 0.5	1.0	1.5	2.0	2.5	3.0	3.5	4	4.5

1. Evaluate Rogers's statements 1 and 3.

A. Only Statement 1 is correct.

B. Only Statement 3 is correct.

C. Both statements are correct.

2. Evaluate Rogers's statements 2 and 4.

A. Only Statement 2 is correct.

B. Only Statement 4 is correct.

C. Both statements are correct.

3. Using the information in the question and the following relevant portion of the interest rate and pricing trees, Rogers calculates the value of the noncallable bond at node A.

Corresponding portion of the interest rate tree (given as bond-equivalent yields):

		8.95%
	7.91%	
		7.23%
Years	1.5	2.0

Corresponding portion of the binomial price tree:

		91.73%
	A→	
		96.17%
Years	1.5	2.0

The price of the noncallable bond at node A is closest to:

A. 89.84% of par.

B. 93.26% of par.

C. 96.14% of par.

4. Using the information in the question and the following relevant portion of the interest rate and pricing trees, Rogers calculates the value of the callable bond at node B.

Corresponding portion of the interest rate tree (given as bond-equivalent yields):

		3.44%
	3.15%	
		2.77%
Years	4.0	4.5

Corresponding portion of the callable bond price tree:

		$100.00
	B→	
		$100.00
Years	4.0	4.5

The price of the callable bond at node B is closest to:

A. 100.0% of par.

B. 101.4% of par.

C. 102.5% of par.

Case 4: Susan Evermore

The Future International Pension Fund includes a $65 million fixed-income portfolio managed by Susan Evermore, CFA, of Brighton Investors. Evermore is in the process of constructing a binomial interest-rate tree that generates arbitrage-free values for on-the-run Treasury securities. She plans to use the tree to value more complex bonds with embedded options.

She starts out by observing that the yield on a one-year Treasury security is 3.50%. She determines in her initial attempt to price the two-year Treasury security that the value derived from the model is higher than the Treasury security's current market price.

After several iterations Evermore determines that the interest rate tree that correctly values the one and two-year Treasury securities has a rate of 4.50% in the lower node at the end of the first year and a rate of 7.0% in the upper node at the end of the first year. She uses this tree to value a two-year, 6% annual coupon bond with a par value of $100 that is callable in one year at $99.50. She determines that an OAS of 50bps is appropriate for this bond.

Evermore also uses the interest rate tree to estimate the option-adjusted spreads of two additional callable corporate bonds, as shown in the following figure.

Issuer	Option-Adjusted Spread
AA-rated issuer	53 basis points
BB-rated issuer	-18 basis points

Evermore concludes, based on this information, that the AA-rated issue is undervalued, and the BB-rated issue is overvalued.

At a subsequent meeting with the trustees of the fund, Evermore is asked to explain what a binomial interest rate model is and how it was used to estimate effective duration and effective convexity. Evermore is uncertain of the exact methodology because the actual calculations were done by a junior analyst, but she tries to provide the trustees with a reasonably accurate step-by-step description of the process:

Step 1: Given the bond's current market price, the on-the-run Treasury yield curve, and an assumption about rate volatility, creates a binomial interest rate tree.

Step 2: Add 100 basis points to each of the 1-year rates in the interest rate tree to derive a "modified" tree.

Step 3: Compute the price of the bond if yield increases by 100 basis points using this new tree.

Step 4: Repeat Steps 1 through 3 to determine the bond price that results from a 100 basis point decrease in rates.

Step 5: Use these two price estimates, along with the original market price, to calculate effective duration and effective convexity.

Lucas Davenport, a trustee and university finance professor, immediately speaks up to disagree with Evermore. He claims that a more accurate description of the process is as follows:

Step 1: Given the bond's current market price, the Treasury yield curve, and an assumption about

rate volatility, create a binomial interest rate tree and calculate the bond's option-adjusted spread (OAS) using the model.

Step 2: Impose a parallel upward shift in the on-the-run Treasury yield curve of 100 basis points.

Step 3: Build a new binomial interest rate tree using the new Treasury yield curve and the original rate volatility assumption.

Step 4: Add the OAS from Step 1 to each of the 1-year rates on the tree to derive a "modified" tree.

Step 5: Compute the price of the bond using this new tree.

Step 6: Repeat Steps 1 through 5 to determine the bond price that results from a 100 basis point decrease in rates.

Step 7: Use these two price estimates, along with the original market price, to calculate effective duration and effective convexity.

At the meeting with the trustees, Evermore also presents the results of her analysis of the effect of changing market volatilities on a 1-year convertible bond issued by High four Corporation. Each bond is convertible into 25 shares of High four common stock. The bond is also callable at 110 at any time prior to maturity. She concludes that the value of the bond will decrease if either (1) the volatility of returns on High four common stock decreases or (2) yield volatility decreases.

1. The value of the 2-year 6% callable bond today using the interest rate trees closest to:

A. $95.24.

B. $101.01.

C. $102.21.

2. Is Evermore correct in her analysis of the relative valuation of the bonds?

A. Correct on both issues.

B. Correct on the AA issue only.

C. Correct on the BB issue only.

3. Which of the following statements regarding the methodologies for estimating effective duration and convexity is most accurate?

A. Davenport's description is a more accurate depiction of the appropriate methodology than Evermore's.

B. The two methodologies will result in the same effective duration and convexity estimates only if the same rate volatility assumption is used in each.

C. The two methodologies will result in the same effective duration and convexity estimates only if the same rate volatility assumption is used in each and the bond's OAS is equal to zero.

4. Is Evermore's conclusions regarding the effect on the value of the convertible bond correct?

A. Evermore is correct on both conclusions.

B. Evermore is correct on stock return volatility only.

C. Evermore is correct on yield volatility only.

Case 5: John Steven

John Steven, CFA, is an experienced equity fund manager who has recently taken a position with Loin City, a UK-based hedge fund that has combined a wide range of strategies to deliver impressive returns over the last five years. One of the fund's strategies is to invest in high-credit-risk fixed income instruments. The fund has an excellent track record of identifying bonds in this sector that subsequently outperform the market.

Steven wishes to familiarize himself with the fund's strategies and has started by looking at some of the techniques used in analyzing fixed income instruments. Exhibit 1 shows the firm's approach to analyzing credit risk.

Exhibit 1: Credit Analysis Tools

Credit Ratings
Before undertaking any level of detailed analysis, the credit rating from the three major agencies should be obtained. Typically, an instrument that is investment grade according to all three agencies will not be worthy of further consideration.
Structural Models
An initial analysis using a simple structural model should be undertaken to calculate the present value of the expected loss.
Reduced Form Models
Detailed analysis should be undertaken using the reduced form models used by the fixed income team. This analysis should only be undertaken once the structural model analysis has been completed.

Steven is surprised that the fund uses credit ratings to filter out investment grade bonds as not worthy of consideration. In his experience, rating agencies have often been wrong, and he intends to send a note to his supervisor stating the following points arguing that credit ratings should not be relied upon as a filter:

Point 1: Ratings do not implicitly depend on the business cycle stage, whereas a debt offering's default probability does.

Point 2: Ratings are volatile over time, which reduces their usefulness as an indication of a debt offering's default probability.

Steven has no experience with structural models and is interested in learning more. He finds an analysis that has been completed for a recent bond issue. The writer concludes his analysis by comparing the swap rate curve to a government bond yield curve.

1. Which of the credit analysis models shown in Exhibit 1 can only be used under the assumption that the issuing company's assets trade in a frictionless market?

A. Structural models.

B. Reduced form models.

C. Both structural models and reduced form models.

2. Under the option analogy of the structural model, owning a company's debt is economically equivalent to owning a riskless bond and simultaneously:

A. buying an American put option on the assets of the company.

B. selling a European put option on the assets of the company.

C. buying a European put option on the assets of the company.

3. Which of Stevenson's points regarding the reliability of credit ratings is most accurate?

A. Point 1 only.

B. Point 2 only.

C. Neither point is correct.

4. Which of the following statements regarding the choice between government bond yield curves and swap-rate curves as a benchmark interest rate curve is most accurate?

A. The swap-rate curve is preferred because swap curves are comparable across countries.

B. Government bond yield curves are preferred because they are based on a more complete set of market yields.

C. Government bond yield curves are preferred because the lack of a liquid secondary market can distort swap yields compared with government bond yields.

Case 6: FutureTech

FutureTech is a large multinational company headquartered in the U.S. Through a series of subsidiaries around the world, FutureTech operates in multiple sectors including retail, engineering, health care, and reinsurance. The company has a large treasury and risk management team based in the U.K., and all responsibility for cash and risk management is centered in this London office.

Recently, a major breach of controls was discovered in the office; a junior employee had bypassed internal controls and opened large positions in several derivative contracts. The employee in question was only authorized to use such contracts for hedging purposes, but the company fears that it may have exposure in excess of $100 million on unhedged positions opened by the employee.

Following an internal investigation, Alex Hill, CFA, has been assigned to review and value several contracts that were flagged during the audit.

The investigation discovered a number of transactions related to credit default swaps (CDS). Alex has received an email from a member of the investigative team asking for his advice on FutureTech's exposure as a result of these transactions. An extract from that email is shown in Exhibit 1.

Exhibit 1: Credit Default Swaps

"...without authorization, the employee sold $350 million notional of protection on the iTraxx Main[1] index, a position that remains open. FutureTech has no exposure to debt instruments issued by any of the constituents of the index, and there appear to be no other transactions in any index CDS. There were, however, two other transactions in single-name CDS. On behalf of FutureTech, the employee purchased $2.5 million of notional exposure on a single-name CDS protection on GD. corporation debt and $3.5 million of notional exposure on ST. corporation debt.

GD. is a constituent of the iTraxx Main index, but ST. is not. Since the single-name positions were opened, the credit spread on both GD. and ST. has increased by over 250 basis points."

[1] The iTraxx Main is an equally weighted CDS index consisting of 125 investment-grade entities.

Alex thinks the ST. transaction may actually be a legitimate contract undertaken by another employee of the firm, Dan Eagen. Alex recently spoke informally with Eagen, who stated that he believes that "ST. is currently preparing to undergo a leveraged buy-out at a significant premium to current market value." Eagen's intention was to make a gain by taking a position in the CDS and ST. stock.

Then, Alex asks Eagen to describe features of equilibrium and arbitrage-free term structure models. Eagen responds by making the following statements:

Statement 1 "Equilibrium term structure models are factor models that use the observed market prices of a reference set of financial instruments, assumed to be correctly priced, to model the market yield curve."

Statement 2 "In contrast, arbitrage-free term structure models seek to describe the dynamics of the term structure by using fundamental economic variables that are assumed to affect interest rates."

1. As a result of the transactions described in Exhibit 1, FutureTech's current net notional exposure to GD. debt is closest to:

A. $3.5 million.
B. $0.3 million.
C. zero.

2. If FutureTech were to enter into an offsetting contract to hedge its exposure to ST. under the CDS described in Exhibit 1, this would most likely result in:

A. a loss on the CDS position.
B. a gain on the CDS position.
C. no gain or loss on the CDS position.

3. Eagen is most likely to take advantage of his prediction for ST. by:

A. purchasing CDS protection and selling the underlying stock.
B. selling CDS protection and buying the underlying stock.
C. buying CDS protection and buying the underlying stock.

4. Which of Eagen's statement(s) regarding equilibrium and arbitrage-free term structure models is incorrect?

A. Statement 1 only.
B. Statement 2 only.
C. Both Statement 1 and Statement 2.

Case 7: Diane Muniz

Diane Muniz is the fixed-income trading strategist at Greentown Capital Management, an investment firm based in Miami, Florida. Muniz is running a training session for three recently hired junior analysts, Amanda Morgan, David Scahill, and Hamza Gomaa. Muniz welcomes Morgan, Scahill, and Gomaa to the firm and states that at today's session they will be discussing bonds with embedded options. She asks the group, "Can any of you list a few general characteristics of bonds with embedded options?"

Morgan responds with the following statements:

- **Statement 1** "Depending on the type of bond, the embedded option can be exercised by either the bondholder or the bond issuer to exploit interest rate movements."
- **Statement 2** "However, both types of options—bondholder and bond issuer options—cannot be embedded in the same bond."
- **Statement 3** "The embedded options cannot be traded independently of the bond."

Muniz moves on to a discussion of the valuation of risky bonds with embedded options and asks if there is a metric that can be used to determine relative value and how such a measure is calculated. In response Scahill states: "The option-adjusted spread, or OAS, can be used to determine the value of a risky bond with embedded options. When assessing relative value for two bonds that are otherwise similar in all respects, the bond with the lower OAS is most likely underpriced or cheap." Morgan adds: "The OAS is a variable spread that is based on the likelihood of cash flows occurring." Gomaa disagrees with Scahill and Morgan, stating: "I believe OAS is the constant spread that when added to all one-period forward rates on the interest rate tree, equates the present value of the bond's cash flows to the market price. Furthermore, for two bonds that have similar characteristics and credit quality, the bond with the higher OAS is underpriced."

In order to initiate discussion on the interest rate risk of bonds with embedded options, Muniz Muniz states that effective duration indicates the sensitivity of a bond's price to interest rate changes and is a measure of interest rate risk. She notes: "When interest rates rise and are high relative to the bond's coupon rate, the effective duration of a callable bond falls and is lower than the effective duration of an otherwise similar straight bond. On the other hand, for the same interest rate scenario, the effective duration of a putable bond will be similar to the effective duration of a comparable straight bond."

Muniz wraps up the training session by posing the following question: "If you expect a steepening of the yield curve, what duration measure provides the best indication of the interest rate risk for a callable bond?" The group is asked to submit answers to Muniz the following day.

1. Which of Morgan's statements is least likely correct:

A. Statement 1.

B. Statement 2.

C. Statement 3.

2. In response to Muniz's question about the valuation of bonds with embedded options and relative value analysis, who is most likely correct?

A. Morgan

B. Gomaa

C. Scahill

3. Muniz's comments regarding effective duration are most likely:

A. correct with regard to callable bonds and incorrect with regard to putable bonds.

B. incorrect with regard to callable and putable bonds.

C. incorrect with regard to callable bonds and correct with regard to putable bonds.

4. For the interest rate scenario presented by Muniz, the most appropriate duration measure is:

A. key rate duration.

B. one-sided up duration.

C. effective duration.

Case 8: Sandy Sherry

Sandy Sherry is the head of trading at Wingaersheek Arbitrage Opportunities, LLP, a hedge fund specializing in fixed-income strategies. The firm's investment approach is to exploit small price differences across similar or identical securities. Sherry has asked Choate Hulk to develop a comprehensive automated trading system that will allow traders to identify opportunities in the market. Sherry and Hulk are discussing several applications that need to be developed for the traders.

Hulk begins development on an algorithm that will evaluate government bonds that have been stripped. He tests his logic by evaluating a dollar-denominated Zimbabwe government bond with a 3.20%, annual pay coupon maturing in three years, using data in Exhibit 1. The bond is quoted in the market at $103.50.

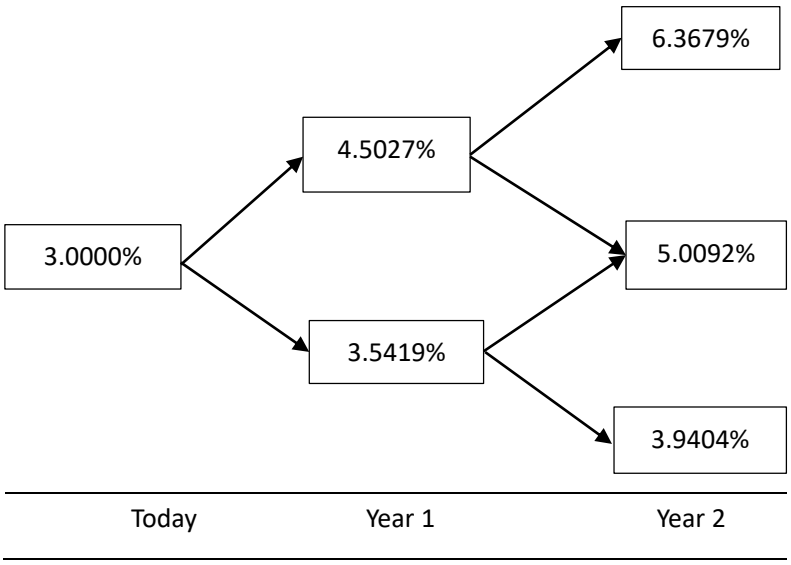
Exhibit 1 Spot, Par, and Forward Rates			
	Year 1	**Year 2**	**Year 3**
Spot Rate	1.10%	---	2.013%
Par Rate	1.10%	1.50%	2.00%
Forward Rate	1.10%	1.91%	3.04%

Sherry wants Hulk to develop a program for pricing securities that are interest rate path dependent, such as mortgage-backed securities (MBS). He believes that using the Monte Carlo method and employing 2,000 simulations will provide an average present value across all scenarios equal to the actual market value of the securities. Hulk runs a simulation and uses it to value a benchmark bond, which is an on-the-run treasury bond. He finds that the value generated does not equal the market price of the bond.

Hulk also selects the two bonds issued by Varlep, plc given in Exhibit 2. Bond 1 is floating-rate bond and has a maturity of three years. Bond 2 includes a conversion option. Varlep's common stock is currently trading at $30 per share.

Exhibit 2 Floating-Rate Bonds Issued by Varlep, plc	
Bond 1	One-year Libor annually, set in arrears, capped at 5.00%
Bond 2	Convertible bond with a conversion price of $50

To value Varlep's bonds, Hulk constructs the binomial interest rate tree provided in Exhibit 3.



1. Based on the Exhibit 1, the implied spot rate on Year 2 by using bootstrapping is:

A. 1.497%

B. 1.503%

C. 1.511%

2. Based on the market price of the Zimbabwe government bond and the interest rates in Exhibit 1, what profitable arbitrage opportunity should Hulk's algorithm most likely identify?

A. Buying the strips and selling the bond

B. Buying the Year 1 and Year 2 strips and selling the Year 3 strip

C. Buying the bond and selling the strips

3. To correct the problem Hulk encounters when using a Monte Carlo simulation, he would most likely:

A. adjust the volatility assumption.

B. increase the number of simulations.

C. add a constant to all interest rates on all paths.

4. The factor that is currently least likely to affect the risk-return characteristics of Bond 2 is:

A. Interest rate movements.

B. Varlep's credit spreads.

C. Varlep's common stock price movements.

Case 9: Scarlett Johansson

Scarlett Johansson, a fixed-income portfolio manager at Coastal Advisors, asks his colleague Aragaki Yui, to determine an upfront payment on a 5-year CDS on ABC Co. Yui collects the information for the CDS given in Exhibit 1.

Exhibit 1: Selected Information on 5-Year CDS on ABC Co.	
Credit Spread	350bps
Coupon Rate	1%
Duration	3 years

Scarlett purchases the 5-year CDS on ABC Co. bond. After buying the 5-year CDS, the credit spread for ABC Co. widens by 150 basis points. Scarlett wants to unwind its CDS position on ABC bond by entering into new offsetting contracts.

Scarlett begins the session by asking Yui to identify types of CDSs. Yui responds, "A single-name CDS is on any obligation of a specific reference entity. An index CDS allows investors to take a position on the credit risk of multiple companies, although higher credit correlations make the index CDS more expensive to purchase."

In reviewing the available ABS transactions, Scarlett prefers for auto ABSs and states because the medium-term risk horizon and homogeneous nature of the assets supports a portfolio approach to analysis. Yui prefers focusing on leveraged loan collateralized loan obligations (CLOs) and states because the non-granular structure of the pools allows for increased added value through loan-by-loan analysis. Yui also makes additional case for CMBS, states it uses statistical approach to analysis because of the heterogeneous nature and typically non-granular of the pools.

1. Based on Exhibit 1, the upfront premium as a percent of the notional required to buy the 5-year CDS on ABC Co. is closest to:

A. 2.5%.
B. 7.5%.
C. –7.5%.

2. The price change in the 5-year CDS on ABC debt, after widening of the credit spread is closest to:

A. 1.5%
B. 3.5%
C. 4.5%

3. In his response to Scarlett regarding types of CDS, Yui is least likely correct with regard to:

A. index CDSs.
B. single-name CDS

C. both.

4. In the discussion of ABS transaction preferences, whose credit analysis method is least likely correct?

A. Scarlett's.

B. Yui's first statement.

C. Yui's second statement.

Case 10: Nicholas Tsao

Nicholas Tsao is a portfolio manager in the fixed-income division of ABC Investment Management (ABC), based in New York. Nicholas is running a training session for newly hired analysts Khatri, Patel, and Ahuja to examine the use of Credit Default Swaps (CDSs) in fixed-income portfolio management.

Nicholas notes that a payment from the credit protection seller to the credit protection buyer is triggered whenever a credit event occurs. He asks each of the analysts to identify a credit event in the United States that will trigger a payment. The following are the responses of each analyst:

- Khatri: "A declaration of bankruptcy by the reference entity is a credit event that will trigger a payment from the CDS seller."
- Patel: "If the reference entity fails to make a scheduled interest or principal payment, it is recognized as a failure-to-pay credit event."
- Ahuja: "A change in seniority of outstanding obligations is also recognized as a credit event that will trigger a payment by the protection seller."

To facilitate a discussion of CDS pricing and CDS trading strategies, Nicholas presents the group with the information in Exhibit 1.

Exhibit 1：Select CDS Information

CDS	Type	Credit Spread (bps)	Recovery Rate	Tenor (yrs.)	Coupon (bps)	Duration
CDX NA IG	Index	58	40%	5	100	4.76
CDX NA HY	Index	329	30%	5	500	4.34
Company A	Single-Name	194	25%	5	100	4.57
Company A	Single-Name	266	40%	10	100	7.38
Company B	Single-Name	165	40%	5	500	4.55
Company B	Single-Name	326	40%	10	500	8.19

Notes: CDX NA IG is an index of CDSs of investment-grade North American corporations. CDX NA HY is an index of CDSs of high-yield North American corporations.

Nicholas states, "I would like you to formulate appropriate CDS trading strategies using the information provided in the following statements:"

Statement 1	"Our economists expect the US economy to strengthen over the coming year, with spreads on high-yield CDSs tightening by 120 bps and spreads on investment-grade CDSs tightening by 7 bps."
Statement 2	"Our analysts expect that the credit curve for Company A will flatten, whereas the credit curve for Company B is expected to steepen."

Only Ahuja responds, as follows: "A trade that addresses Statement 2 would be to sell Company A CDSs with a 10-year tenor and buy Company A CDSs with a 5-year tenor. Alternatively, one could

buy Company B CDSs with a 10-year tenor and sell Company B CDSs with a 5-year tenor."

1. With regard to Nicholas' question on credit events, who is *least likely* correct?

A. Ahuja

B. Patel

C. Khatri

2. Based on Exhibit 1, the price per 100 par of Company A CDSs with a 5-year tenor is closest to:

A. 95.70.

B. 99.06.

C. 104.29.

3. Based on the information in Exhibit 1 and Statement 1, an appropriate long/short trade would be to:

A. sell CDX NA IG and buy CDX NA HY.

B. sell CDX NA HY and buy CDX NA IG.

C. sell Company A CDSs and buy Company B CDSs.

4. Is Ahuja's response to Statement 2 by Nicholas most likely correct?

A. Yes

B. No, she is incorrect about the trade involving Company A CDSs.

C. No, she is incorrect about the trade involving Company B CDSs.

Case 11: Tom Han

Tom Han, chief investment officer of Micky Investment Management Company. During his meeting with the analysts, they discuss the impact of weakening economic activity. The equity market values are predicted to decline in the coming year and the negative GDP growth rate of the previous quarters is not expected to improve. Tom wants the investors to consider adding more bonds to their portfolios and limiting their equity exposure.

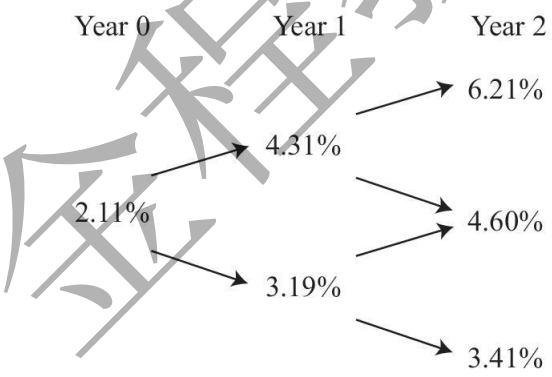
Tom makes the following statements:"Because of low government yields we should consider investment-grade corporate bonds over government securities. According to the consensus forecast among economists, the central bank is expected to lower interest rates in their upcoming meeting."

After the meeting, Essie Coleman, a fixed-income analyst selects the following four fixed-rate investment-grade bonds issued by Bliss Paper Company for investment (Exhibit 1).

Exhibit 1: Bliss Paper Company's Fixed-Rate Bonds

Bond*	Annual Coupon	Type
Bond X	4.5%	Straight bond
Bond Y	4.5%	Callable at par without a lockout period
Bond Z	4.5%	Putable at par one and two years from now
Bond S	4.5%	Convertible bond: currently out of money

Exhibit 2: Binomial Interest Rate Tree



*Note: All bonds have a remaining maturity of three years.

Essie finds that demand for consumer credit is relatively strong, despite other poor macroeconomic indicators. As a result, she believes that volatility in interest rates will increase. Essie also reads a report from Wind, a reliable financial and economic information provider, forecasting that the yield curve may invert in the coming months.

1. Assuming the interest rates forecast is proven accurate, the bond with the smallest price increase is most likely:

A. Bond X.
B. Bond Y.
C. Bond Z.

2. Based on Exhibit 1, if the forecast for interest rates and equity returns are proven accurate, which bond's option is most likely to be exercised?

A. Bond Y.
B. Bond Z.
C. Bond S.

3. Using the interest rate information found in Exhibit 2, the value of the three-year putable bond is closest to

A. 102.63
B. 103.30
C. 102.88

4. If the forecast of the interest rate volatility proves accurate, the bond with the greatest price increase is most likely:

A. Bond Y.
B. Bond Z.
C. Bond S.

Case 12: Connie Ye

Connie Ye is a senior analyst at MSK investment management company. She is currently analyzing the following bonds for investment.

Fixed-Income Securities	Features
Bond X	Zero- coupon, 3- year corporate bond with a par value of 100. Risk- neutral probability of default (the hazard rate) for each date for the bond is 1.25%. And the recovery rate is 30%.
Bond Y	Similar features as Bond X, except a 4% annual payment corporate bond.

She performs the analysis by assuming no interest rate volatility and that the government bond yield curve is flat at 2.5%. To understand the effect on the bond's fair value, Connie increases the recovery rate and the probability of default. She increases both by 20% of their existing estimates and calculates the bond's fair value again.

Rebecca recently joined Connie's team supporting credit analysis and credit risk modeling. After a brief orientation on the firm and its investment process, Connie instructs Rebecca to develop a model that derives the credit valuation adjustment (CVA). Connie makes the following comments regarding credit modeling.

Comment 1: The factors to consider in modeling credit risk are the expected exposure to default loss, the risk-neutral probability of default, and the loss given default.

Comment 2: The use of an actual default rate in the model may overstate the observed value for a corporate bond because it includes a default risk premium associated with uncertainty over the timing of possible default loss.

Comment 3: In practice，we use the risk neutral probability of default, which is the probability of default implied in the current market price. Usually, risk-neutral default probability is higher than actual default probability.

Connie works with another analyst, George Hastings, to discuss credit scoring and credit rating models. Hastings starts the conversation by saying, "Credit scoring models are primarily applied to consumers or small business borrowers. In some cases, it only uses negative information, such as delinquencies or defaults, while other models use a mix of factors, such as payment history and recent credit searches." The focus of credit scores is the probability of default. Hastings continues, "Credit ratings, on the other hand, are used in the corporate and sovereign bond market and also for asset-backed securities. Ratings are focused on probability of default. Credit rating agencies, such as Standard & Poor's, consider the loss given default by means of notching, which adjusts the issuer rating to reflect the priority of claims in the capital structure."

Connie and Rebecca get into a discussion on structural models of credit risk. Connie tells Recebba, "Structural models are dependent on the structure of the company's balance sheet. Equity is analogous to a purchased call option on the assets of the company whereby the strike price equals the face value of the debt. Strengths of these models are that they aim to explain why default occurs and are dependent on readily available public information, such as the market value of the company's assets. Weaknesses are that the assumptions of models are not realistic and measuring the default barrier can be difficult to implement."

1. The fair value of Bond X under new estimates of the recovery rate and probability of default is closest to:

A. 89.60.

B. 94.33.

C. 90.23.

2. Connie is least likely correct with regard to which point regarding credit modeling?

A. Comment 1

B. Comment 2

C. Comment 3

3. Are Hastings's comments regarding credit scores and credit ratings most likely correct?

A. Yes

B. No, he is incorrect with regard to credit scores.

C. No, he is incorrect with regard to credit ratings.

4. Connie is least likely correct with regard to which aspect of structural models?

A. The description

B. The strengths

C. The weaknesses

Case 13: Daniela Ibarra

Daniela Ibarra is a senior analyst in the fixed-income department of a large wealth management firm. Marten Koning is a junior analyst in the same department.

The firm invests in a variety of bonds. Ibarra is presently analyzing a set of bonds with some similar characteristics, such as four years until maturity and a par value of €1,000. Exhibit 1 includes details of these bonds.

Bond	Description
B1	A zero-coupon, four-year corporate bond with a par value of €1,000. The wealth management firm's research team has estimated that the risk-neutral probability of default (the hazard rate) for each date for the bond is 1.50%, and the recovery rate is 30%.
B2	A bond similar to B1, except that it has a fixed annual coupon rate of 6% paid annually.
B3	A bond similar to B2 but rated AA.
B4	A bond similar to B2 but the coupon rate is the one-year benchmark rate plus 4%.

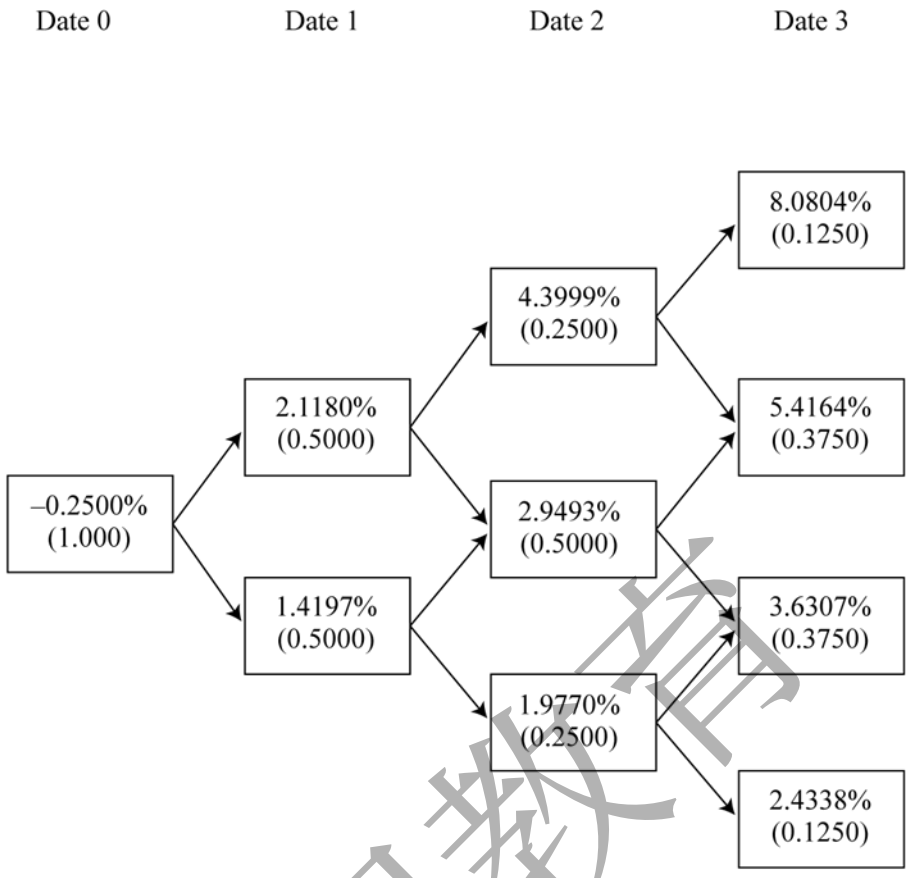
Ibarra asks Koning to assist her with analyzing the bonds. She wants him to perform the analysis with the assumptions that there is no interest rate volatility and that the government bond yield curve is flat at 3%.

Ibarra performs the analysis assuming an upward-sloping yield curve and volatile interest rates. Exhibit 2 provides the data on annual payment benchmark government bonds. She uses this data to construct a binomial interest rate tree (shown in Exhibit 3) based on an assumption of future interest rate volatility of 20%.

Exhibit 2. Par Curve for Annual Payment Benchmark Government Bonds

Maturity	Coupon Rate	Price	Discount Factor	Spot Rate	Forward Rate
1	–0.25%	€100	1.002506	–0.2500%	
2	0.75%	€100	0.985093	0.7538%	1.7677%
3	1.50%	€100	0.955848	1.5166%	3.0596%
4	2.25%	€100	0.913225	2.2953%	4.6674%

Exhibit 3. One-Year Binomial Interest Rate Tree for 20% Volatility



Note: Answer the first two questions (1–2) based on the assumptions made by Marten Koning, the junior analyst. Answer questions (3) based on the assumptions made by Daniela Ibarra, the senior analyst.

1. The market price of bond B1 is €875. The bond is:

A. fairly valued.

B. overvalued.

C. undervalued.

2. Koning realizes that an increase in the recovery rate would lead to an increase in the bond's fair value, whereas an increase in the probability of default would lead to a decrease in the bond's fair value. He is not sure which effect would be greater, however. So, he increases both the recovery rate and the probability of default by 25% of their existing estimates and recomputes the bond's fair value. The recomputed fair value is closest to:

A. €853.14.

B. €848.00.

C. €855.91.

3. The issuer of the floating rate note B4 is in the energy industry. Ibarra personally believes that oil prices are likely to increase significantly within the next year, which will lead to an improvement in the firm's financial health and a decline in the probability of default from 1.50% in Year 1 to 0.50% in Years 2, 3, and 4. Based on these expectations, which of the following statements is correct?

A. The CVA will decrease to €22.99.

B. The note's fair value will decrease.

C. The value of the risk exposure of date 3 is 1103.55.

4. Floating rate note B4 is currently rated BBB by Standard & Poor's and Fitch Ratings (and Baa by Moody's Investors Service). Ibarra expects that both the recovery rate and harzard rate will decrease by 25% of their existing estimates, which action does Ibarra most likely expect from the credit rating agencies?

Transition Matrix

From/To	AAA	AA	A	BBB	BB	B	CCC,CC,C	D
AAA	**90.00**	9.00	0.60	0.15	0.10	0.10	0.05	0.00
AA	1.50	**88.00**	9.50	0.75	0.15	0.05	0.03	0.02
A	0.05	2.50	**87.50**	8.40	0.75	0.60	0.12	0.08
BBB	0.02	0.30	4.80	**85.50**	6.95	1.75	0.45	0.23
BB	0.01	0.06	0.30	7.75	**79.50**	8.75	2.38	1.25
B	0.00	0.05	0.15	1.40	9.15	**76.60**	8.45	4.20
CCC,CC,C	0.00	0.01	0.12	0.87	1.65	18.50	**49.25**	29.60
Credit Spread	0.60%	0.90%	1.10%	1.50%	3.40%	6.50%	9.50%	

A. Downgrade from BBB to BB

B. Upgrade from BBB to AAA

C. Place the issuer on watch with a positive outlook.

7. Derivatives

Case 1: Ryan Parisi Case Scenario

Ryan Parisi is a Managing Director in the Derivatives Group at High Ridge Partners, an investment management firm. Parisi specializes in advising institutional clients on the use of forward contracts in their portfolio management strategies. Parisi is preparing to meet with three of the firm's U.S. based clients: Leslie Sheroda, Kihoon Kwon, and David Ruane. Corey Curmaci, an analyst in the Derivatives Group, has also been asked to attend the meeting. Prior to the meeting, Parisi asks Curmaci if he is clear about how the value of a forward contract is determined. Curmaci responds, "Yes, lam. In general, the value of a forward contract may be positive or negative at the inception of the contract, during its life, and at the expiration of the contract."

Leslie Sheroda manages equity portfolios for a pension fund. One month (30 days) ago, Sheroda had indicated that the pension fund expected a large inflow of cash in 60 days. In order to hedge against a potential rise in equity values over this period, Parisi advised Sheroda to enter into a long forward contract on the S&P 500 stock index expiring in 60 days. Sheroda has asked Parisi to calculate the value of the forward position today; that is, 30 days after the contract was initiated. Parisi has collected the information in Exhibit 1 below to carry out the valuation assignment.

Exhibit 1 Selected Financial Information for Sheroda Meeting	
Price of a 60-day S&P 500 Forward Contract 30 Days Ago	1403.22
S&P 500 Index Level Today	1450.82
Annualized Continuously Compounded Risk-Free Rate	3.92%
Annualized Continuously Compounded Dividend Yield for S&P 500	2.50%

Three months ago (90 days), Kwon purchased a bond with a 5% annual coupon rate and a maturity of 7 years from the date of purchase. The bond has a face value of $1,000 and pays interest every 180 days from the date of issue. Kwon is concerned about a potential increase in interest rates over the next year and has approached Parisi for advice on how he can use forward contracts to manage his risk. Parisi advises Kwon to enter into a short forward contract expiring in 360 days. The annualized risk-free rate now is 4% per year and the price of the bond with accrued interest is $1,071.33. Kwon asks Parisi to calculate the appropriate price for the forward contract. Parisi's next meeting is with Ruane, who is the corporate treasurer for a manufacturing firm. For the meeting, Parisi has collected the information in Exhibit 2.

Exhibit 2 Selected Financial Information for Ruane Meeting	
Annualized 90-day LIBOR rate	3.2%
Annualized 450-day LIBOR rate	4.5%
Annualized risk-free rate in the U.S.	4.0%
Annualized risk-free rate in the euro zone.	6.0%

Spot Exchange Rate $ per €	1.3900

Three months (90 days) from now Ruane expects to borrow $5 million, at LIBOR, for a period of twelve months (360 days). He is concerned that interest rates may rise significantly over the next few months and wishes to hedge this risk. Parisi advises Ruane to enter into a Forward Rate Agreement (FRA) expiring in 90 days on 360 day LIBOR. Ruane wants to know the rate he would receive on the FRA.

1. In his response to Parisi, Curmaci is least likely correct with respect to the value of a forward contract:

A. at inception.

B. at expiration.

C. during the life of the contract.

2. Based on the information in Exhibit 1 and assuming a 360-day year; the value of Sheroda's forward contract is closest to:

A. $49.16.

B. $50.71.

C. $52.18.

3. Based on a 360-day year, the price of the forward contract on the bond purchased by Kwon is closest to:

A. $1,042.55.

B. $1,063.19.

C. $1,114.18.

4. The rate that Ruane would get on the FRA expiring in 90 days on 360 day LIBOR is closest to:

A. 1.26%

B. 3.83%.

C. 4.79%.

Case 2: Bridget Moyle

Bridget Moyle is a senior associate in the risk management division of ANM Financial Advisers (ANMFA). Moyle specializes in the use of derivatives to help ANMFA manage its various risk exposures. Moyle is meeting with two recently hired analysts, Jordan Petsas and Katy Iacocca. Petsas and Iacocca have been asked to prepare for a discussion on the fundamentals of futures, options, and swaps.

Moyle provides Petsas and Iacocca with the following information for a Treasury bond and asks them to calculate the price of a futures contract on this bond. The bond has a face value of $100,000, pays a 7% semiannual coupon, and matures in 15 years. The bond is priced at $156,000 and yields 2.5%. The futures contract expires in eight months, and the annualized risk-free rate is 1.5%. There are multiple deliverable bonds, and the conversion factor for this bond is 1.098.

The next item on the agenda is a discussion of option valuation models. Moyle states, "We are currently considering the purchase of put options on shares of the Rousseff Corporation. Selected information is provided in Exhibit 1.

Exhibit 1: Selected Stock and Options Data for Rousseff Corporation and the Risk-Free Interest Rate	
Exercise price	$590
Days to expiration (two 30-day periods)	60
Current stock price	$609.90
Up move on stock (per 30-day period)	12%
Down move on stock (per 30-day period)	4%
30-day risk-free interest rate (Annualized, monthly compounding)	3.00%

Iacocca responds, "In general, we could value the option using either the Black–Scholes–Merton model or the binomial option pricing model. But there is not enough information presented to use the Black–Scholes–Merton model."

"That is correct," states Moyle, and continues, "With respect to the Black–Scholes–Merton model, can you explain how the risk-free rate, time to expiration, and volatility affect European option prices?"

In answer to Moyle's question, Iacocca states, "Higher risk-free rates result in lower call and put option prices. Longer times to expiration result in higher call prices, but the impact on put prices is unclear. Higher volatility results in higher call and put option prices."

1. Based on the information provided by Moyle, the futures price on the Treasury bond is closest to:

A. $154,047.

B. $139,239.

C. $143,494.

2. Based on the information in Exhibit 1, the price of the put option using the two-period binomial option pricing model is closest to:

A. $14.98.

B. $1.96.

C. $9.31.

3. With respect to Moyle's question about the impact of selected inputs on the price of options, Iacocca is least likely correct about:

A. volatility.

B. time to expiration.

C. the risk-free rate.

4. Which of the following is not an assumption underlying the BSM options pricing model

A. The pricing of the underlying instrument moves smoothly from value to value.

B. Short selling of the underlying instrument is not allowed.

C. The option can only be exercised at marturity.

Case 3: Shirley Nolte

Shirley Nolte, CFA, is a portfolio manager for McHugh Investments. Her portfolio includes 5,000 shares of Pioneer common stock (ticker symbol PNER), which is currently trading at $40 per share and does not pay any dividends. Pioneer is an energy and petrochemical business that operates or markets its products in the United States, Canada, Mexico, and over 100 other countries around the world. Pioneer's core business is the exploration, production, and transportation of crude oil and natural gas. Pioneer also manufactures and markets petroleum products, basic petrochemicals, and a variety of specialty products.

Nolte would like to fully hedge her exposure to price fluctuations in Pioneer common stock over the next 90 days. She determines that the continuously compounded risk-free rate is 5%. She also gathers some information on exchange-traded options available on Pioneer stock. This data is shown in Exhibit 1.

Exhibit 1: Exchange-Traded Options on Pioneer Stock

Maturity	Exercise Price	Call Option Price	Call Option Delta	Put Option Price
1-month	$40	$2.84	0.54	$2.67
3-month	$40	$5.00	0.58	$4.50
6-month	$40	$7.14	0.61	$6.15
9-month	$40	$8.81	0.63	$7.34

She also concludes that the 9-month put option is mispriced relative to the 9-month call option, and an arbitrage opportunity is possible, but that the 3-month put option is correctly priced relative to its comparable call option.

One year at-the-money calls on the stock of Delpha (current price $60) are trading at $6.90. Nolte believes that over the next year, the stock could either appreciate or depreciate by 15%.

1. Which of the following positions will *best* delta hedge Nolte's long position in Pioneer?

A. Short 9,259 1-month call options.

B. Short 8,197 3-month call options.

C. Short 7,937 6-month call options.

2. If Nolte hedges the position with the 3-month call options, she:

A. will have to continuously rebalance the position in order to maintain the delta hedge.

B. can offset the cost of the hedge and maintain the hedged position by buying an equivalent amount of 3-month put options.

C. will perfectly hedge the position over the 90-day investment horizon and won't need to rebalance the position only if the stock price of Pioneer remains at $40 for 90 days.

3. Is Nolte correct in her analysis of the relative pricing of the 3-month put option and the 9-month put option?

A. Nolte is correct on both options.

B. Nolte is only correct on the 3-month option.

C. Nolte is only correct on the 9-month option.

4. For this question only, assume that the periodically compounded risk-free rate is 5%. An arbitrage profit can *most likely* be earned by:

A. buying Delpha calls and shorting Delpha stock.

B. buying Delpha stock and Delpha calls.

C. buying Delpha stock and writing Delpha calls.

Case 4: Michelle Norris

Michelle Norris, CFA, manages assets for individual investors in the U.S. as well as in other countries. Norris limits the scope of her practice to equity securities traded on U.S. stock exchanges. Her partner, John Witkowski, handles any requests for international securities. Recently, one of Norris's wealthiest clients suffered a substantial decline in the value of his international portfolio. Worried that his U.S. allocation might suffer the same fate, he has asked Norris to implement a hedge on his portfolio. Norris has agreed to her client's request and is currently in the process of evaluating several futures contracts. Her primary interest is in a futures contract on a broad equity index that will expire 240 days from today. The closing price as of yesterday, January 17, for the equity index was 1,050. The expected dividends from the index yield *2%* (continuously compounded annual rate). The continuously compounded risk-free rate is 4%. Norris decides that this equity index futures contract is the appropriate hedge for her client's portfolio and enters into the contract.

Sixty days after entering into the futures contract, the equity index reached a level of 1,015. The futures contract that Norris purchased is now trading on the Chicago Mercantile Exchange for a price of 1,035. Interest rates have not changed. After performing some calculations, Norris calls her client to let him know of an arbitrage opportunity related to his futures position. Over the phone, Norris makes the following comments to her client:

"We have an excellent opportunity to earn a riskless profit by engaging in arbitrage using the equity index, risk-free assets, and futures contracts. My recommended strategy is as follows: We should sell the equity index short, buy the futures contract, and pay any dividends occurring over the life of the contract. By pursuing this strategy, we can generate profits for your portfolio without incurring any risk."

Sixty days ago when the Swiss franc/euro exchange rate was SF1.12 per euro, Witkowski entered into (on behalf of a client) a one-year, quarterly settlement euro-Swiss franc swap paying €1 million at inception. The fixed-for-fixed swap had the franc fixed rate at 0.96% and the euro fixed rate at 0.78%. Currently, the euro position has a value of €1.0014 per €1 notional and the exchange rate is SF 1.10 per euro. Exhibit 1 provides information about Swiss interest rates.

Exhibit 1: Swiss Interest Rates

Term	Rate	PV of $1
30	0.50%	0.9996
60	0.54%	0.9991
90	0.48%	0.9988
120	0.65%	0.9978
180	0.77%	0.9962
210	0.67%	0.9961
300	0.82%	0.9932

360	1%	0.9901

1. The price of the futures contract on the equity index as of the inception date, January 18, is *closest* to:

A. 1,064.

B. 1,071.

C. 1,078.

2. Which of the following *best* describes the movement of the futures price on the 240-day equity index futures contract as the contract moves toward the expiration date?

A. The futures price will move toward zero as expiration nears.

B. The futures price will move toward the (at inception) expected spot price as expiration nears.

C. The futures price will move toward the spot price as expiration nears.

3. Sixty days after the inception of the futures contract on the equity index, Norris has suggested an arbitrage strategy. Regarding the appropriateness of the strategy, the strategy is *best* described as:

A. appropriate since the futures contract is underpriced.

B. inappropriate since the futures contract is overpriced.

C. inappropriate since the futures contract is properly priced in the market.

4. If the expected growth rate in dividends for stocks increases by 75 basis points, which of the following would benefit the most? An investor who:

A. is short futures contracts on the equity index.

B. is long futures contracts on the equity index.

C. has a long position in put options on the equity index.

5. Sixty days after entering into the equity index futures contract, the value to the short party under the futures contract as compared to the value under an otherwise identical forward contract would *most likely* be:

A. lower.

B. the same.

C. higher.

6. Sixty days after inception, the value of the currency swap to Witkowski's client is *closest* to:

A. -€19,633

B. -€141,584

C. -€1,021,033

Case 5: Mafadi

Mafadi Consulting Limited is a boutique financial services company located in Johannesburg, South Africa. Mafadi specializes in providing commodity and currency hedging solutions to institutional investors and corporations.

Andre Fourie is a senior client services consultant for Mafadi. He manages relationships with a number of institutions to assist with their hedging needs. One of Fourie's client's is Global Bullion, a mining and exploration company headquartered in the United States.

Fourie is discussing forward contracts with Patrick Jacob, a new risk analyst at Global Bullion. Jacob is asking about similarities and differences between forward and futures contracts. Fourie makes the following comments to Jacob:

Comment 1: If you are long a futures or forward contract and the price of the underlying has risen, the value of a futures contract is most likely lower than that of the equivalent forward contract.

Comment 2: Forward contracts are marked to market each day, whereas futures contracts are not.

Comment 3: The market value of both futures and forward contracts at initiation is zero.

Jacob wants to understand more about the carry arbitrage approach to valuation and, as part of the discussion, Fourie describes the two fundamental rules for the arbitrageur:

Rule 1: The arbitrageur never uses her own money to purchase the underlying security and always invests any proceeds from short selling transactions at the risk-free rate.

Rule 2: The arbitrageur does not take any market price risk on the total trade, but individual components of the trade may involve price risk.

Mbali Ndlovu, a trader on Mafadi's derivatives desk, works closely with Fourie to implement solutions for his clients. Fourie asks Ndlovu to review and calculate the value of a five-year ZAR20,000,000 swap into which Global Bullion entered two years ago. It is a receive-fixed, Libor-based interest rate swap with annual resets (30/360 day count). The fixed rate in the swap contract established two years ago was 3%. Exhibit 1 estimates the present value factors.

Exhibit 1 Present Value Factors for Five-Year Swap

Maturity (years)	Present Value Factor
1	0.9802
2	0.9560
3	0.9311

In addition to assisting Fourie, Ndlovu focuses on finding profitable trades for Mafadi by investing the firm's own capital. Ndlovu has noticed some unusual activity in foreign exchange forward rates, especially the rates for the New Zealand dollar (NZD) and the South African rand

(ZAR), ZAR/NZD. The foreign exchange forward rate, F0 (ZAR/NZD, T), is currently below the foreign exchange spot rate, S0 (ZAR/NZD).

Ndlovu is also evaluating the forward contract in Zulu Mineral Mining (Zulu) stock to determine if an arbitrage opportunity exists. The South African 12-month prime rate is 3.25%. The spot price for Zulu is ZAR 60.50. Zulu pays an annual dividend of ZAR3.00, and the next dividend is paid in three months. Interest compounds annually.

Ndlovu receives a request from Fourie to structure an OTC swap transaction for one of his clients. After reviewing the request, Ndlovu agrees to be the counterparty for a one-year swap on Tanzanite Resources (Tanzanite) stock in which the client is seeking to enter into a receive-equity returns and pay-fixed arrangement. Tanzanite does not pay a dividend. The swap is structured as a quarterly reset, 30/360 day count, with a notional value of ZAR 5,000,000. The fixed rate is 3.2% annually. Zulu has a return of –3.6% for the first quarter.

1. Which of Fourie's comments to Jacob is least likely accurate?

A. Comment 1

B. Comment 2

C. Comment 3

2. Are Fourie's comments regarding fundamental rules for arbitrageurs most likely correct?

A. No, Rule 1 is incorrect

B. Yes

C. No, Rule 2 is incorrect

3. The value of Global Bullion's swap contract is closest to:

A ZAR 1,720,380.

B ZAR 1,324,380.

C ZAR 344,076.

4. Based on the carry arbitrage model, New Zealand interest rates, compared with South African interest rates, are most likely:

A. higher.

B. the same.

C. lower.

5. The three-month forward price for Zulu stock is closest to:

A. ZAR63.99

B. ZAR59.47

C. ZAR57.99

6. The cash flow to Ndlovu after the first quarter of the Tanzanite swap is closest to:

A. ZAR 219,529.

B. –ZAR 140,471.

C. ZAR 340,000.

Case 6: Nils

Nils analyzes a US Treasury futures contract that he plans to use to hedge a corporate bond's interest rate risk. He researches the characteristics of Treasury futures and observes the following characteristics.

Characteristic 1 The underlying deliverable bond in a US Treasury futures contract consists of a basket of bonds from which the short position can deliver the cheapest bond.

Characteristic 2 Eligible deliverable bonds can have various maturities and coupon rates, and the seller will receive the futures price adjusted by a conversion factor to account for any accrued interest.

Characteristic 3 Long and short positions are marked to market each day. Therefore, the contract's market value at the end of each day is zero.

Nils also notices that a US company needs to borrow 100 million Australian dollars (A$) for one year for its Australian subsidiary. The company decides to issue US-denominated bonds in an amount equivalent to A$100 million. Then the company enters into a one-year currency swap with quarterly reset (30/360 day count) and the exchange of notional amounts at initiation and at maturity. At the swap's initiation, the US company receives the notional amount in Australian dollars and pays to the counterparty, a swap dealer, the notional amount in US dollars. At the swap's expiration, the US company pays the notional amount in Australian dollars and receives from the counterparty the notional amount in US dollars. Based on interbank rates, he observes the following spot rates today, at Time 0:

Days to Maturity	A$ Spot Interest Rates (%)	US$ Spot Interest Rates (%)
90	2.50	0.10
180	2.60	0.15
270	2.70	0.20
360	2.80	0.25

Assume that the counterparties in the currency swap agree to an A$/US$ spot exchange rate of 1.140 (expressed as number of Australian dollars for US$1).

An Australian company which has ongoing floating-rate debt, asks Nils for advice. The company has profited for some time by paying at a floating rate because rates have been falling steadily for the last few years. Now, however, the company is concerned that within three months the Australian central bank may tighten its monetary policy and your debt costs will thus increase. Rather than lock in the borrowing via a swap, the company prefers to hedge by buying a swaption expiring in three months. The current three-month forward, five-year swap rate is 2.65%. The current five-year swap rate is 2.55%. The current three-month risk-free rate is 2.25%.

1. Which characteristic observed by Nils regarding Treasury futures is least likely correct?

A. Characteristic 1

B. Characteristic 2

C. Characteristic 3

2. The annual fixed swap rates for Australian dollars and US dollars, respectively, will be closest to:

A. 2.80% and 0.10%.

B. 2.77% and 0.25%.

C. 2.65% and 0.175%.

3. The notional amount (in US$ millions) will be closest to:

A. 88.

B. 100.

C. 114.

4. With reference to the Black model to value the swaption, which statement is correct?

A. The underlying is the three-month forward, five-year swap rate.

B. The discount rate to use is 2.55%.

C. The swaption time to expiration, T, is five years.

Case 7: Allen Powell

Allen Powell has been hired recently to work with senior analyst Steven Williams. Williams provides him with these following information.

Alpha Company

Powell's first task is to illustrate how to value a call option on Alpha Company with a one-period binomial option pricing model. It is a non-dividend-paying stock, and the inputs are as follows.

- The current stock price is 50, and the call option exercise price is 50.
- In one period, the stock price will either rise to 56 or decline to 46.
- The risk-free rate of return is 5% per period.

Based on the model, Williams asks Powell to estimate the hedge ratio, the risk-neutral probability of an up move, and the price of the call option. In the illustration, Powell is also asked to describe related arbitrage positions to use if the call option is overpriced relative to the model.

European Options on Futures Index

The second task is the valuation of option on index. The S&P 500 Index (a spot index) is presently at 1,860 and the 0.25 expiration futures contract is trading at 1,851.65. Suppose further that the exercise price is 1,860, the continuously compounded risk-free rate is 0.2%, time to expiration is 0.25, volatility is 15%, and the dividend yield is 2.0%. Based on this information, the following results are obtained for options on the futures contract.

Options on Futures	
Calls	**Puts**
$N(d_1)$ =0.491	$N(-d_1)$ = 0.509
$N(d_2)$ = 0.461	$N(-d_2)$ = 0.539
c = US$51.41	p = US$59.76

European Interest Rate Options

On 15 May, Williams anticipates that some regulatory changes will be enacted, and he wants to profit from this forecast. On 15 June, Williams intend to borrow 10,000,000 Singapore dollars to fund the purchase of an asset, which he expects to resell at a profit three months after purchase, say on 15 September. The current three-month Sibor (that is, Singapore Libor) is 0.55%. The appropriate FRA rate over the period of 15 June to 15 September is currently 0.68%. Williams is concerned that rates will rise, so he wants to hedge his borrowing risk by purchasing an interest rate call option with an exercise rate of 0.60%.

1. The optimal hedge ratio for the Alpha Company call option using the one-period binomial model is closest to:

A. 0.60.

B. 0.67.

C. 1.67.

2. The value of the Alpha Company call option is closest to:

A. 3.71.

B. 5.71.

C. 6.19.

3. Identify the statement that best describes how the Black model is used to value a European call option on the futures contract just described.

A. The call value is the present value of the difference between the exercise price times 0.461 and the current futures price times 0.539.

B. The call value is the present value of the difference between the current futures price times 0.491 and the exercise price times 0.461.

C. The call value is the present value of the difference between the current spot price times 0.491 and the exercise price times 0.461.

4. In using the Black model to value this interest rate call option, what would the underlying rate be?

A. 0.55%

B. 0.68%

C. 0.60%

Case 8: Laura Carter

Laura Carter CFA, a valuations specialist at ICMA centre, focus on derivatives invesment. She is valuing an American call option on Kim Ltd. with an exercise price of USD 20 and it will expiry in two years. The underlying (Kim Ltd' stock) of American call option is currently trading at USD 30 and is due to pay a dividend of USD 1.5 in one year's time. The stock's up move factor is 1.25 and the down move factor is 0.80. The annual risk free rate is 5%.

1. The risk neutral probability of a down move is closest to:

A. 0.80

B. 0.56

C. 0.44

2. The call option's value after an up move at year 1 is closest to:

A. USD 16.7347

B. USD 17.2143

C. USD 35.7143

3. The hedge ratio at year 1 after a down move is closest to:

A. 1.0000

B. 0.9833

C. 0.8333

4. The call option's current value is closest to:

A. USD10.2724

B. USD11.0966

C. USD22.0086

5. Assuming that the given option was a European option, its current value would have been:

A. higher.

B. same.

C. lower.

Case 9: Caroline Saunby

The ICMA Centre is a derivative-related investment company and has a group of experts with various background. Recently, Caroline Saunby, CFA, an analyst of ICMA Centre, is valuing a two year European call option on the periodically compounded one year spot rate. The exercise rate of the option is 1.5% and the risk neutral probability is 50%. The notional principal is £3 million. The two period binomial interest rate is shown below:

				t=2	
		t=1		Underlying	2.65%
		Underlying	2.10%	Value	0.9742
t=0		Value	0.9794		
Underlying	1.60%			Underlying	1.85%
Value	0.9843			Value	0.9818
		Underlying	1.35%		
		Value	0.9867	Underlying	1.36%
				Value	0.9866

1. The rate at the top most node at year 2 is:

A. a two-year spot rate beginning from year 2

B. a one-year spot rate beginning from year 2

C. a one-year spot rate beginning from year 3.

2. The current option value is closest to:

A. £1,320

B. £13,200

C. £26,400

Case 10: Alice Zhen

Alice Zhen, CEO and chief investment officer of Princeton Capital, is collaborating with Tom Jeffinsin, head trader, and Jim Madisox, a new analyst, to discuss option valuation methodologies in the context of the firm's use of derivatives to manage client portfolios.

Zhen initiates the discussion by highlighting that the Black–Scholes–Merton (BSM) model is a robust tool for valuing options, despite its complex computational aspects. Zhen then proceeds to write the BSM model on the firm's whiteboard, presented as Exhibit 1.

Exhibit 1 BSM Model for Options on Non-Dividend Paying Stocks

$$c = SN(d_1) - e^{-rT}xN(d_2),$$

and

$$p = e^{-rT}XN(-d_2) - SN(-d_1),$$

where

$$d_1 = \frac{\ln\left(\frac{S}{X}\right) + [r - \gamma + 0.5\sigma^2] \times T}{\sigma \times \sqrt{T}}$$

$$d_2 = d_1 - \sigma \times \sqrt{T}$$

Zhen proceeds to assess Madisox's understanding of the components of the BSM. Madisox accurately points out that a call option can be seen as a leveraged position in the underlying stock. To replicate a call option, the appropriate strategy would be to purchase N(d1) shares and simultaneously borrow an amount $e^{-rT}xN(-d_2)$.

Jeffinsin further contributes to the discussion by introducing option Greeks, emphasizing that the BSM model incorporates six key inputs: stock price, option exercise price, dividends, risk-free interest rate, time to maturity, and implied volatility. He explains that the impact of these inputs on the option price can be measured using option Greeks. Delta and gamma assess the relationship between stock price changes and option price, while Theta approaches zero as the option nears maturity. Additionally, Vega tends to be higher when an option is out of the money.

Zhen then mentions that a client is interested in selling calls on 1,000 shares of Weehawkin stock, with relevant stock and option information detailed in Exhibit 2.

Exhibit 2 Option Information on Weehawkin Corporation Stock

Stock Price	$100
Call Option Exercise Price	$100
Call Option Value	$9.23
Call Option Delta	0.587
Call Option Gamma	0.019

Zhen asks Madisox to outline an appropriate hedging strategy. Madisox explains that in order to be fully hedged, an option trader must consider how changes in the stock price relative to the option exercise price impact the value of the call options. A proper hedging strategy, according to Madisox, involves utilizing call option delta and incorporating call option gamma to determine the necessary number of shares for the hedge.

Madisox mentions that the implied volatility for the Weehawkin call option mentioned in Exhibit 2 is 30%. He also discusses the volatility surface, which illustrates how implied volatility varies across exercise price and time to maturity for other call options on Weehawkin stock. Zhen adds that implied volatility is valuable for assessing market price risk as it is calculated based on historical stock price volatility. Jeffinsin agrees and points out that the volatility smile and skew tend to exhibit similar shapes as the option price of hedging increases.

1. Madisox's statement about the BSM model is least likely correct with respect to:

A. purchasing N(d1) shares.

B. the leveraged position in a stock.

C. borrowing an amount $e^{-rT}xN(-d_2)$.

2. Jeffinsin's statement about option Greeks is least likely correct with respect to:

A. vega.

B. theta.

C. delta and gamma.

3. Is Madisox's suggested hedging strategy for Weehawkin options most likely correct?

A. Yes.

B. No, he should only use delta.

C. No, he should subtract gamma.

4. Whose comment regarding implied volatility is most likely correct?

A. Zhen's

B. Madisox's

C. Jeffinsin's

Case 11: Ellen Advisors Inc

Ellen Advisors Inc. provides portfolio replication services to pension funds and insurance companies using options. Clients can replicate market exposures with smaller investments. Ellen manages Wertfin Insurance Company's exposures related to annuities indexed to the German Blue Chip Equity Index. Portfolio manager Hannes Messer is meeting with Wertfin's risk manager, Jens Szillat, to discuss the principles behind the option strategies being used.

Szillat asks Messer to provide more information about Ellen's methodologies for managing the index options in their portfolio, stating that while they have a basic understanding of option valuation models, they would like to deepen their knowledge in this area.

Messer states, The binomial valuation model can be applied to the two-year European style index call options we purchased one year ago. The applicable underlying instrument is the German Blue Chip Equity price index, which excludes dividends. Exhibit 1 shows the option's characteristics at the time of purchase.

Exhibit 1: Binomial Model Variables

u	1.15
d	0.90
π	0.52
Index price	EUR 720
Strike price	EUR 750
Hedge ratio	0.5697
1-year interest rate	3%
S–	648
C–	0

Messer logically points out, "it is worth noting that with a 10% decrease in the index over the past year, the outcomes achievable through these options could have been achieved through alternative means without utilizing options". In response, Szillat astutely adds, "It appears that the payoff would have been equivalent to that of the call option by acquiring 0.5697 index units and lending EUR 356.79 at the prevailing one-year interest rate."

The analysis conducted a year ago showed that two-year puts with a strike price of EUR750 were priced at EUR38.48. Utilizing the information provided in Exhibit 1 alongside the current index value, the binomial valuation model now calculates the price of the put as EUR80.15. It is worth noting that the current trading price of the put has exceeded this calculation, currently standing at EUR92.

Szillat responds, "I am curious whether you also use the Black–Scholes–Merton (BSM) model

for valuation. I understand the BSM and binomial models both have the following three assumptions in common."

- Assumption 1: Trading is possible at every instant.
- Assumption 2: Volatility can be predicted with certainty.
- Assumption 3: The annualized returns on the underlying follow a normal distribution.

Szillat then asks, "How do you utilize the BSM model?"

Messer answers, "We use the BSM model to calculate estimates on a wide array of comparative option variables, such as how much the option value will change for a change in a particular parameter. For example, we can estimate how the rate of change of an option price speeds up or slows down for a given change in the price of the underlying index."

Messer concludes, "We also use the BSM model to calculate the implied volatility. The implied volatilities of the index options expiring in one year are shown in Exhibit 2."

Exhibit 2: Implied Volatility Curve

Strike Price	Implied Volatility
700	18.7
710	17.98
720	17.38
730	16.69
740	15.83
750	15.40
760	14.50
770	14.03
780	13.21
790	12.11
800	11.09

1. With respect to his assessment of replicating the option payoff, Szillat is least likely correct about:

A. lending EUR356.79.
B. using the one-year interest rate.
C. purchasing 0.5697 index units.

2. Does the put option with a strike price of EUR750 currently offer an arbitrage opportunity?

A. Yes.

B. No, because the put is deep in the money.

C. No, because the market has bid up the price of the put.

3. Which of Szillat's assumptions is least consistent with the BSM model?

A. Assumption 1

B. Assumption 2

C. Assumption 3

4. In describing how call option prices change, Messer is most likely referring to:

A. delta.

B. vega.

C. gamma.

5. Which of the following would Messer most likely conclude from the implied volatility data in Exhibit 2 if he excludes the effects of moneyness and time to expiration?

A. Using out-of-the-money options to establish either long or short positions is more expensive than using at-the-money options.

B. Using out-of-the-money put options to hedge is more expensive than establishing a long position with out-of-the-money call options.

C. Using out-of-the-money call options to establish a long position is more expensive than establishing a short position using out-of-the-money put options.

8. Alternative Investment

Case 1: Wanda Maximoff

Wanda Maximoff is a Swiss-based wealth manager who offers discretionary portfolio management services to high-net-worth individuals. She believes that the portfolios of a number of her clients would benefit from investments in hedge funds. Maximoff has discussed the relative merits of hedge fund investing with six clients and has received their approval to add this asset class to their portfolios, subject to agreed upon investment criteria. Maximoff consults the notes that she has made during her conversations with these clients.

Client 1 prefers a hedge fund strategy that uses top-down analysis in a broad range of securities markets, taking positions that are thematic or directional. Markets can be valued using macroeconomic and fundamental analysis, and the hedge fund strategy is typically implemented using discretionary trading. Maximoff also notes that this client has a high tolerance for investment risk.

Maximoff researches an event-driven strategy involving a potential merger between City Airline (CA) and Discount Airways (DA) for Client 2. CA offered to acquire DA in an all-stock deal, offering one share of CA stock for every three shares of DA. Before the offer became public, DA stock traded at CHF13 per share. After the merger announcement, DA stock rose to CHF15 per share. CA currently trades at CHF46 per share, which is CHF3 per share lower than its price before the offer became public. Maximoff also mentions that the stock of CA's direct competitor Big Airways (BA) gained 12% on its CHF48 share price when CA's offer for DA became public.

Maximoff wants to exploit the arbitrage opportunity from the offer announcement by buying 225,000 DA shares at CHF 15 per share and short selling 75,000 shares of CA at CHF46 per share.

Client 3 would like to know the differences between fund-of-funds strategies and multi-manager strategies. Maximoff makes the following statements:

Statement 1: Both multi-manager funds and funds-of-funds are designed to offer steady, low-volatility returns via their strategy diversification.

Statement 2: Funds-of-funds have historically outperformed multi-manager strategies.

Statement 3: Funds-of-funds generally have higher fees relative to multi-manager strategies.

Client 4 wants to add a volatility trading strategy as a portfolio diversifier and has specified that the strategy must by highly liquid. Maximoff's notes indicate that there are multiple ways of implementing a volatility trading strategy; although, some strategies offer more liquidity than others.

Client 5 informs Maximoff that for equity- related strategies, the client considers low volatility to be more important than negative correlation.

Client 6 is a small foundation that has a traditional asset allocation of 65% stocks/35% bonds. It considers allocating 10% of portfolio asset to hedge fund strategy. The foundation requires the hedge fund strategy allocation to: a) limit volatility, b) maximize risk-adjusted returns, and c) limit

downside risk.

Wanda prepares expected risk and return characteristics for three portfolios that have allocations of 60% stocks, 30% bonds, and 10% hedge funds, where the 10% hedge fund allocation follows either an equity market-neutral, global macro, or convertible arbitrage strategy. The risk and return characteristics of the three portfolios are presented in Panel B of Exhibit 1.

Exhibit 1

Hedge Fund Strategy	SD (%)	Sharpe Ratio	Sortino Ratio	Maximum Drawdown (%)
Panel A: Current Portfolio				
N/A	10.06	0.80	1.23	18.63
Panel B: Three Potential Portfolios with a 10% Hedge Fund Allocation				
Equity market neutral	10.03	0.78	1.19	17.37
Global macro	9.83	0.93	1.32	17.25
Convertible arbitrage	10.33	0.81	1.24	23.23

1. The most appropriate hedge fund strategy for Client 1 is:

A. a global macro strategy.

B. a managed futures strategy.

C. a dedicated short-selling strategy.

2. Assuming the merger between CA and DA succeeds, the payoff on Maximoff's merger arbitrage trade will be:

A. CHF75,000.

B. CHF675,000.

C. CHF3,375,000.

3. Which statement made by Maximoff about the differences between funds-of-funds and multi-manager funds is least likely correct?

A. Statement 1

B. Statement 2

C. Statement 3

4. Which of the following volatility trading strategies is most likely to meet Client 4's liquidity preference?

A. VIX index futures.

B. OTC variance swaps.

C. OTC volatility swaps.

5. Based on what Client 5 considers important for equity-related strategies, which strategy should Maximoff most likely avoid?

A. Short biased strategies.

B. Equity market neutral strategies.

C. Long/short equity strategies.

6. Which hedge fund strategy is most suitable for Client 6?

A. Equity market neutral

B. Global macro

C. Convertible arbitrage

Case 2: EastCoast Associates

EastCoast Associates offers quantitatively driven investment opportunities for a range of clients, making both traditional and alternative investments. Stephen Beck is the founder and CIO of the firm. Beck discusses how to diversify GreatCity insurance's portfolio with the company's CFO, Peter Foster. Foster is interested in different hedge fund strategies. In selecting a hedge fund manager, Foster prefers to hire a manager that uses the following:

Take advantage of arbitrage opportunities between securities that arise because of variations in duration, credit quality, liquidity, and optionality.

To exploit price differences relative to expected future price relationships, with mean reversion being an important consideration.

To forecast macroeconomic conditions to enable trades across various points on the yield curve.

Beck's senior investment manager, Jim Smith, presents the following potential hedge fund investments:

Hedge Fund 1: A relative value strategy fund focusing only on fixed-income arbitrage.

Hedge Fund 2: An equity strategy fund focusing only on Long/short equity strategies.

Hedge Fund 3: An opportunistic strategy fund focusing on global macro strategies.

Foster wants to know the risks involved with his choice of strategy. Smith responds, "This strategy has credit risk, interest rate risk, and left-tail risk attributes."

Foster tells Beck that GreatCity's investment committee (IC) would like to invest 20% of the insurance's portfolio in the hedge fund strategy. At present, the portfolio is invested in traditional assets, mainly stocks and bonds. The committee's main objectives for the combined portfolio are that any hedge fund strategy allocation should a) maximize risk-adjusted returns, b) limit portfolio drawdown, and c) not impair portfolio liquidity. The IC wants to avoid layering of fees for any hedge fund allocation.

After requisite due diligence, Beck's staff shares the following information on several funds when combined with a traditional 60%/40% portfolio of stocks and bonds.

Exhibit 2 Past Performance results of a 48% stocks/32% bonds/20% Hedge Fund Strategy Portfolio

Category/Type	Mean Return (%)	SD (%)	Sharpe Ratio	Sortino Ratio	Maximum Drawdown (%)
Traditional Portfolio	6.96	8.66	0.62	1.13	14.42
Event Driven	7.13	7.76	0.71	1.44	20.96
Fixed-Income Arbitrage/ Relative Value	7.5	7.82	0.75	1.39	12.68
Convertible Arbitrage/ Relative Value	6.91	7.68	0.69	1.25	27.91
Fund of Funds Event/Multi-Manager	6.56	7.4	0.63	1.15	21.37

Note: The table values are extracted from Exhibit 19 of Reading 19

Finally, Foster asks about the differences between fund-of-funds and multi-strategy funds that investors must consider when deciding between these two multi-manager types that best fits their needs.

1. The fund most appropriate for Foster is:

A. Hedge Fund 1.

B. Hedge Fund 2.

C. Hedge Fund 3.

2. Smith is least likely correct regarding:

A. credit risk.

B. interest rate risk.

C. left-tail risk attributes.

3. The hedge fund strategy least suitable for meeting the GreatCity insurance portfolio's objectives is:

A. fixed-income arbitrage.

B. convertible arbitrage.

C. fund of funds.

4. Which one of the following statements regarding differences between fund-of-funds (FoFs) and multi-strategy is least likely correct?

A. Multi-strategy funds offer relatively faster tactical asset allocation and improved fee structure relative to fund-of-funds.

B. Multi-strategy funds offer better liquidity to investors than FoFs.

C. Multi-strategy funds generally outperform FoFs but with more variance and occasional large losses.

Case 3: Sally Stone

Sally Stone, a seasoned investor in equity and fixed income securities, is interested in adding real estate to his portfolio. With no previous real estate experience, Stone seeks professional advice from GEK, a real estate investment advisory firm. Stone asked the following questions regarding real estate investments in the introductory meeting with Sarah Smith, an analyst at GEK.

Question 1: Which form of real estate investment would be best suited for me in terms of portfolio diversification?

Question 2: How efficient is real estate market compared to the stock and bond markets?

Question 3: Which factors should be taken into consideration when using real estate investment indices?

A few days later, Stone meets his former colleague, Henry Thomas, who has invested in commercial real estate. Thomas tells Stone that it is an appropriate time to invest in industrial and hotel REITs and makes the following two statements.

Statement 1: Increasing consumer spending and business formation trends will positively affect revenues of industrial and hotel REITs.

Statement 2: Hotel REITs' revenue streams are protected from changes in demand because there are long-term leases on hotel rooms.

1. As a response to Question 1, which form of real estate investment is not suited for Stone?

A. Mortgage REITs

B. Publicly traded REITs

C. Direct investment in real estate through a joint venture

2. Equity investors in real estate can gain from:

A. Rent

B. Price appreciation

C. Both A) and B)

3. As a response to Question 2, compared to stock and bond markets, real estate market is:

A. less efficient

B. more efficient

C. equally efficient

4. Which of the following statements would be least accurate when responding to Question 3?

A. Appraisal based indexes suffer from appraisal lag which underestimates volatility.

B. Appraisal based indexes tend to have lower correlation with other asset classes.

C. Transaction based indexes are preferred because they are not noisy.

5. Which statement of Thomas is not correct?

A. Statement 1

B. Statement 2

C. Both Statements 1 & 2

Case 4: Tim Zhou

Tim Zhou is an accounts manager at ABC capital, an asset management firm. He wants to diversify his clients' portfolios by adding publicly traded real estate securities. His current portfolios are largely comprised of domestic equity and corporate bonds. Zhou mentions his intention to invest in publicly traded real estate to his colleague, Jessican Zhang, who responds:

"You should also consider direct real estate investments in your portfolio because such investments will likely result in current income and capital appreciation. However, they may impact portfolio risk because of high correlation with existing investments."

Vincent Lin, the fund's chief investment officer, recommends investing in securities that provide cash flows from sales of developed or improved properties.

Lin asks Zhou about the economic factors that affect the value of REITs of different property subtypes. Zhou makes the following comments about the major economic drivers of value of various types of equity REITs:

Comment I: Job creation is an important economic factor that affects the value of office REITs more than it affects the value of industrial and storage REITs.

Comment II: Retail sales growth is more important for the value of industrial REITs than for storage and office REITs.

Comment III: Population growth is less of a driver of value for multi-family REITs than for office and retail REITs.

Amy Dolly, an alternative investments research analyst at ABC, has been assigned to assist Zhou in his plans to include publicly traded real estate in some of his clients' portfolios. Dolly calculates and reports net asset value per share (NAVPS), instead of book value per share (BVPS), as the relevant valuation measure and provides the following explanation for her preferred approach:

I: NAVPS provides the fundamental benchmark for the value of a REIT. Discounts in the REIT share price from NAVPS show potential undervaluation and premium in the REIT share price from NAVPS reflect overvaluation.

II: NAVPS includes the value added by the management of the REIT.

III: NAVPS shows the current market value of the property rather than the values based on historical cost.

Dolly collects financial data for all three types of property REITs to calculate NAVPS. Exhibit 2 shows the data for REIT I.

Exhibit 2: Selected financial data for REIT I

Pro forma cash Net operating income (NOI) for last 12 months	$280 million
Cash and equivalents	$40 million
Land held for future development	$60 million
Accounts receivable	$20 million
Prepaid/other assets (excluding intangibles)	$6 million
Total debt	$1,430 million

Other liabilities	$168 million
Shares outstanding	60,000,000
Estimated growth in NOI in next 12 months	4.00%
Capitalization rate	6.50%

1. Regarding direct real estate investments, Zhang is least likely correct with respect to:

A. high correlation with existing investments.

B. current income generation.

C. capital appreciation.

2. The type of publicly traded real estate securities suggested by Lin is most likely a:

A. REIT.

B. REOC.

C. MBS.

3. Which of Zhou's comments regarding REITs is least appropriate:

A. I.

B. II.

C. III.

4. Which of Dolly's comments regarding REITs is least appropriate:

A. I.

B. II.

C. III.

5. Using the information in Exhibit 2, the NAVPS of REIT I is closest to:

A. $44.30

B. $50.13.

C. $52.93.

Case 5: Christian Mathew

Christian Mathew, chief investment officer at Bayside Asset Management (BAM), has short-listed two candidates, Richard Elliott and Martin Taylor, for the job of an investment analyst. Mathew wants to assess the candidates' knowledge and understanding of commodities because BAM wants to add commodities to their current investment mix of stocks and bonds.

Mathew starts the interview by asking the candidates about the difference in spot and futures prices and their impact on the futures market. He poses the following question to Elliott and Taylor:

Question: If the crude oil July–August calendar spread is –4.525 cents per pound and crude oil July–December calendar spread is USD4.16 per barrel, what can you say about these two spreads?

Satisfied with the responses of the candidates, Mathew gives Elliott and Taylor the following information given in Exhibit 1& 2 to calculate the total return and number of contracts needed in order to roll over a position.

Exhibit 1: Investor Hypothetical Data for WTI Crude oil futures

Realized price return on a WTI Crude oil futures contract	4.5%
Roll return after all contracts were rolled forward	2.0%
Initial collateral required	12.0%
Risk-free rate	1.5%
Time period for holding the contracts	1 year

Exhibit 2: Investor Hypothetical Data for Long Futures Contracts for Wheat bought in January 2016

Investor position to roll forward	USD16,500
March 2016 contract price	USD5.50/bushel
November 2016 contract price	USD4.12/bushel

Mathew further makes the following comments about roll return:

Comment 1: "In a portfolio of diversified commodity futures, roll return can significantly impact an investor's overall return over both single and multiple periods.

Comment 2: Sector diversification or concentration can influence an investor's roll return."

1. The best response to question of Mathew is:

A. individual prices are not important as only spreads are traded in commodity markets.

B. July-August spread shows futures markets are in backwardation and July-December shows futures markets are in contango.

C. July-August spread shows futures markets are in contango and July-December spread shows

that futures markets are in backwardation.

2. Based on Exhibit 1, the investor's total return on this position (annualized excluding leverage) was closest to:

A. 6.5%.

B. 6.7%.

C. 4.9%.

3. Based on the information given in Exhibit 2, the transaction most likely done in order to maintain the investor's current exposure is:

A. sell 4,000 near-term contracts and buy 3,000 of the longer-term contracts.

B. close out 3,000 near-term contracts and initiate 4,005 of the longer- term contracts.

C. let the near-term 3,000 contracts expire and invest the proceeds in 3,000 longer-term contracts

4. Regarding the comments on roll return, Mathew is correct with respect to:

A. Comment 1.

B. Comment 2.

C. Both comments.

Case 6: Paul Aimar

Paul Aimar is a financial adviser specializing in real estate investments. He is meeting with Juan Veron, a new client who is looking to diversify his investment portfolio. Veron is interested in learning more about investing in real estate but is curious as to how it would add value to his portfolio. Aimar lists several reasons an investor would include real estate investments in their portfolio.

Veron further inquires whether real estate investments have indexes similar to those of equities and fixed income. Aimar responds that real estate indexes do exist, but they differ from both equity and fixed income indexes. The two major types of real estate indexes are appraisal-based and transaction-based, both have advantages and disadvantages. A disadvantage of appraisal-based indexes is that they suffer from a lag, which tends to smooth the index. A disadvantage of transaction-based indexes is that they may contain random upward or downward movements.

Next, Aimar and Veron discuss characteristics and risks related to real estate investments.

1. Which of the following is least likely a reason to include real estate investments in a portfolio?

A. Tax benefits.
B. High short-run returns.
C. Inflation hedge.

2. Aimar's comments regarding the appraisal-based and transaction-based indexes are most likely:

A. incorrect with respect to the disadvantage of appraisal-based indexes.
B. incorrect with respect to the disadvantage of transaction-based indexes.
C. correct.

3. Which of the following is not a characteristic of real estate investment?

A. Heterogeneity and fixed location.
B. High unit value.
C. Low transaction costs.

4. A person investing in commercial real estate should be least concerned about risks due to::

A. changes in business conditions.
B. inflation in strong economic conditions.
C. leverage.

Case 7: Jeremy Grant

Jeremy Grant is a financial consultant known for his expertise in publicly traded real estate securities. Grant meets with Simon Walberg, a new client interested in adding real estate investments to his portfolio. Walberg asks about the different types of publicly traded real estate securities. Grant responds that there are several, for example, one type involves buying shares of a company that focuses on the development of real estate and generates income by selling these developed properties.

Walberg asks Grant about the valuation of REITs. Grant outlines the net asset value method.

Next, Walberg asks about the disadvantages of investing in publicly traded real estate securities. Grant makes the following comments in response to Walberg's question:

Comment 1: "REITs have no tax advantage compared to REOCs."

Comment 2: "Direct property owners have more control over property investment decisions than minority shareholders in a publicly traded REIT."

Comment 3: "The appraised net asset value of a REIT is more volatile than its market value, therefore risk is lower for direct property investors."

After thorough analysis, Grant believes demographic is a key economic driver for the major property types.

1. Grant's example of a form of public investment in real estate is most likely an example of investing in:

A. a REOC.
B. a REIT.
C. a mortgage-backed security.

2. Which of the following should most likely be considered when applying NAV method?

A. The share price is almost always equal to the NAVPS.
B. NAV approach treats a company as an individual asset or static pool of assets. However, management teams can purchase and sell assets and these decisions can add or subtract value.
C. NAV estimates become problematic when property markets are very liquid.

3. Which one of Grant's comments in response to Walberg's question is most likely correct?

A. Comment 1
B. Comment 2
C. Comment 3

4. The demand for which of the following types of real estate is likely most affected by population demographics?

A. Office

B. Multi-family

C. Industrial and warehouse

Case 8: Wabash Trading Advisers

Wabash Trading Advisers is a commodities trading and advisory firm with particular emphasis on the grains and livestock markets. Its clients include major food companies, financial institutions, and trading companies.

Tomas Gorski recently joined Wabash as a commodity analyst after several years with another firm as an equity analyst. He meets with a senior commodity analyst at Wabash, Pilar Moreno. She asks Gorski, "What differences are there between valuing commodities and valuing equities?" In response, Gorski makes the following statements.

Statement 1: Commodity valuation focuses on supply and demand, whereas equity valuation focuses on discounted cash flows.

Statement 2: Commodities do not generate future cash flows beyond what can be realized through their purchase and sale.

Statement 3: Equities and commodities are both considered financial assets.

Moreno explains to Gorski that Wabash does not participate in all of the commodity sectors. "We have intentionally chosen to avoid industrial metals because of certain disadvantage related to the economies of scale", she says.

Moreno continues, "One of Wabash's oldest clients, Fond du Lac, has been in business for more than 100 years and has developed sophisticated pricing models. Currently, their models predict that the price of corn is poised to more than double in the next six months. Fond du Lac has purchased a large amount of corn in the spot market and has taken delivery at its storage facilities. When the price increase occurs, they intend to sell the corn in the spot market."

Moreno discusses commodity sectors' returns with his colleague Gorski. Moreno comments that the commodity futures returns are based on three theories. Gorski agrees and makes the following statements:

"The insurance theory proposes that the producer hedges his sales price risk by using commodity futures market to lock in prices hence the futures price curve is typically in backwardation. The hedging perspective assumes a flat commodity curve if the two forces of sellers and buyers seeking price protection are equal. Finally, the theory of storage focuses on a direct relationship between the level of inventories and the convenience yield."

1. Which of Gorski's statements about the differences in the valuation of equities and commodities is least likely correct?

A. Statement 2
B. Statement 1
C. Statement 3

2. Because of large economies of scale for processing industrial metals, producers:

A. immediately shut down new capacity when supply exceeds demand.
B. have an incentive to maintain maximum operating production levels when demand declines.
C. find it difficult to cut back production or capacity even when supply exceeds demand or demand slows

3. Fond du Lac would most likely be acting as a(n):
A. speculator.
B. arbitrageur.
C. informed investor.

4. Which of Gorski's descriptions of the futures return theories is least likely correct?
A. The description of the insurance theory.
B. The description of the hedging pressure hypothesis.
C. The description of the theory of storage.

9. Portfolio Management

Case 1: Seva Wolff

Seva Wolff has just inherited $1.2 million. She meets with Roberta Gomez, her financial advisor, about changes to her investment policy statement—and hence, her portfolio—due to this major life event.

Gomez recommends that Wolff consider exchange-traded funds (ETFs) for her portfolio and suggests that she can compile a list of ETFs suitable for Wolff.

Wolff is uncertain about this class of investment product and asks several questions. In her response, Gomez makes the following statements:

Statement 1: ETFs represent shares in a portfolio. The fund manager must disclose the holdings on an annual basis.

Statement 2: ETFs trade on both primary and secondary markets.

Statement 3: Market makers known as authorized participants keep ETF prices in line with a fund's NAV per share through a process known as creation/redemption. The costs of creation/redemption are borne by all of the fund's shareholders.

Statement 4: Relative to traditional mutual funds, ETFs tend to distribute less in capital gains to their shareholders.

Gomez then mentions that Wolff should consider other asset classes that form part of a well-diversified portfolio. She says the expected return on an asset is affected by the investor's intertemporal rate of substitution. She makes the following statements:

Statement 5: Typically, the covariance between a risk-averse investor's intertemporal rate of substitution and the current asset price is negative.

Statement 6: An investor's breakeven inflation rate is the expected future inflation minus the risk premium for future inflation.

Gomez asks Wolff to describe how ETF performance is measured. Wolff explains that most ETFs are designed to track the performance of a specific benchmark index, such as the S&P 500 Index. Wolff cautions, however, that there are numerous sources of tracking error that may cause a deviation in an ETF's return relative to its benchmark index. Wolff provides an example, stating that one of the sources of tracking error is an ETF portfolio manager's operation with short sellers.

Finally, Wolff wants Gomez to help her calculate holding period cost of a S&P 500 ETF. The information is given: S&P 500 ETF with a 0.15% annual fee, round-trip commissions of 0.1%, and bid–ask spread of 0.15%.

1. Considering Gomez's statements 1 and 2:

A. only statement 1 is accurate.

B. only statement 2 is accurate.

C. both statements are accurate.

2. Considering Gomez's statements 3 and 4:

A. only statement 3 is accurate.

B. only statement 4 is accurate.

C. neither statement is accurate.

3. Gomez's statement 5 is best described as:

A. correct.

B. incorrect about the covariance between the intertemporal rate of substitution and the current asset price.

C. incorrect about covariance being a factor in the pricing of securities.

4. Gomez's statement 6 is best described as:

A. correct.

B. incorrect, because breakeven inflation is equal to expected inflation plus a risk premium for inflation uncertainty.

C. incorrect, because breakeven inflation is equal to expected inflation minus actual inflation.

5. In describing tracking error, Wolff's example most likely relates to:

A. trading costs.

B. full replication.

C. securities lending.

6. Which of calculation of hold period cost of S&P 500 ETF is incorrect:

A. 3-month holding period cost (%) is 0.29%.

B. 12-month holding period cost (%) is 0.40%.

C. 2-year holding period cost (%) is 0.60%.

Case 2: Pearl Asset Management

Hong Zhou, Jianguo Yeung, and Jm Leor Joeng work for Pearl Asset Management, a large private wealth advisory firm. They are all developing multifactor models to attempt to explain asset price returns. Zhou has built his model based on standardized sensitivities of asset returns to intrinsic valuation model inputs. When Zhou asks Yeung about factors that his model uses to explain the differences in returns of different asset classes, Yeung replies that he can't define exactly what the factors are but insists that his model uses statistical relationships that have been proven to hold over time. Joeng discounts both Zhou and Yeung's approaches and instead insists that surprises cause stock prices to move. Hence, he has built his model based on surprises rather than sensitivities to absolute factors.

Zhou wishes to combine the actively managed Lincoln investment fund with a passively managed fund that tracks the Russell 2000 (which is the benchmark for the Lincoln fund). Expected risk and return data is as follows:

	Lincoln Fund	Russel 2000
Expected annual return	7.6%	6.5%
Return standard deviation	19.0%	11.0%
Active risk	5.0%	0.0%
The risk-free rate is 3.0%		

Joeng asks Zhou about risk premium on an asset. Specifically, Joeng wants to know the impact on the risk premium if an asset's future value is negatively correlated with investors' utility from future consumption. Joeng also wants to know the relationship between a country's growth rate and the real risk-free rate.

1. Regarding the use of multifactor models, which of the following statements is most likely to be correct?

A. Zhou is using a macroeconomic model, Yeung is using a fundamental factor model, and Joeng is using principal component analysis.

B. Zhou is using a fundamental factor model, Yeung is using principal component analysis, and Joeng is using a macroeconomic model.

C. Zhou is using principal component analysis, Yeung is using a macroeconomic model, and Joeng is using a fundamental factor model.

2. To achieve the optimal level of active risk, what proportion of funds would Zhou allocate to the Lincoln fund?

A. 53%.

B. 82%.

C. 151%.

3. With regard to Joeng's question, Zhou would most appropriately reply that the risk premium would be:

A. lower.

B. higher.

C. unaffected by the correlation.

4. For countries with high expected economic growth, it is least likely that:

A. real risk-free rates will be high.

B. inter-temporal rate of substitution will be high.

C. investors will save less.

Case 3: Millennium Investments

Millennium Investments (MI), an investment advisory firm, provides asset allocation recommendations for its clients. Richie Shepard, senior analyst at MI, is using a two-factor macroeconomic model to evaluate a portfolio of two stocks: WMB and REL. The two factors in the model are surprises in inflation and in real GDP growth rate (both given in percentages). The portfolio is invested 60% in WMB. Factor sensitivity and other information for the two stocks are shown in Exhibit 1.

Exhibit 1: WMB and REL

Stock	E(R)	Inflation	GDP Growth Rate
WMB	9%	-2.2	+3.0
REL	10.8%	-1.0	+3.3

Another stock (not in the portfolio), PSL, has a factor sensitivity of -0.9 to inflation and +1.2 to GDP growth rate.

Shepard is also looking at evaluating three portfolios using a single-factor model. Information about the three portfolios is shown in Exhibit 2.

Exhibit 2: Portfolio Factor Sensitivity and Expected Return

Portfolio	*Expected Return*	*Factor Sensitivity*
X	0.10	1.00
Y	0.12	1.25
Z	0.15	1.50

Shepard is meeting with a client to discuss inclusion of actively managed funds in that client's portfolio. To prepare for the meeting, Shepard prepares a presentation to illustrate the merits and risks of this change. Shepard cannot recall the term that is used to capture the sum of active factor risk and active specific risk.

Shepard feels that the economy is finally out of recession and poised for robust growth over the next three to five years.

1. Using the information in Exhibit 1, the expected return on the portfolio is closest to:

A. 8.4%.

B. 9.2%.

C. 9.7%.

2. Using information in Exhibit 1, the portfolio's sensitivity to inflation is closest to:

A. —1.1.

B. —1.7.

C. —2.2.

3. Last year, PSL's actual return was 8% (0.5% unexplained by the model). Inflation surprise, as well as GDP growth rate surprise, was +0.5%. PSL's expected return was closest to:

A. 7.35%.

B. 7.50%.

C. 8.50%.

4. Using information in Exhibit 2, taking advantage of an arbitrage opportunity would most likely require shorting:

A. portfolio X.

B. portfolio Y.

C. portfolio Z.

5. The term that Shepard cannot recall is most likely:

A. active total risk.

B. active risk squared.

C. alpha risk.

6. Based on Shepard's economic outlook, it can be most appropriately concluded that:

A. government bonds will outperform corporate bonds.

B. higher-rated corporate bonds will outperform lower-rated corporate bonds.

C. lower-rated corporate bonds will outperform higher-rated corporate bonds.

Case 4: Halimah Yusuf

Halimah Yusuf is a portfolio manager at VSL Asset Management (VSLAM), based in Singapore. VSLAM provides customized portfolio management and investment consulting services to institutional clients. Yusuf is meeting with new analysts, John Cerra, Eunice Quek, and Inderjit Singh, to review the firm's portfolio management models and techniques.

Yusuf welcomes everyone to the meeting and begins by stating, "We use multifactor models for portfolio construction as well as return and risk attribution." She asks, "Can anyone tell me how arbitrage pricing theory (APT) is related to these multifactor models?"

Quek responds, "APT helps us determine the appropriate number of factors to use in a multifactor model; however, it does not specify the identity of those factors."

Yusuf continues, "Multifactor models fall into one of three categories: macroeconomic factor models, fundamental factor models, and statistical factor models. For macroeconomic factor models, the factors are the value, or level, of selected macroeconomic variables. For fundamental factor models, the factors are company share attributes, such as price-to-earnings ratio and market capitalization. Finally, when using statistical factor models, we apply statistical techniques, such as factor analysis or principal component analysis, to derive factors that are portfolios of securities that best explain historical return covariances and variances."

To explain the use of multifactor models for portfolio return attribution, Yusuf presents the group with portfolio and benchmark information in Exhibit 1. She also notes the risk-free rate of return is 1.3%.

Exhibit 1 Multifactor Model Data

	Factor Sensitivity		Factor
Factor	Portfolio	Benchmark	Return
Market	1.05	1	3.5%
Small-Cap	0.5	0.3	4.7%
Value	–0.6	0.2	–4.5%
Momentum	0.5	0.1	5.1%

Yusuf asks the group to use Exhibit 1 to characterize the portfolio manager's investment style. Cerra responds, "This manager has a large-cap orientation and follows a contrarian strategy with a growth bias."

Yusuf continues, "Based on your review of the information in Exhibit 1 and given that the portfolio manager's active return from security selection is 1.5%, I would like each of you to identify the factor that contributes the most to the manager's active return." The analysts respond as follows:

Cerra says, "My calculations suggest that it is the Value factor."

Quek responds, "I disagree. In my view, it is the Momentum factor."

Singh states, "No, my analysis indicates that it is the Market factor."

Finally, Yusuf provides the group with the information in Exhibit 2 and states, "As I previously stated, multifactor models can also be used to identify a portfolio manager's risk exposures. Please use the information in Exhibit 2 to identify the portfolio with the highest active factor risk related to style factors, relative to active risk."

Exhibit 2 Active Risk Squared Analysis for Selected Portfolios (Entries Are in Percentage Squared)

	Active factor				
Portfolio	Industry Factor	Style Factor	Total Factor	Active Specific	Active Risk Squared
X	12	28	40	24	64
Y	7.2	14.4	21.6	14.4	36
Z	4	10	14	2	16

1. Is Quek's response to Yusuf most likely correct?

A. Yes.

B. No, she is incorrect regarding the number of factors.

C. No, she is incorrect regarding the identity of the factors.

2. In her statement about the three types of multifactor models, Yusuf is least likely correct with respect to:

A. statistical factor models.

B. fundamental factor models.

C. macroeconomic factor models.

3. Based on Exhibit 1 and other information provided by Yusuf, the expected return on the portfolio is closest to:

A. 8.90%.

B. 11.28%.

C. 12.58%.

4. In his response to Yusuf, Cerra's characterization of the portfolio manager's investment style, using Exhibit 1, is most likely correct with respect to having a:

A. growth bias.

B. contrarian strategy.

C. large-cap orientation.

5. Which of the following analysts most likely provides the correct answer to Yusuf's question on the contribution to active return?

A. Quek

B. Cerra

C. Singh

6. In response to Yusuf, based on the information in Exhibit 2, the portfolio with the highest active factor risk exposure to the style factor is:

A. Portfolio X.

B. Portfolio Y.

C. Portfolio Z.

Case 5: Faster Analytics Capital Management

Faster Analytics Capital Management makes portfolio recommendations using various factor models. Bill Adams, chief economist at Faster Analytics, is responsible for providing macroeconomic and capital market forecasts. Mauricio Rodriguez, a Faster Analytics research analyst, is examining the prospects of several portfolios: the FACM Century Fund (CF), the FACM Esquire Fund (EF), the FACM Zeta Fund (ZF), and the FACM Delta Benchmark (DB).

Figure 1: Selected Data for CF, ZF and Their Benchmark	
Information ratio (CF)	0.12
Information ratio (ZF)	0.25
Benchmark Sharpe ratio	0.30
Benchmark total risk(s)	20%

Rodriguez's supervisor, Barbara Woodson, asks Rodriguez to use the capital asset pricing model (CAPM) and a multifactor model (APT) to make a decision about whether to continue or terminate the Esquire Fund. The two factors in the multifactor model are not identified. To help with the decision, Adams provides Rodriguez with the capital market forecasts shown in Figure 2.

Figure 2: Capital Market Forecasts	
Risk-free rate	4%
Market portfolio risk premium	8%
APT factor 1 risk premium	5%
APT factor 2 risk premium	2%
Inflation rate	3%

After examining the prospects for the EF portfolio, Rodriguez derives the forecasts in Figure 3.

Figure 3: EF Data	
Expected Return	12%
CAPM beta	0.80
APT factor 1 risk sensitivity	1.50
APT factor 2 risk sensitivity	2.00

Rodriguez also develops a 2-factor macroeconomic factor model for the EF portfolio. The two factors used in the model are the surprise in GDP growth and the surprise in investor sentiment. The equation for the macro factor model is:

$REF = a_{EF} + b_{EF,1}F_{GDP} + b_{EF},2F_{IS} + \varepsilon_{EF}$

Rodriguez says to Woodson that for a long-term, default-risk-free bond, if the covariance between the bond's price and investors' inter-temporal rate of substitution is positive, the bond will trade at a lower price than it otherwise would, and that covariance will capture the risk

premium on the bond. Rodriguez also states that according to the Taylor Rule, when the output gap is positive, the actual real GDP is higher than potential real GDP and thus the policy rate should be above the neutral rate.

In their final meeting, Rodriguez informs Woodson that the DB portfolio consistently outperformed its benchmark over the past five years. "The consistency with which DB outperformed its benchmark is amazing. The difference between the DB monthly return and its benchmark's return was nearly always positive and varied little over time," says Rodriguez.

1. The highest possible Sharpe ratio for a portfolio consisting of a combination of the CF fund and the benchmark is closest to:

A. 0.32.
B. 0.35.
C. 0.38.

2. For an investor in the ZF, the optimal level of active risk, and the corresponding total excess return (over risk-free rate), are respectively closest to:

	Optimal active risk	Total excess return
A.	12.0%	9.2%.
B.	16.7%	10.2%.
C.	18.6%	11.9%.

3. Considering the data provided in Figure 2 and Figure 3, should Rodriguez recommend that Faster Analytics continue to invest in the EF fund using an analysis based on the CAPM or 2-factor APT?

	CAPM?	2-factor APT?
A.	Yes	Yes
B.	Yes	No
C.	No	Yes

4. Rodriguez's statement regarding default risk-free bonds is most likely:

A. correct.
B. incorrect about the existence of a risk premium on a default-risk-free bond.
C. incorrect about the covariance being positive.

5. Rodriguez's statement regarding positive output gap is most likely:

A. correct.

B. incorrect about the policy rate and neutral rate.

C. incorrect about the real GDP and potential GDP.

6. The historical performance of the DB portfolio is best summarized as:

A. high active risk.

B. high tracking risk.

C. high information ratio.

Case 6: Fireflies Investment Partners

Fireflies Investment Partners is a global asset management firm offering a wide variety of mutual funds to both institutional and individual investors. Joel Miller, Fireflies' chief risk officer, is responsible for risk oversight across the firm's many strategies, as well as communication of any risk issues to the portfolio management, compliance, and executive teams.

Miller then asks Tess Lee, a senior risk analyst in the group, to explain how Fireflies uses scenario risk measures. Lee explains, "Scenario analysis complements VaR because it can better account for market liquidity. A limitation of scenario analysis, however, is that it has a greater reliance on historical market data than does VaR."

Next, they talk about the limitations of VaR. Miller states that these limitations may be addressed by variations, or extensions, to VaR. For example, CVaR captures the potential loss if VaR is exceeded. IVaR measures ex ante tracking error. Relative VaR is used to determine the effect on VaR from any changes in portfolio composition.

Then, they move on to discuss risk measures applied by different market participants. Lee states that risk measures for banks typically consider liquidity, solvency, and capital sufficiency, whereas risk measures for traditional asset managers typically are focused on investment performance. Lee provides an example, stating that "For Fireflies' private wealth clients, calculates active share for each client and uses ex ante tracking error to measure the degree to which clients' current portfolios might underperform their benchmarks in the future. For equity-only portfolios, forward-looking beta is used to measure sensitivity to the broad equity market."

Lee then explains how the risk exposures of option positions may or decrease overall portfolio risk. Lee and Miller discuss delta, gamma, and vega as option sensitivity measures. Lee summarizes what she has learned to make sure he has understood correctly: "Delta measures the sensitivity of an option to the price of the underlying security and ranges from –0.5 to +0.5. Gamma is a second-order effect that measures the sensitivity of delta to price changes in the underlying. Vega is a first-order effect that measures the change in an option's volatility relative to the change in price of the underlying."

1. Are Lee's comments regarding scenario analysis most likely correct?

A. No, with regard to market liquidity

B. No, with regard to historical data

C. Yes

2. Miller's statement about extensions to VaR is most likely correct with respect to:

A. IVaR.

B. CVaR.

C. relative VaR.

3. Is Lee's statement regarding the application of risk measures most likely correct?

A. Yes.

B. No, it is incorrect about forward-looking beta.

C. No, it is incorrect about ex ante tracking error.

4. Which option sensitivity measure does Lee most accurately describe?

A. Vega

B. Delta

C. Gamma

Case 7: Baker Street Asset Management

Sherlock Holmes is a portfolio manager at Baker Street Asset Management (BSAM), based in London. BSAM provides customized portfolio management and investment consulting services to institutional clients. John Watson, the CIO of BSAM, asks Holmes to explain how he assesses his investment strategies.

Holmes responds that he uses backtesting to assess whether a strategy would have produced desirable results and makes the following comments, "Backtesting implicitly assumes that the past is likely to repeat itself. This assumption, however, may not hold true, and the markets may exhibit extreme upside and downside risks that have never been seen before. To mitigate this issue, we use point-in-time data when backtesting."

Next, they discuss some of the problems with backtesting. Holmes mentions that it is subject to several biases. For example, analysts may make an inference after looking at statistical results rather than testing a prior inference.

Holmes also uses historical simulations to supplement the results of backtesting. Since the number of simulations required is usually greater than the size of the historical dataset, a process involving random sampling with replacement is frequently used in investment research. Watson asks what this process is called.

Watson asks Holmes whether he considers the approach called sensitivity analysis. Holmes says he and his team also condiser sensitivity analysis as a supplement of backtesting, and makes the following comments:

Comment I: Sensitivity analysis fails to account for skewness and fat tails, which is why it is often supplemented by a Monte Carlo simulation.

Comment II: Sensitivity analysis involves constructing results by randomly selecting returns from many different historical periods without regard to time-ordering.

1. Holmes's comments regarding an assumption and issue with backtesting are most likely:

A. correct.

B. incorrect, because over long periods of time, this assumption holds true.

C. incorrect, because using point-in-time data does not help to overcome this issue.

2. The example Holmes gave of a problem with backtesting is most likely an example of:

A. cross validation.

B. data snooping.

C. survivorship bias.

3. The name of the process involving random sampling with replacement is most likely:

A. backward induction.

B. rolling windows.

C. bootstrapping.

4. Which of the Holmes's comment regarding sensitivity analysis is(are) most likely correct?

A. Only Comment I

B. Only Comment I

C. Niether of the comments

Case 8: Linda Yang

Linda Yang is a portfolio manager for JC Investments, a large investment management company based in China. Linda wants to the impact of macro-economic fluctuations on client portfolios. And furthermore, Linda wants to explore innovative strategies to enhance the existing procedures JC employs for analyzing financial instruments and constructing investment portfolios.

Linda calls a meeting with her two assistents, Micky and Tom, to discuss the issues relating to the business cycle and its effects on their respective portfolios. She makes the following statements:

Statement 1:"The real default-free interest rate, a component of the discount rate used to price all financial instruments, is related not only to expected real GDP growth, but also the expected volatility of that growth."

Statement 2:"The price-yield relationship for default-free nominal bonds can be understood by exploring default-free yield curves. The yield curves have three distinct characteristics. These are level, indicating the high or low of rates on average; slope, indicating steepness; and curvature, showing the change in rates with maturity."

Tom suggests that they should also analyze the yield spread between non-inflation-adjusted and inflation-indexed bonds of the same maturity. He further elaborates that the bond risk premium generally rises with maturity.

The meeting then discusses risk premium information from the research desk. The risk premium will be incorporated into the real required rate for pricing of securities.
Exhibit 1 presents the following data collected from the research desk:

Exhibit 1: Interest rates, inflation and risk premium	
Real risk-free rate	0.5%
Expected inflation next year	1.4%
Premium for inflation uncertainty	0.60%
Credit risk premium	1.8%
Equity risk premium	4.1%

1. Regarding Statement 1, the real default-free interest rate is positively related to:

A. Expected GDP growth rate only.

B. Expected GDP volatility only.

C. Both GDP growth rate and volatility.

2. With regard to Statement 2 on yield curve characteristics, Linda is most likely incorrect with respect to the:

A. Level.

B. Slope.

C. Curvature.

3. Based on Tom's suggestion, yield spread between non-inflation-adjusted and same maturity inflation-indexed bonds is most likely influenced by:

A. expectations of the investors over remaining bond maturity.

B. risk premium for current inflation.

C. risk premium for future inflation uncertainty and investors' inflation expectations over the remaining maturity of the bonds.

4. Based on the data presented in Exhibit 1, if the price of a corporate bond with a face value of £100 and one full year to maturity is £95.60, what would be the implied credit premium embedded in the bond's price?

A. 1.80%.

B. 2.10%.

C. 4.0%.

Case 9: Tamara Ogle

Tamara Ogle, CFA, and Isaac Segovia, CAIA, are portfolio managers for Lucas Investment Management (Lucas). Ogle and Segovia both manage large institutional investment portfolios and are working together to research portfolio optimization strategies. Ogle mentions the Premier fund. Exhibit 1 shows the Premier fund's exposures and expected return, as well as benchmark specifications.

Exhibit 1: Premier Fund Characteristics

Security(i)	Portfolio Weight(w_{Pj})	Benchmark Weight(w_{Bi})	Return E(R_j)
X	35%	40%	11.20%
Y	20%	25%	4.25%
Z	45%	35%	14%
Total	100%	100%	

Ogle states that the information ratio for a manager is a good indicator of relative performance Ogle also makes the following statements:

Statement 1:" Unlike the Sharpe ratio, the information ratio can be affected by the addition of cash or leverage."

Statement 2:" The information ratio of an unconstrained portfolio is unaffected by aggressiveness of the active weights."

Statement 3:" Among active portfolios with similar strategy, the portfolio with the highest information ratio need not have the highest Sharpe ratio."

Statement 4:" The optimal active risk for an unconstrained portfolio is less than the optimal active risk for a constrained portfolio."

Ogle then considers the Dena and Orient funds. Exhibit 2 shows selected data for the two funds.

Exhibit 2: Selected Information for Dena and Orient Funds

	Dena	Orient
Information coefficient	0.20	0.25
Transfer coefficient	0.99	0.80
Independent bets/year	12	X

1. Based on the information in Exhibit 1, the ex-ante active return for the Premier fund is closest to:

A. 0.63%.

B. 1.05%.

C. 2.92%.

2. Regarding Ogle's Statements 1 and 2:

A. both statements are incorrect.

B. one statement is correct and one is incorrect.

C. both statements are correct.

3. Assuming that Dena Fund and Orient Fund both have the same information ratio, the value of "X" in Exhibit 2 must be closest to:

A. 10.

B. 12.

C. 16.

4. Regarding Ogle's Statements 3 and 4:

A. both statements are incorrect.

B. one of the statements is correct and the other is incorrect.

C. both statements are correct.

Case 10: Sally Sishek

Sally Sishek, CFA, works as a freelance risk management consultant in the United States. Recently, she was contacted by BlueCanopy Investments (BCI), an asset management firm that recently experienced a significant financial loss after what it described as a "serious failure in multiple risk management processes."

Sishek has had an initial meeting with Jon Bagwell, the chief investment officer of BCI, who is leading the review of risk management following the resignation of BCI's chief risk officer (CRO) last month.

Bagwell has concerns that the CRO relied too heavily on VaR as a risk measure, rather than also implementing other complimentary controls.

Sishek is reviewing the VaR analysis carried out by the recently departed CRO. Some of the calculations involved are shown in Exhibit 1.

Exhibit 1: VaR Calculations		
Portfolio EGF Internal Ref: 0300201 5% VaR		
Inputs:	Mean annual return	9.4%
	Annual volatility	14.2%

Assumptions:

- 250 trading days per year.
- Risk factors are normally distributed.
- Mean and volatility calculated using historical data over a 3-year lookback period.
- The historical standard deviation has been adjusted upward to reflect the long-term expectations relative to the lookback period.

5% Annual VaR = [9.4% − (1.65 × 14.2%)] = –14%

5% Daily VaR = [0.0376% − (1.65 × 0.0568%)] = –0.056%

Sishek has some concerns about the calculations as well as the firm's use of VaR. Bagwell admits that he has very little idea how the VaR calculations were currently used to manage risk. Sishek suggests that in the short term, the firm should immediately implement at least the following recommendation:

Risk Management Recommendation

Impose a daily 1% VaR limit of (for example) $2,000,000 on a portfolio. Monitor the portfolio for any signs of trending and liquidate the portfolio if cumulative monthly losses exceed $7,500,000.

She also intends to provide a list of typical risk management measures that traditional asset managers employ and agreed to put together a case study on how each of these measures could be implemented. The list she will provide is shown in Exhibit 2.

Exhibit 2: Risk Management Measures

Typical risk measures employed by traditional asset managers include:

1. **Beta sensitivity**: useful for equity only
2. **Active share**: a measure of similarity to a benchmark
3. **Surplus-at-risk**: an application of VaR
4. **Maximum drawdown**: percentage of portfolio redeemed at peak times

Bagwell states that he is concerned about risks associated with the ETFs that BCI has been investing in. Sishek makes the following statements about the risks of investing in ETFs:

Statement 1: Some ETF legal structures expose the investors to counterparty risk.

Statement 2: Settlement risk is a key concern for foreign equity ETFs that invest in American depository receipts (ADRs).

1. The calculated percentage value for daily VaR in Exhibit 1 is most likely:

A. correct given the assumptions and method described.
B. too high given the assumptions and method described.
C. too low given the assumptions and method described.

2. Sishek's short-term risk management recommendation is best described as an example of:

A. risk budgeting.
B. a stop loss limit.
C. a position limit.

3. The description of measures given by Sishek in Exhibit 2 is inaccurate with respect to:

A. active share because it does not require the use of a benchmark.
B. surplus-at-risk because it is not an application of VaR.
C. maximum drawdown because it is not a measure of redemptions.

4. Which of Sishek's statements about risks of investing in ETF are accurate?

A. Only statement 1 is correct.
B. Only statement 2 is correct.
C. Both statements are correct.

Case 11: Pari Patel

Pari Patel is a senior portfolio manager at Applegate Capital Management, an institutional manager in San Francisco that offers a variety of strategies. Patel oversees the management of the Applegate Alpha Fund, a mutual fund with the objective of providing capital appreciation while minimizing downside risk.

In reviewing the VaR report, Patel would like more insight on the average loss that would occur if the VaR cutoff is extended and asks Flaherty to contact the risk team to improve the reporting metrics. After discussing with his colleague on the risk team, Flaherty responds that going forward they will add conditional VaR, incremental VaR, and marginal VaR to the report.

Patel is looking to enhance equity investings. He has recently hired David Wu to help construct a quantitative strategy that will use economic input from the fixed-income committee. Wu has a background in quantitative modeling of equity markets and is working on incorporating a target equity risk premium into an equity valuation model. Wu makes the following observations based on his prior experiences:

Observation 1 The equity premium should be larger than, and positively correlated with, the corporate bond premium.

Observation 2 Equities provide superior consumption-hedging properties to high-quality bonds.

Patel wants to invest in commercial real estate, he asks Wu about his view on commercial real estate related to other asset classes.

Wu adds that credit spreads should also be investigated since it will compensate investors for credit risk. She makes the following comments:

Comment 1:"Corporate bond spreads are a function of the business cycle, but the economic impact on spreads depends only on issuers' rating, and is indifferent to its industrial sector. When spreads widen, the spreads on bonds issued by corporations with a low credit rating widen the most."

Comment 2:"Company specific factors are also an important consideration in yield determination of corporate issuers when comparing these with government bonds of the same maturities."

Comment 3:"Corporate profits of different companies are impacted differently by the business cycle. This is because of the distinct nature of products and services delivered by the company which affects earnings and equity performance over the business cycle."

1. Which extension of VaR will most likely meet Patel's needs?

A. Conditional

B. Incremental

C. Marginal

2. Which of Wu's three observations is least likely correct?

A. Observation 2

B. Observation 1

C. Both

3. Relative to other asset classes, investors in commercial real estate are least likely to require a risk premium for:

A. Uncertainty in interest rate volatility.

B. Illiquidity.

C. Uncertainty in terminal value.

4. Which of Wu's comments is most likely incorrect?

A. Comment 1

B. Comment 2

C. Comment 3

10. Ethics

Case 1: JR and Associates

Jacobs, Riccio, and Associates (JRA) is a global investment advisory firm that primarily provides high-net-worth individuals and their families with personalized wealth management solutions such as wealth planning, retirement planning, investment management, and trust and fiduciary services.

Benjamin Jacobs, CFA, and Andrew Riccio, CFA, founded JRA 10 years ago. Prior to establishing the firm, Jacobs worked as a lawyer for Brightman Partners, a large and prestigious law firm that specializes in real estate, family law, and estate planning. Riccio worked as a Certified Public Accountant for Earnest & Olds (E&O), a multinational professional services firm that specializes in providing tax, consulting, and advisory services to corporations and individuals. Kathy Parker, CFA, joined the firm as the third senior partner two years after it was founded. Previously, she had worked for the Frontline Group, a broker/dealer. JRA acquires most of its clients through referral arrangements put in place by the three senior partners.

Jacobs has a fee-sharing arrangement with his former colleagues at Brightman Partners (BP) when they refer clients to JRA. The annual investment fee stated in JRA's marketing brochure is higher than the fee most of its clients pay because Jacobs offers a discount on the investment fee to clients who are referred by BP lawyers. This discount encourages the BP lawyers to market JRA's services to their clients. In return, JRA shares a portion of the client's' annual investment advisory fee with the referring lawyer. The lawyers at BP disclose this fee-sharing arrangement with the clients that they refer to JRA. JRA discloses all of this information in the JRA investment management agreement that individuals sign at the time they become clients.

Kathy Parker has a somewhat different referral arrangement in place with the Frontline Group. Frontline's brokerage unit refers all of its small institutional clients (pension plans, profit sharing plans, and endowments) that are looking for investment management to JRA. In return, all of the trading from these accounts continues to be executed through Frontline's broker/dealer. Because Frontline continues to provide "best price and best execution" to these clients, Parker believes no additional client disclosures are necessary because client trading is unaffected.

Since starting JRA, Jacobs and Riccio have developed a close relationship with Tim Carroll, an independent consultant they met at a networking event. Carroll is hired by pension funds to solicit and review proposals from investment advisers who wish to manage a portion of the pension fund's assets. Over the years, Carroll has been instrumental in JRA's success by referring several of his pension fund clients to the firm because of the firm's outstanding performance record and superior client service. To thank Carroll for all of his hard work on JRA's behalf (regardless of whether Carroll's pension fund clients actually hire JRA), Jacobs and Riccio each make sizable annual donations to Carroll's Children's Charity, a non-profit organization Carroll created to benefit orphans. Because these donations are made annually, they are not disclosed to the pension funds referred by Carroll who become JRA clients.

1. Does Jacobs violate the CFA Institute Code and Standards by offering his referral clients a lower investment advisory fee than the one quoted in JRA's marketing brochure?

A. No.

B. Yes, because JRA is misrepresenting its fees.

C. Yes, because JRA is not dealing with its clients fairly.

2. Does Jacobs violate the CFA Institute Code and Standards in his disclosure of referral arrangements to his clients?

A. Yes.

B. No, because the lawyers disclose to their clients the discount that JRA offers.

C. No, because the discount and the fee-sharing arrangement is disclosed to individuals at the time they sign the investment management agreement.

3. Has Parker violated the CFA Institute Code and Standards in her referral arrangement with Frontline Group?

A. Yes.

B. No, because Frontline Group continues to provide "best price" and "best execution".

C. No, because nothing has changed—all client trades are still executed by Frontline.

4. Did Jacobs and Riccio violate the CFA Institute Code and Standards by making annual donations to Carroll's Children's Charity?

A. No.

B. Yes, because these donations create a conflict of interest.

C. Yes, because these donations represent additional compensation to Carroll.

Case 2: Nancy Bates

Nancy Bates, CFA, is a vice president in the operations department of ACME Investment Management. Her team supports the firm's investment-related systems.

Bates is required to complete her quarterly online compliance training by the end of the current month. Her training focuses exclusively on the potential misuse of company data, such as front-running and the disclosure of investment decisions and strategies.

ACME's compliance manual discusses the firm's procedures for reporting and analyzing material nonpublic information (MNPI) obtained outside of the firm. The manual states that employees have a duty to report MNPI immediately to the designated contact in the legal department. If MNPI is deemed present, the securities of the firm involved are placed on a restricted list and ACME employees are blocked from trading these issues until the information in question becomes public. Bates has not reviewed the compliance manual since it was last updated more than a year ago.

The following weekend, Bates has dinner with her brother, Aaron Dugan, CFA, an analyst in the internal audit department of Hampshire Construction, Inc. (HCI). HCI is a privately owned corporation that specializes in the design and construction of oil refineries for several global clients. Dugan is concerned about his job, as he explains in Statement 1.

Statement 1: I think HCI is about to be purchased by EuroFabrik (EUF), a large, publicly owned European conglomerate that wants to expand its footprint in the energy infrastructure space. The tip-off was when I received requests from the legal folks for specific internal audit working papers. I did some freelance research and figured out what was going on. I am pretty sure at this point that the sale will go through and the Europeans will take over all the administrative roles. I am going to be out of a job and might need some of your industry contacts to help me with my job search.

Bates is worried about Dugan and shares her concerns with her administrative assistant, Amy Tamworth, in Statement 2.

Statement 2: My brother works for a large, private construction company and believes that they are about to be bought out by a big global firm looking to expand operations. He is not part of the negotiations, which are confidential, but he is in the internal audit department and has access to enough information that he was able to deduce what was happening.

Tamworth has just finished her first quarterly compliance training and urges Bates to report her conversation with Dugan to the appropriate contact in the legal department.

Bates is unsure about whom that is and is advised to look at the appendix in the Code of Ethics training handbook. Bates finds the contact information and subsequently meets with the lawyer to report her information.

Tamworth's position is clerical with no access to investment recommendations. She is nevertheless required to request permission for personal trades through the compliance system. Tamworth is a CFA candidate currently enrolled for the Level I exam.

Tamworth does some online research, looking for the overlap of "large, private construction company" and "big global firm looking to expand operations." She identifies HCI and EUF as the likely companies. Based on a quick reading of some internet articles, Tamworth believes that the purchase will have a positive impact on EUF's stock price. Because of her research, Tamworth believes that she can rely on the mosaic theory to defend any subsequent trading activity. She requests permission for the trade in ACME's compliance system, and it is granted.

1. According to the Standards, which of the following best describes ACME's compliance training and procedures?

A. The training is inadequate; the procedures for reporting and analyzing MNPI incidents are reasonably designed and adequate

B. The training program and the procedures for reporting and analyzing MNPI incidents are both reasonably designed and adequate

C. The training program is inadequate as to the follow-up after MNPI reporting. If the information is deemed material, the firm should also publicly disclose the information

2. Which of the following best describes Dugan's revelations in Statement 1?

A. Dugan has violated the Standards by disclosing material nonpublic information

B. Dugan has not violated the Standards as he had no intent for his sister or himself to profit from the information

C. Dugan has not violated the Standards because his revelations may be unreliable as he is only "pretty sure" that the deal will happen

3. Bates' failure to immediately report the information to ACME's legal department violated the Standard relating to:

A. loyalty.

B. misrepresentation.

C. material nonpublic information.

4. Which of the following best describes Tamworth's reliance on the mosaic theory to justify her decision to trade EUF stock?

A. Tamworth can rely on the mosaic theory because she had to research whether the purchase would have a positive impact on EUF's stock price

B. Tamworth cannot rely on the mosaic theory because it was clear from Bates' remarks that the

information that triggered Tamworth's research was misappropriated

C. Tamworth can rely on the mosaic theory because Bates did not name either of the firms and Tamworth had to piece together information from other sources to identify the participants

Case 3: Michael Pompeo

Michael Pompeo, CFA, is a portfolio manager at Atlantic Investments with discretionary authority over all of his account. Pompeo manages 25 emerging market pension funds, he recently had the opportunity to buy 100,000 shares in a publicly listed company whose prospects are considered "above industry norm" by most analysts. The company's shares rarely trade because most managers use a buy-and-hold strategy because of the company's small free float. Before placing the order with his dealer, Pompeo allocated the shares to be purchased according to the weighted value of each of his clients' portfolios. When it came time to execute the trades, the dealer was able to purchase only 50,000 shares.

After work, Pompeo meets with Jerry Bush, one of his best friends, at a bar in the financial district. Jerry Bush, CFA, is a technology analyst at Pacific Securities, Inc. and is a leading authority on Japanese technology companies. Bush's clients include many leading Japanese equity managers. While still employed at Pacific, Bush makes plans during the weekends to join Atlantic Investments. His plans consist of contacting officials of Atlantic Investments and submitting resume. Once he feels ready to join Atlantic, Bush provides Pacific with his resignation notice. Two weeks later after leaving Pacific, Bush constructs earnings models of the technology companies he previously covered, using the knowledge and experience gained while at Pacific. He then contacts former clients by using public sources and encourages them to become clients of his new firm.

While at a bar, Pompeo and Bush overhears several employees of a competitor discuss how they will manipulate down the price of a thinly traded micro-cap stock's price over the next few days. Pompeo's clients have large positions of this stock, so when he arrives at work the next day, he immediately sells all of these holdings. Because he had determined the micro-cap stock was suitable for all of her accounts at its previously higher price, Pompeo buys back his client's original exposure at the end of the week at the new, lower price.

The following week, Pompeo plans to manage the portfolios of several family members in exchange for a percentage of each portfolio's profits. Because his family members have extensive portfolios requiring substantial attention, they have requested that Pompeo provide the services outside of his employment with Atlantic. Pompeo notifies his employer in writing of his prospective outside employment. Two weeks later, Pompeo begins managing the family members' portfolios.
Pompeo develops an analytical model while he is employed by the former employer three years ago. While at the firm, he systematically documents the assumptions that make up the model as well as his reasoning behind the assumptions. After Pompeo is hired to be the portfolio manager of Atlantic. Pompeo takes copies of the records supporting his model to his new firm.

1. To prevent violating any CFA Institute Standards, it would be most appropriate for Pompeo to reallocate the 50,000 shares purchased by:

A. reducing each pension fund's allocation proportionately.

B. distributing them equally among all the pension fund portfolios.

C. allocating randomly but giving funds left out priority on the next similar type trade.

2. Are Bush's actions regarding in compliance with the Code and Standards?

A. No, because the names of former clients, modeling skills, and experience gained by Bush are confidential information of Pacific Securities.

B. Yes, assuming he is not in breach of any non-compete agreement signed while at Pacific Securities.

C. No, because he is prohibited from engaging in activities related to starting his new business while still employed by Pacific Securities.

3. When trading the micro-cap stocks, Pompeo least likely violates the CFA Institute Standard relating to:

A. Material Nonpublic Information.

B. Preservation of Confidentiality.

C. Market Manipulation.

4. By taking copies of the records of the analytical model, Pompeo least likely violates the CFA Institute Standard of Professional Conduct concerning

A. Record retention.

B. Loyalty to employer.

C. Independence and objectivity.

Case 4: Cheryl LaPoint

Cheryl LaPoint is a CFA candidate who has passed the Level II exam. She works as a commercial real estate broker in the Boston office of Trans Continental Properties (TCP), a publicly traded company with offices around the US. Along with brokering office, warehouse, and manufacturing space, TCP has a small relocation services unit that brokers residential home sales as a value-add to their commercial work. Lately, the firm has been struggling.

LaPoint typically commutes to work with friend and neighbor Andrew Saltzman, CFA, who works as a portfolio manager for a large investment firm. One Monday as they depart for work, LaPoint turns the radio to a national business news channel. One of the top stories is the announcement of major layoffs in a number of TCP's offices. She tells Saltzman:

Statement 1: I have known about this for several weeks but I couldn't tell you because of your job. I have no idea how large the layoff will be or if my job is vulnerable. The press release went out at 7:00 AM, and I checked online before I left home to make sure it was already in the news.

As the story unfolds, it becomes clear that TCP is closing a number of offices. The Boston office is among them, and its operations will be transferred to the TCP office in New York City (NYC).

When LaPoint arrives at work, she learns that only a few of the senior staff in Boston will be retained and reassigned to positions in NYC. The remaining staff, including LaPoint, will be laid off. Emails have already been sent to all clients of the Boston office, announcing the closure and layoffs. Contact information about who will be handling their business out of the NYC office was included, with a promise of more information to come.

Later that day, LaPoint meets with the human resources department. She is offered a generous severance package contingent on her signing a six-month non-compete agreement, which includes a clause forbidding her to solicit any business from TCP clients.

The next few days are spent preparing the site for closure. The IT department removes all company applications and data from the personal laptops of the staff. The facility will be officially closed by Friday when the staff terminations become effective.

LaPoint has maintained separate personal and professional social media accounts. Prior to her official termination, she updates all of her social media accounts with the pending change in her employment status. She adds a message to her professional social media accounts that these accounts will be shut down within two weeks. Many of these platforms generate an automatic update to all of the members of LaPoint's networks, alerting them to the changes in her profile.

After her termination, LaPoint realizes that she still has a remote hard drive used for backups. The drive contains both personal files and work files from her former company. LaPoint does a full backup of her personal laptop, which has had all company files removed. Previous backups, which contain company files, remain on the drive. Not wanting to lose the backup history for her personal files, LaPoint ponders how to handle the disposition of the drive.

A competitor of TCP contacts LaPoint and offers her a temporary position in the residential brokerage operations of the firm. The position would not require LaPoint to compete with TCP's commercial business. The hiring manager assures LaPoint that she would not be given any assignments that would put her in competition with TCP's relocation services unit.

1. LaPoint's statement to Saltzman:

A. violated the Standard relating to loyalty.

B. violated the Standard relating to material nonpublic information.

C. did not violate the Standards relating to loyalty or to material nonpublic information.

2. Which of the following best describes LaPoint's handling of her social media presence?

A. Her handling of her social media presence complied with the Standards

B. She violated her non-solicitation agreement and the Standard relating to loyalty by not eleting her professional accounts immediately upon termination

C. She violated her non-solicitation agreement and the Standard relating to loyalty as the automatic updates that some accounts generate are a form of solicitation

3. Regarding the backup drive, according to the Standards LaPoint should:

A. return the drive to her former employer.

B. keep the drive but never restore any of her former employer's data.

C. contact her former employer, explain the situation with her personal files, and keep the drive.

4. According to the Standards, which of the following should be the principal consideration for LaPoint in deciding whether to accept the temporary position?

A. LaPoint's experience is in commercial, and not residential, real estate, no non-compete violation is likely to occur

B. Accepting this position would be a violation of LaPoint's non-compete agreement and the Standard relating to loyalty

C. The assurances given to LaPoint by the hiring manager would allow her to conform with the non-compete agreement and the Standard relating to loyalty

Case 5: Fiona O'Connor

Fiona O'Connor, CFA, who is based in Dublin, runs the asset management firm that manages the assets for the Step Up Social Impact Private Equity Fund (the Fund), which is registered in Ireland. The general partner of the Fund has asked O'Connor to meet with Elise Jensen, CFA, a pension asset consultant, to find out whether Jensen will pitch the Fund to her institutional clients looking for an environmental, social, and governance (ESG) approach. Jensen specializes in working with continental European–based pension funds, many of which are Swiss pension funds required by Swiss pension regulations to undertake an ESG assessment prior to making an investment. In addition, all her clients have a relatively low risk profile, because they are small funds. The few pension funds Jensen works with that do not require an ESG assessment still include the desire for this type of evaluation in their investment mandate.

During an introductory meeting that lasts about an hour, Jensen asks O'Connor to give an overview of the Fund. O'Connor makes the following two statements:

First, as you are aware, the Step Up Fund is a global social impact fund. Therefore, we have allocated 85% of our investment portfolio to education and health care. In addition, some of the companies we invest in offer scholarships or free services to those who cannot afford their services. As a result, our investment returns may not be as high as those of funds that have a strict "for-profit" investment strategy, but we still track our Fund against ESG indexes. We have also developed a set of "social impact" metrics that aim to show the Fund has a positive impact on people's lives. Details of the investment strategy and how we select investments are clearly and extensively described in our fund prospectus. In addition, investors are notified prior to any changes being made in our investment process.

Second, I also want to disclose to you the compensation arrangements for the asset management firm's six investment analysts, all of whom report to me directly. Two of the analysts work part-time, because they made earlier commitments with other asset management firms before I found them. But they do not work for other social impact funds, so I'm OK with this arrangement because we consider them independent contractors. We disclose this and other forms of management compensation to all clients and potential clients. All the analysts are paid monthly and participate in the firm's year-end bonus program. The value of the bonus pool is determined by how well the company has performed.

Prior to the end of the meeting, O'Connor invites Jensen to join her and one of her analysts on an upcoming trip to Harare, Zimbabwe, to undertake an annual ESG assessment for one of their social impact investments. The Fund has invested in a private university for women that was founded a couple of years ago, with 40% of the students coming from disadvantaged families." During their trip to Zimbabwe, O'Connor and Jensen meet with the university's chief financial officer and learn about the increasing success of the school and the impact the school programs are having on their students. Jensen expresses her excitement about the potential of the school

and cannot wait to return home to present the school as a potential investment to her clients. After returning home, Jensen makes her first presentation to her smallest client, with assets totaling EUR20 million. She makes the following statement:

I just got back from a due diligence trip to Zimbabwe with Fiona O'Connor, the portfolio manager of the Step Up Fund, which has an ESG investment mandate. We visited an amazing women's university that has solicited donations for a scholarship program for disadvantaged women. The school is very well run, and with the new scholarship program, investment returns are expected to increase, because they will no longer need to subsidize tuition. I've been assured the other holdings within the Step Up Fund are of equal caliber. I got to know O'Connor during the trip and feel she has a good grasp of ESG issues. I really believe you should invest in the Step Up Fund, because it meets your investment objectives. I would start with a EUR5 million investment.

1. Based only on the information given, when providing investment advice to her clients, Jensen should most likely adhere to which of the following to avoid violating Standard I(A): Knowledge of the Law?

A. Irish legislation
B. Swiss regulations
C. CFA Institute Standards of Professional Conduct

2. Given O'Connor's first statement about the asset allocation, expected returns, and strategy of the Step Up Social Impact Private Equity Fund, does O'Connor most likely violate the CFA Institute Standards?

A. No.
B. Yes, with regard to Standard III(A): Loyalty, Prudence, and Care.
C. Yes, with regard to Standard V(B): Communication with Clients and Prospective Clients.

3. With regard to the asset management firm's compensation arrangements for the investment analysts as mentioned in O'Connor's second statement, does O'Connor most likely violate any CFA Institute Standards?

A. No.
B. Yes, relating to the bonus pool.
C. Yes, relating to the part-time policy.

4. During Jensen's meeting with her client, did she most likely make any inappropriate comments related to Standard III(C): Suitability?

A. No.
B. Yes, with regard to due diligence.
C. Yes, with regard to due diligence and asset allocation.

Case 6: Lauren Li

Lauren Li is a Level III CFA candidate working at pension management firm SOC Master Pension Trust (SOC). SOC owns a significant number of shares of the fashion manufacturer Bellastyle across several pension funds. Bellastyle is a publicly traded company and is considering a merger with one of its competitors. The merger requires a change in Bellastyle's legal structure that requires shareholder approval at a scheduled special shareholder meeting. Li believes the firm has the following options as it prepares to vote Bellastyle shares on behalf of the pension funds.

Option 1: Continue the firm's custom of always aligning with management on shareholder votes and following the recommendations of Bellastyle management.

Option 2: Do further research on the merger implications as they relate to the firm's investment in Bellastyle.

Option 3: Abstain from voting, thereby positioning the firm with the eventual outcome of the vote.

When asked whether the firm should sell shares of Bellastyle prior to the merger vote, Li reminded colleagues about the firm's obligations. Stock sales of Bellastyle would need to follow Priority of Transactions, and violations may result in sanctions by the CFA Institute.

Li's friend inquired about Bellastyle since the news of the potential merger was in the headlines. Li made the following statements regarding what constitutes confidential information:

Statement 1: Confidential information must be material and nonpublic.

Statement 2: Information resulting from, and relevant to, a firm's business that is the subject of the special relationship is considered confidential.

Statement 3: Information that could reasonably be expected to impair the firm's ability to render unbiased and objective advice must be kept confidential.

1. To comply with the Standards, Li's firm would most likely follow which shareholder vote option?

A. Option 1

B. Option 2

C. Option 3.

2. Regarding Li's reference to the Priority of Transactions, which of the following recommended procedures for compliance conforms with the Standards?

	Limited Participation in Equity IPOs	Restrictions on Private Placements	Establish Blackout/ Restricted Periods
A.	Does not conform	Does not conform	Does not conform
B.	Does not conform	Conforms	Does not conform
C.	Conforms	Conforms	Conforms

3. CFA Institute–authorized sanctions implied by Li least likely include a(n):

A. public censure.

B. cautionary letter.

C. administrative sanction.

4. Which statement made by Li regarding confidentiality most likely complies with the Standards?

A. Statement 1

B. Statement 2

C. Statement 3

Case 7: John Wickerstead

John Wickerstead, CFA, is the retired chief financial officer (CFO) of Consolidated Hospital Corporation (CHC), a publicly traded for-profit corporation that owns and manages a number of hospitals. Wickerstead now serves as a compensated member of CHC's board of directors. He also serves without compensation on the boards of several religiously sponsored charities that offer free health clinics to needy families and individuals. These charities are organized as non-profit corporations (NPCs). He has consistently disclosed these affiliations to CHC. In all of his director duties, Wickerstead acts as a fiduciary.

Prior to CHC's next board meeting, Wickerstead renews his disclosures with the compliance department of CHC and then receives the agenda and materials for the meeting.

One item on the agenda is a proposal to participate in a new government program that will subsidize the establishment of clinics to provide health services in underserved communities. The terms of the legislation seem straightforward:

- The initial program is funded for seven years;
- Services will be either free or subsidized depending on financial need;
- Providers will be granted exclusive operating rights among program participants for specific underserved areas;
- A generous startup allowance for administrative and overhead costs is given to support clinics in the first year, decreasing over the next three years to industry standard levels; and
- To incentivize patient enrollment, eligibility for existing government benefits, such as family nutritional and child support, will be tied to participation in the new program.

The CHC draft application requests that new clinics be located in at-need areas near more established health facilities. The rationale is that the initial levels of financial support under the program will allow the new clinics to offer price competitive services to families outside of the at-need population. The board has determined that the proposed rates qualify under the current reimbursement regulations and that the new program appears to be a profitable opportunity for CHC to expand its presence.

During the board meeting it is suggested that Wickerstead should refrain from voting on the proposal due to a conflict of interest created by his position on the boards of the NPCs. Wickerstead responds to the suggestion with two statements:

Statement 1: The goals of the NPCs are aligned with those of this legislation. I know the profiles of their current beneficiaries. The incentives built into the legislation ensure any direct competition with our new clinics will be immaterial. It will be limited to a small cohort of beneficiaries who are eligible only for subsidized, and not fully paid for, health care. Once the CHC plan is announced, I will encourage the NPCs to work with their existing beneficiaries and providers such as CHC to reach optimal outcomes tailored to each family's situation.

Statement 2: I fully intend to vote as there are significant defects in this proposal. We should not use the allowances for facilities and administration in the initial years to indirectly subsidize not-at-need clients. Even if legal, it violates the spirit of the legislation. It is unethical and opens us to a charge of misuse of grant funds. This would have a negative impact on our reputation and shareholder value. Further, this indirect subsidy of not-at-need clients in the new clinics violates our duty to deal fairly with all of our clients.

1. To whom does Wickerstead have a primary duty of loyalty as an unpaid member of the board of directors of the NPCs?

A. The NPCs only
B. The beneficiaries of the NPCs
C. The religious denominations sponsoring the various NPCs

2. To whom does Wickerstead have a primary duty of loyalty as a paid director on the board of CHC?

A. CHC as his employer
B. The shareholders of CHC
C. The clients and shareholders of CHC

3. In Statement 1, which of the following best characterizes Wickerstead's stance on the potential conflict of interest?

A. It is reasonable and thorough
B. It is weak because Wickerstead cannot know with certainty whether the competitive overlap will be material or not
C. It is weak because Wickerstead cannot guarantee that the NPCs will behave in a cooperative manner

4. From the point of view of Wickerstead's ethical duties, which of the following best characterizes the position in Statement 2 he has taken?

A. The reputational risk is material to CHC, and Wickerstead has struck a good balance among his many duties
B. The reputational risks and potential harms he raised are only speculative, and opposing the plan on this basis violates his duty to CHC and its shareholders
C. Insisting that not-at-need clients should not be indirectly subsidized places the interests of these potential clients ahead of his more compelling duties to CHC and its shareholders

Case 8: Lauren Lester

Lauren Lester, CFA, is a managing partner of Zebra Investment Advisory. Oliver Orton, CFA, is a junior portfolio manager, and Will Walton is a senior investment analyst at the firm. Orton is reviewing performance records from the firm's fixed income funds and notices that there may have been a slight overstatement of returns due to the methodology used to determine interest income. As Orton begins to research the issue, he notices that Lester, as the most senior employee in the firm, had reviewed and signed off on the performance calculations. Orton decides that he will not report his findings to his supervisor.

Orton proceeds to evaluate the returns of the firm's multi-asset strategies and is verifying that all accounts are in the appropriate composites. He identifies one non-discretionary, segregated, and non-fee-paying account within the largest composite for further scrutiny.

Walton has heard positive reports from colleagues in the industry about a new third- party provider specializing in the research related to trading commodity futures and starts working with the firm. Aware of Lester's propensity to move quickly on new opportunities, Walton immediately uses the research provider's insights to initiate a series of trades in commodity futures which quickly produce encouraging results.

Walton, who recently took the Level II portion of the CFA examination, is asked by Lester about his perception of the test. Walton replied, "Overall, I thought the exam was less challenging than I anticipated. However, the ethics section posed some complex questions, and I felt that I did extremely well on the interest-rate swap components of the fixed income section."

1. By not reporting his findings to his supervisor, does Orton violate the Standards?

A. No

B. Yes, because he should have reported his findings to his supervisor

C. Yes, because the slight overstatement misrepresents actual performance

2. To be compliant with the Standards, should the account identified by Orton be utilized in the composite?

A. Yes

B. No, because it is non-fee-paying

C. No, because it is non-discretionary

3. By initiating trades immediately after receiving the third-party research on commodity futures, did Walton violate the Standards?

A. No

B. Yes, because sufficient diligence was not conducted

C. Yes, because third-party research is not permitted in commodity futures

4. Which statement of Walton's was a violation of the Standards?

A. "…the ethics section posed some complex questions"

B. "Overall, I thought the exam was less challenging than I anticipated"

C. "I felt that I did extremely well on the interest-rate swap components of the fixed income section"

Case 9: Tim Trent

Alan Abington, CFA, is the director of investments at Winters Asset Management (WAM). His colleague, Tim Trent, CFA, holds the role of senior investment analyst, while Hannah Harris acts as the senior vice president of business development.

Harris is in the process of preparing for a series of meetings with prospective clients and is gathering historical performance data related to the fund managed by Abington. The available track record of the fund spans a period of 12 years, with the initial four years tracing back to Abington's tenure at his previous firm, and the subsequent eight years marking his term at WAM.

To prepare the meeting presentation report, Harris asked Trent for assistance. Trent submits a section for the report outlining the robust research process WAM has implemented regarding its public equity strategy, which incorporates analysis of financial statements, use of expert networks, technical analysis, and discussions with company management.

Trent recalls a notable success story from two years ago involving a regional bank. This bank's shares saw a remarkable uptick in the first quarter, surpassing the benchmark. This surge can be attributed to a confluence of factors: an advantageous technical setup, a bullish perspective from the expert network on banks with similar structures, and the bank management's televised remarks about a conducive macroeconomic environment for mergers and acquisitions. Trent then showcases a table detailing this exceptional quarterly outperformance in percentage terms from that period. However, she also highlights that even though they've retained their stake in the bank, its stock has not fared as well against the benchmark in subsequent times.

Trent supervises not only his personal account but also those of a few close friends who are clients. In adherence to the firm's policies, which dictate that all accounts should receive equal treatment, Trent ensures that all other clients are given priority in the allocation of shares deemed appropriate for the other clients and his friends. Only after this does he allocate to his own account and those of his friends, if remaining shares are still available. This approach is employed to circumvent any semblance of favoritism.

1. Which method of presentation of historical performance data by Abington would be a violation the Standards?

A. Including all twelve years without making the appropriate disclosures

B. Including the first four years and making the appropriate disclosures

C. Including the last eight years without making the appropriate disclosures

2. Is Trent's recap of the drivers of the regional bank investment's outperformance a violation of the Standards?

A. No

B. Yes, because reliance on expert networks is not permitted

C. Yes, because the mention of potential mergers and acquisition activity is material non-public information

3. Is Trent's table showing the quarterly outperformance a violation of the Standards?

A. No

B. Yes, because the table presents out-of-date information

C. Yes, because the performance presents quarterly outperformance from that period.

4. Is Trent's approach to allocating shares a violation of the Standards?

A. Yes

B. No, because he is avoiding any appearance of favoritism

C. No, because he is allocating to client accounts before his personal and friends' accounts

Case 10: Eagle Investment Partners

Eagle Investment Partners manages fixed income portfolios on a discretionary basis for institutions and high-net-worth individuals. Eagle adopted the Standards as part of its ethics and compliance program. The firm does not require employees to sign non-compete agreements. Local securities laws are consistent with the Standards.

Eagle hires an investment consulting firm, Pigeon Associates, to bring new clients to the firm. Eagle agrees to pay Pigeon 20% of the management fee Eagle charges referred clients in the first year. These referral payments are legal in the market in which Eagle operates. Eagle's chief executive considers whether the firm is required to make any disclosures to new clients referred by Pigeon.

Jason Lucas, CFA, is a portfolio manager at Eagle and has several analysts reporting to her. One of the analysts.Dennis Wade, has recently registered to begin the CFA Program. Another of the analysts, Ginny Adams, recently sat for the Level II CFA exam.

Wade's former university roommate is the chief executive of ChipMasater, a small privately held microchip design firm. The chief executive asks Wade to join ChipMaster's board due to his industry knowledge and contacts. Wade would receive no cash compensation. but would receive shares in ChipMaster and reimbursement for expenses related to attendance at board meetings.

Lucas leaves Eagle to start his own firm and wants to hire Adams. He invites Adams to lunch at the new firm's office. After their discussion, Adams accepts a job offer from Lucas. During his first days at the new firm. Adams recreates and implements the equity valuation model he built and used at Eagle.Shortly after setting up his new firm, Lucas meets with one of his former clients from Eagle. The client brings him an luxurious watch and says "This is for you to celebrate your new endeavor, I'll be transferring my assets from Eagle to you as soon as you can get the paperwork completed for me to sign.

1. According to the Standards, when new clients are referred by Pigeon, must Eagle make any disclosures?

A. No.

B. Yes, it must disclose the existence of the referral agreement only.

C. Yes, it must disclose both the referral agreement and the compensation.

2. To comply with the Standards, is Wade required to take any action before accepting the ChipMaster offer?

A. No.

B. Yes, he is required only to notify Eagle.

C. Yes, he is required to obtain Eagle's approval.

3. Regarding the new firm, did Lucas or Adams violate the Standard related to duties to employers?

A. No.

B. Yes, because Lucas' solicitation of Adams is a violation.

C. Yes, because Adam's implementation of the valuation model is a violation

4. Regarding his former client, do the Standards require Lucas to take any action?

A. No.

B. Yes, he must refuse the gift offered by the client.

C. Yes. he must refuse to accept the client's account.