LEVEL III

Question:	1
Topic:	Individual PM (IPS and Human Capital)
Minutes:	27

Reading References:

Level III, Volume 2, Study Session 4, Reading 10
"Managing Individual Investor Portfolios," Ch. 2, James W. Bronson, CFA, Matthew H. Scanlan, CFA, and Jan R. Squires, CFA, *Managing Investment Portfolios: A Dynamic Process*, Third Edition (CFA Institute, 2007).

Level III, Volume 2, Study Session 4, Reading 14
"Lifetime Financial Advice: Human Capital, Asset Allocation, and Insurance," Roger G. Ibbotson, Moshe A. Milevsky, Peng Chen, CFA, Kevin X. Zhu (The Research Foundation of CFA Institute, 2007).

LOS:
2012-III-2-10-a, j, k, l
"Managing Individual Investor Portfolios"
    The candidate should be able to:
    a) **discuss how source of wealth, measure of wealth, and stage of life affect an individual investor's risk tolerance;**
    b) explain the role of situational and psychological profiling in understanding an individual investor;
    c) compare the traditional finance and behavioral finance models of investor decision making;
    d) explain the influence of investor psychology on risk tolerance and investment choices;
    e) explain the use of a personality typing questionnaire for identifying an investor's personality type;
    f) compare risk attitudes and decision-making styles among distinct investor personality types, including cautious, methodical, spontaneous, and individualistic investors;
    g) explain the potential benefits, for both clients and investment advisers, of having a formal investment policy statement;
    h) explain the process involved in creating an investment policy statement;
    i) distinguish between required return and desired return and explain the impact these have on the individual investor's investment policy;
    j) **explain how to set risk and return objectives for individual investor portfolios and discuss the impact that ability and willingness to take risk have on risk tolerance;**
    k) **discuss each of the major constraint categories included in an individual investor's investment policy statement;**
    l) **formulate and justify an investment policy statement for an individual investor;**
    m) determine the strategic asset allocation that is most appropriate for an individual investor's specific investment objectives and constraints;

LEVEL III

Question:	1
Topic:	Individual PM (IPS and Human Capital)
Minutes:	27

n)   compare Monte Carlo and traditional deterministic approaches to retirement planning and explain the advantages of a Monte Carlo approach.

2012-III-2-14-b, c, g
"Lifetime Financial Advice: Human Capital, Asset Allocation, and Insurance"
The candidate should be able to:
a)   explain the concept and discuss the characteristics of "human capital" as a component of an investor's total wealth;
b)   **discuss the earnings risk, mortality risk, and longevity risk associated with human capital and explain how these risks can be reduced by appropriate portfolio diversification, life insurance, and annuity products;**
c)   **explain how asset allocation policy is influenced by the risk characteristics of human capital and the relative relationships of human capital, financial capital, and total wealth;**
d)   discuss how asset allocation and the appropriate level of life insurance are influenced by the joint consideration of human capital, financial capital, bequest preferences, risk tolerance, and financial wealth;
e)   discuss the financial market risk, longevity risk, and savings risk faced by investors in retirement and explain how these risks can be reduced by appropriate portfolio diversification, insurance products, and savings discipline;
f)   discuss the relative advantages of fixed and variable annuities as hedges against longevity risk;
g)   **recommend basic strategies for asset allocation and risk reduction when given an investor profile of key inputs, including human capital, financial capital, stage of life cycle, bequest preferences, risk tolerance, and financial wealth.**

LEVEL III

Question:	1
Topic:	Individual PM (IPS and Human Capital)
Minutes:	27

Guideline Answer:

Part A

To calculate the required return needed to reach the target annuity future value, use the following inputs:

Number of years to retirement	=	15
Annual savings	=	–25,000
Current portfolio value	=	–650,000 (900,000 – 250,000 trust contribution)
Target portfolio value	=	1,600,000

Then solve for i:
i = 3.6467% or, rounded to **3.65%**

Part B

Alonso's ability to take risk appears to be above average for the following reasons:
- He has the ability to consistently save part of his annual earnings.
- He has a relatively large asset base in comparison to his goal, and thus a low required return, allowing him to withstand short-term market volatility.
- Alonso makes a substantial gift every year to a children's sports program. If necessary, he could decrease or eliminate the gift, reducing his expenses.
- Alonso has a medium- to long-term investment horizon for saving the funds needed at retirement.
- Alonso does not plan to leave an estate.

LEVEL III

Question:	1
Topic:	Individual PM (IPS and Human Capital)
Minutes:	27

Part C

Template for Question 1-C

<table>
<tr><td colspan="2">i. Describe one change in Alonso's circumstances that has:</td></tr>
<tr>
<td>decreased his earnings risk.</td>
<td>Alonso now has a longer term (guaranteed 10-year) contract, instead of a one-year contract. This reduces the risk of a substantial drop in his income. OR
Alonso's increased savings can help to offset his earnings risk.</td>
</tr>
<tr>
<td>increased his earnings risk.</td>
<td>The guarantee on Alonso's employment contract is backed by corporate ownership, subjecting Alonso to the credit risk of the owners and the possibility of a substantial drop in his income in case of default.</td>
</tr>
<tr><td colspan="2">ii. Describe one change in Alonso's circumstances that has:</td></tr>
<tr>
<td>decreased his financial market risk in retirement.</td>
<td>Alonso's increased savings rate will allow him to accumulate a larger asset base at retirement. This would allow the portfolio to absorb greater losses from market fluctuations before affecting his ability to support himself.

In addition, he will not be exposed to the credit risk of the issuer of the annuity.</td>
</tr>
<tr>
<td>increased his financial market risk in retirement.</td>
<td>Alonso no longer plans to purchase an annuity to fund his retirement spending needs. He now intends to rely on his investment portfolio to meet his spending needs Funding for living expenses will now be subject to market fluctuations in retirement.</td>
</tr>
</table>

LEVEL III

Question:	1
Topic:	Individual PM (IPS and Human Capital)
Minutes:	27

Part D

i. <u>Time horizon:</u> At both age 40 and age 45, Alonso has a long-term time horizon.

   Initially, Alonso faced a three-stage horizon consisting of: (1) 15 years until his planned retirement date; (2) the 25-year annuity period; and (3) his post-annuity retirement years (if he outlives the annuity).

   Currently, Alonso faces a two-stage horizon consisting of: (1) the next 10 years until retirement; and (2) his remaining life expectancy during retirement. During his retirement, the investment portfolio will cover expenses.

ii. <u>Liquidity:</u> In the previous time period, Alonso had a need to fund a trust for his children in the amount of USD 250,000.

   Currently he has no known liquidity needs.

LEVEL III

Question: 1
Topic: Individual PM (IPS and Human Capital)
Minutes: 27

Part E

Template for Question 1-E

Determine which *one* asset class in Alonso's portfolio *most* closely resembles his current human capital. (circle one)	Justify your response with *two* reasons.
Treasury bills	Alonso's human capital is bond-like, not equity-like, because of the fixed payments provided in his contract. His contract extends over 10 years, much longer than Treasury bill maturities. His contract is subject to the creditworthiness of the team owner. Such credit risk is similar to corporate securities' credit risk, rather than to government credit risk.
A-rated corporate amortizing ABS	Alonso's human capital will gradually deplete (as he works toward age 55), similar to the principal of corporate ABS securities and unlike government bonds.
AAA-rated government bonds	Although amortizing ABS payments are not typically indexed for inflation (as Alonso's salary is), the structure and payment stream of corporate amortizing ABS *most* closely resemble his human capital, from among the choices given.
Small-cap domestic equities	
Large-cap international equities	

LEVEL III

Question: 2
Topic: Individual PM (Taxes)
Minutes: 9

Reading References:
Level III, Volume 2, Study Session 4, Reading 11
"Taxes and Private Wealth Management in a Global Context," Stephen M. Horan, CFA, and Thomas R. Robinson, CFA (CFA Institute, 2008).

LOS:
2012-III-2-11-c, d, e, f
"Taxes and Private Wealth Management in a Global Context"
    The candidate should be able to:
    a)   compare basic global taxation regimes as they relate to the taxation of dividend income, interest income, realized capital gains, and unrealized capital gains;
    b)   determine the impact of different types of taxes and tax regimes on future wealth accumulation;
    c)   calculate accrual equivalent tax rates and after-tax returns;
    d)   explain how investment return and investment horizon affect the tax impact associated with an investment;
    e)   discuss the tax profiles of different types of investment accounts and explain their impact on after-tax returns and future accumulations;
    f)   explain how taxes affect investment risk;
    g)   discuss the relation between after-tax returns and different types of investor trading behavior;
    h)   explain the benefits of tax loss harvesting and highest-in/first-out (HIFO) tax lot accounting;
    i)   demonstrate how taxes and asset location relate to mean–variance optimization.

LEVEL III

Question:	2
Topic:	Individual PM (Taxes)
Minutes:	9

Guideline Answer:

Part A

Template for Question 2-A

Determine, based *only* on tax considerations, whether Alonso's advisor is correct or incorrect (circle one) with respect to Alonso's:		Justify *each* response with *one* reason.
i. after-tax return	correct incorrect	Alonso's after-tax return would have been greater than or equal to his actual return, all else equal, if a greater proportion of his investments had been in taxable accounts. This is because he can use losses to offset other income or realized gains.
ii. investment risk	correct incorrect	Tax exempt investors bear all of the risk associated with returns in their accounts. Taxable accounts have the effect of sharing investment risk between the investor and the taxing authority. In negative-return years, losses can offset taxes on other income or gains. In positive-return years, after-tax return is lower than pre-tax return. This smoothing effect of taxes on investment returns (lower returns in positive years and higher returns in negative years) reduces the overall volatility of the return stream and, all else equal, reduces investment risk.

Part B

The estimated accrual equivalent return is higher for the 15-year period than that of the 3-year period as a result of deferring taxes on realized gains over time. In the case of this portfolio, the difference occurs because only a maximum of half of the capital gains are realized and taxed each year, allowing for compound earnings on the reinvested balances.

LEVEL III

Question: 3
Topic: Execution/Monitoring/Rebalancing
Minutes: 21

Reading References:
Level III, Volume 6, Study Session 16, Reading 39
"Execution of Portfolio Decisions," Ch. 10, Ananth Madhavan, Jack L. Treynor, and Wayne H. Wagner, *Managing Investment Portfolios: A Dynamic Process*, Third Edition (CFA Institute, 2007).

Level III, Volume 6, Study Session 16, Reading 40
"Monitoring and Rebalancing," Ch. 11, Robert D. Arnott, Terence E. Burns, Lisa Plaxco, CFA, and Philip Moore, *Managing Investment Portfolios: A Dynamic Process*, Third Edition (CFA Institute, 2007).

LOS:
2012-III-6-39-c, e, h, k–m
"Execution of Portfolio Decisions"
 The candidate should be able to:
 a) compare market orders with limit orders, including the price and execution uncertainty of each;
 b) calculate and interpret the effective spread of a market order and contrast it to the quoted bid–ask spread as a measure of trading cost;
 c) compare alternative market structures and their relative advantages;
 d) compare the roles of brokers and dealers;
 e) explain the criteria of market quality and evaluate the quality of a market when given a description of its characteristics;
 f) explain the components of execution costs, including explicit and implicit costs, and evaluate a trade in terms of these costs;
 g) calculate and discuss implementation shortfall as a measure of transaction costs;
 h) contrast volume weighted average price (VWAP) and implementation shortfall as measures of transaction costs;
 i) explain the use of econometric methods in pretrade analysis to estimate implicit transaction costs;
 j) discuss the major types of traders, based on their motivation to trade, time versus price preferences, and preferred order types;
 k) describe the suitable uses of major trading tactics, evaluate their relative costs, advantages, and weaknesses, and recommend a trading tactic when given a description of the investor's motivation to trade, the size of the trade, and key market characteristics;
 l) explain the motivation for algorithmic trading and discuss the basic classes of algorithmic trading strategies;
 m) discuss the factors that typically determine the selection of a specific algorithmic trading strategy, including order size, average daily trading volume, bid–ask spread, and the urgency of the order;
 n) explain the meaning and criteria of best execution;

LEVEL III

Question:	3
Topic:	Execution/Monitoring/Rebalancing
Minutes:	21

o)   evaluate a firm's investment and trading procedures, including processes, disclosures, and record keeping, with respect to best execution;

p)   discuss the role of ethics in trading.

LOS:

2012-III-6-40-h, i, j

"Monitoring and Rebalancing"

The candidate should be able to:

a)   discuss a fiduciary's responsibilities in monitoring an investment portfolio;

b)   discuss the monitoring of investor circumstances, market/economic conditions, and portfolio holdings and explain the effects that changes in each of these areas can have on the investor's portfolio;

c)   recommend and justify revisions to an investor's investment policy statement and strategic asset allocation, given a change in investor circumstances;

d)   discuss the benefits and costs of rebalancing a portfolio to the investor's strategic asset allocation;

e)   contrast calendar rebalancing to percentage-of-portfolio rebalancing;

f)   discuss the key determinants of the optimal corridor width of an asset class in a percentage-of-portfolio rebalancing program;

g)   compare and contrast the benefits of rebalancing an asset class to its target portfolio weight versus rebalancing the asset class to stay within its allowed range;

h)   explain the performance consequences in up, down, and nontrending markets of 1) rebalancing to a constant mix of equities and bills, 2) buying and holding equities, and 3) constant proportion portfolio insurance (CPPI);

i)   distinguish among linear, concave, and convex rebalancing strategies;

j)   judge the appropriateness of constant mix, buy-and-hold, and CPPI rebalancing strategies when given an investor's risk tolerance and asset return expectations.

LEVEL III

Question: 3
Topic: Execution/Monitoring/Rebalancing
Minutes: 21

Guideline Answer:

Part A

Template for Question 3-A

Identify *three* market characteristics that support Kadar's conclusion that Betania has a higher quality market.	Justify *each* response with *one* reason.
Bid–ask spread	Because Betania has tighter spreads than Alphastan, the cost of trading small amounts of an asset is lower. As a result, investors can trade positions without excessive loss of value. If bid–ask spreads are wide, investors cannot profitably trade on information, except when the information is of great value. Narrower spreads, therefore, lead to higher market quality.
Market hours	The Betania market is open five days per week versus only three days per week for Alphastan. This gives Betania greater convenience and more opportunity to trade, leading to higher market quality.
Market depth	Based on the typical quotes given, the Betania market has a larger number of shares at each price level in the order book. Therefore, the cost of trading a large amount of shares in Betania is lower and market quality is higher.
Number of member firms	The presence of many buyers and sellers contributes to increased market liquidity. Betania has a larger number of member firms than Alphastan (32 vs. 5). Since both markets are quote driven, Betania has more potential buyers and sellers. The additional buyers and sellers create more competition and greater diversity of opinion, leading to higher market quality.

Note: Any three of the four answers to Question 3-A above are acceptable.

LEVEL III

Question: 3
Topic: Execution/Monitoring/Rebalancing
Minutes: 21

Part B

Template for Question 3-B

Determine which algorithmic participation strategy [volume-weighted average price (VWAP), time-weighted average price (TWAP), or implementation shortfall] is *most* appropriate for Kadar's trades. (circle one)	Justify your response with *two* reasons.
volume-weighted average price (VWAP)	Kadar should select an implementation shortfall strategy because it attempts to minimize the weighted average of market impact and the opportunity costs of missed or delayed trades.
time-weighted average price (TWAP)	As global equity markets are rising and this trend is expected to continue, Kadar should be more concerned with reducing opportunity costs. To minimize these opportunity costs, implementation shortfall will "front-load" trade execution to complete the trade more quickly than either TWAP or VWAP.
[implementation shortfall]	

LEVEL III

Question: 3
Topic: Execution/Monitoring/Rebalancing
Minutes: 21

The other strategies are less appropriate because:

A VWAP strategy is less appropriate because the strategy attempts to match the expected volume pattern in the stock, typically over a whole trading day. If Kadar is correct and markets rise during the course of the day, then trading over the whole day will lead to a higher average trade price, and higher opportunity cost relative to implementation shortfall.

A TWAP strategy is less appropriate because the strategy assumes trading volume is constant throughout the trading day. Trades are executed in equal proportion over the whole day. If Kadar is correct and markets rise during the course of the day, then trading over the whole day will lead to a higher average trade price, and higher opportunity cost relative to implementation shortfall.

Part C

Template for Question 3-C

Determine which of the available rebalancing strategies (buy-and-hold, constant-mix, or CPPI) is *most* appropriate for Marsden. (circle one)	Justify your response with *two* reasons.
buy-and-hold constant-mix CPPI	CPPI is the most appropriate rebalancing strategy for Marsden for the following reasons: • CPPI provides a floor (minimum portfolio value), which the client requires; • CPPI will outperform both the buy-and-hold and constant-mix strategies in Kadar's scenario of rising markets; • CPPI is a convex strategy which increases investment in risky assets as the portfolio value increases. This is consistent with the client's willingness to accept additional risk as his portfolio value increases.

LEVEL III

Question: 4
Topic: Behavioral
Minutes: 17

Reading References:
Level III, Volume 2, Study Session 3, Reading 8
"The Behavioral Biases of Individuals," Michael M. Pompian, CFA (CFA Institute, 2011).

LOS:
2012-III-2-8-a–d
"The Behavioral Biases of Individuals"
    The candidate should be able to:
    a. **distinguish between cognitive errors and emotional biases;**
    b. **discuss commonly recognized behavioral biases and their implications for financial decision making;**
    c. **analyze an individual's behavior for behavioral biases;**
    d. **evaluate the impact of biases on investment policy and asset allocation discuss approaches to mitigate their effects.**

LEVEL III

Question: 4
Topic: Behavioral
Minutes: 17

Guideline Answer:

Part A

Template for Question 4-A
Note: Each diagnostic question is designed to reveal a different bias.

Diagnostic Question	Identify the behavioral bias that *each* diagnostic question in Exhibit 1 is *most likely* to reveal. (circle one)
1. Would a prior investment decision that resulted in a loss stop you from making a similar decision, even if the new investment appears to be the best alternative?	anchoring hindsight ⬛ regret aversion ⬛ representativeness status quo
2. How frequently do you review your investment portfolio?	anchoring hindsight regret aversion representativeness ⬛ status quo ⬛
3. Would you sell a recent equity investment following a management announcement of a significant decline in the expected growth rate of revenue?	⬛ anchoring ⬛ hindsight regret aversion representativeness status quo

LEVEL III

Question: 4
Topic: Behavioral
Minutes: 17

Regret aversion refers to the influence of past decisions (associated with poor investment performance) on similar choices in the present. Often, rational actions are not taken in order to avoid a recurrence of the regret experienced after the past decision(s).

Status quo bias is an emotional bias in which people do nothing (i.e., maintain the "status quo") instead of making a change. People are generally more comfortable keeping things the same. This bias might prevent an investor from looking for opportunities where change may be beneficial.

Anchoring is the tendency to continue using information that had been used in past decisions despite the availability and relevance of new information. As a result, investment decisions become difficult to reverse when the new information indicates that a change is advisable.

Part B

Template for Question 4-B

Identify *two* cognitive biases exhibited by Stoffer. (circle one)	Justify *each* response with *one* reason.
First cognitive bias: endowment conservatism [mental accounting] illusion of control	Stoffer's practice of separating investments by source of funds and following different strategies with each source indicates a desire for distinct "mental accounts."
Second cognitive bias: endowment conservatism mental accounting [illusion of control]	Stoffer's feeling of personal influence over her company's stock price indicates an overestimation of the degree of control she can exercise over the success of her investments.

Question:	4
Topic:	Behavioral
Minutes:	17

Endowment bias is an emotional bias in which people value an asset more when they hold the rights to it than when they do not. There is no evidence that Stoffer suffers from this bias. In addition, this is not a cognitive bias.

Conservatism bias is a belief perseverance bias in which people maintain their prior views or forecasts by inadequately incorporating new information. There is no evidence that Stoffer suffers from this cognitive bias.

Part C

The advisor should attempt to moderate Stoffer's behavioral biases because her biases are cognitive (mental accounting and illusion of control), not emotional, biases, so she can be educated to avoid these biases. Also, because of her concentrated investments, the risk to Stoffer's ability to maintain her standard of living is high. Adapting to her biases could prevent Stoffer from achieving her investment goals.

LEVEL III

Question: 5
Topic: Economics
Minutes: 24

Reading References:
Level III, Volume 3, Study Session 6, Reading 18
"Capital Market Expectations," Ch. 4, John P. Calverley, Alan M. Meder, CFA, Brian D. Singer, CFA, and Renato Staub, *Managing Investment Portfolios: A Dynamic Process*, Third Edition (CFA Institute, 2007).

Level III, Volume 3, Study Session 7, Reading 19
"Equity Market Valuation," Peter C. Stimes, CFA, and Stephen E. Wilcox, CFA (CFA Institute, 2010).

LOS:
2012-III-3-18-b, c, n–q
"Capital Market Expectations"
   The candidate should be able to:
   a) discuss the role of, and a framework for, capital market expectations in the portfolio management process;
   b) **discuss, in relation to capital markets expectations, the limitations of economic data, data measurement errors and biases, the limitations of historical estimates, *ex post* risk as a biased measure of *ex ante* risk, biases in analysts' methods, the failure to account for conditioning information, the misinterpretation of correlations, psychological traps, and model uncertainty;**
   c) **demonstrate the application of formal tools for setting capital market expectations, including statistical tools, discounted cash flow models, the risk premium approach, and financial equilibrium models;**
   d) explain the use of survey and panel methods and judgment in setting capital market expectations;
   e) discuss the inventory and business cycles, the impact of consumer and business spending, and monetary and fiscal policy on the business cycle;
   f) discuss the impact that the phases of the business cycle have on short-term/long-term capital market returns;
   g) explain the relationship of inflation to the business cycle and the implications of inflation for cash, bonds, equity, and real estate returns;
   h) demonstrate the use of the Taylor rule to predict central bank behavior;
   i) evaluate 1) the shape of the yield curve as an economic predictor and 2) the relationship between the yield curve and fiscal and monetary policy;
   j) identify and interpret the components of economic growth trends and demonstrate the application of economic growth trend analysis to the formulation of capital market expectations;
   k) explain how exogenous shocks may affect economic growth trends;

LEVEL III

Question:	5
Topic:	Economics
Minutes:	24

l) identify and interpret macroeconomic, interest rate, and exchange rate linkages between economies;

m) discuss the risks faced by investors in emerging-market securities and the country risk analysis techniques used to evaluate emerging market economies;

n) compare the major approaches to economic forecasting;

o) demonstrate the use of economic information in forecasting asset class returns;

p) evaluate how economic and competitive factors affect investment markets, sectors, and specific securities;

q) discuss the relative advantages and limitations of the major approaches to forecasting exchange rates;

r) recommend and justify changes in the component weights of a global investment portfolio based on trends and expected changes in macroeconomic factors.

LOS:
2012-III-3-19-d–g
"Equity Market Valuation"
The candidate should be able to:

a) explain the terms of the Cobb-Douglas production function and demonstrate how the function can be used to model growth in real output under the assumption of constant returns to scale;

b) evaluate the relative importance of growth in total factor productivity, in capital stock, and in labor input given relevant historical data;

c) demonstrate the use of the Cobb-Douglas production function in obtaining a discounted dividend model estimate of the intrinsic value of an equity market;

d) critique the use of discounted dividend models and macroeconomic forecasts to estimate the intrinsic value of an equity market;

e) contrast top-down and bottom-up approaches to forecasting the earnings per share of an equity market index;

f) discuss the strengths and limitations of relative valuation models;

g) judge whether an equity market is under-, fairly, or over-valued using a relative equity valuation model.

LEVEL III

Question: 5
Topic: Economics
Minutes: 24

Guideline Answer:

Part A

Template for Question 5-A
Note: Consider *each* source of error independently.

Source of error	Determine which of Cooke's analyses in Exhibit 1 is *most likely* to be affected by *each* of the following sources of error. (circle one)	Justify *each* response with *one* reason.
i. survivorship bias	1 2 ③ 4 5	Cooke's data series for his regression analysis includes only those economies that achieved developed status. He has excluded all that failed to reach current developed country status. By only including the economies that survived to developed status, he is likely overly optimistic in his projection of Emergistan's real GDP growth.
ii. regime changes	① 2 3 4 5	Cooke's inflation model was created using the full 50-year history of Emergistan. However, the creation of a central bank 12 years ago appears to have resulted in high and volatile inflation. Therefore, data prior to 12 years ago is probably not relevant for current economic analysis.

LEVEL III

Question: 5
Topic: Economics
Minutes: 24

	1	
	2	By using interpolated data points to calculate bond prices where none were available, Cooke has probably created a smoother (or appraised) price series than would actually exist. As a result, he has most likely underestimated bond market volatility. He also has most likely overestimated risk-adjusted return.
iii. appraisal data	3	
	4	
	5	

LEVEL III

Question: 5
Topic: Economics
Minutes: 24

Part B

Template for Question 5-B
Note: Consider *each* methodology independently and use *only* the economic data in Exhibit 2.

Methodology	Determine whether the EMD is *most likely* to become stronger, weaker, or remain unchanged relative to the USD, based on *each* of the following methodologies. (circle one)	Justify *each* response with *one* reason.
i. purchasing power parity	stronger boxed: weaker remain unchanged	Emergistan has a higher inflation rate than the U.S., and this difference is forecast to grow. PPP asserts that movements in an exchange rate should offset any difference in the inflation rates between two countries.
ii. capital flows	stronger boxed: weaker remain unchanged	Capital flows, measured by foreign direct investment, are forecast to decline as a percent of GDP (from 1.9% to 1.7%). This will decrease the demand for Emergistan's currency, all else being equal.*

*An alternative answer to Question 5-Bii is that EMD is most likely to become stronger because capital flows, measured by foreign direct investment, are forecast to increase. This is the result of forecast GDP increasing at a faster rate (4.3% to 4.6% per year) than foreign direct investment is decreasing. This will increase the demand for a country's currency, all else being equal.

LEVEL III

Question: 5
Topic: Economics
Minutes: 24

Part C

The H-model is defined as follows:

$$V_0 = D_0 / (r - g_l) \times [(1 + g_l) + N/2 \times (g_s - g_l)]$$

Where:

    V_0 = intrinsic value
    D_0 = current dividend rate
    g_s = initial expected growth rate of dividends
    g_l = long-term expected growth rate of dividends
    N = period of years for growth rate of dividends to decline from g_s to g_l
    r = required rate of return for the stock market

so,
$$V_0 = 46 / (0.102 - 0.04) \times [(1 + 0.04) + 15/2 \times (0.12 - 0.04)]$$
$$V_0 = 1216.8$$

Part D

i.
Tobin's q is defined as:

q = (Market value of equity + Market value of debt) / Replacement cost of assets

so,

q = (224 billion EMD + 116 billion EMD) / 152 billion EMD

q = 2.24

ii
According to economic theory, Tobin's q will be lower than 2.24 in the long run, all other factors held constant.

The market is valued higher than the replacement cost of assets. Either security prices will fall or companies will continue to invest in new assets until the ratio reverts to an equilibrium value of 1.0. However, it may take several years for this adjustment to occur.

LEVEL III

Question:	6
Topic:	Institutional Portfolio Management
Minutes:	34

Reading References:
Level III, Volume 2, Study Session 5, Reading 15
"Managing Institutional Investor Portfolios," Ch. 3, R. Charles Tschampion, CFA, Laurence B. Siegel, Dean J. Takahashi, and John L. Maginn, CFA, *Managing Investment Portfolios: A Dynamic Process*, Third Edition (CFA Institute, 2007).

Level III, Volume 2, Study Session 5, Reading 16
"Linking Pension Liabilities to Assets," Aaron Meder and Renato Staub (UBS Global Asset Management, 2007).

Level III, Volume 2, Study Session 5, Reading 17
"Allocating Shareholder Capital to Pension Plans," Robert C. Merton, *Journal of Applied Corporate Finance* (Blackwell Publishing, winter 2006).

LOS:
2012-III-2-15-a–e
"Managing Institutional Investor Portfolios"
　　　The candidate should be able to:
   a)　**contrast a defined-benefit Plan to a defined-contribution plan, from the perspective of the employee and employer and discuss the advantages and disadvantages of each;**
   b)　**discuss investment objectives and constraints for defined-benefit plans;**
   c)　**evaluate pension fund risk tolerance when risk is considered from the perspective of the 1) plan surplus, 2) sponsor financial status and profitability, 3) sponsor and pension fund common risk exposures, 4) plan features, and 5) workforce characteristics;**
   d)　**prepare an investment policy statement for a defined-benefit plan;**
   e)　**evaluate the risk management considerations in investing pension plan assets;**
   f)　prepare an investment policy statement for a defined-contribution plan;
   g)　discuss hybrid pension plans (e.g., cash balance plans) and employee stock ownership plans;
   h)　distinguish among various types of foundations, with respect to their description, purpose, source of funds, and annual spending requirements;
   i)　compare the investment objectives and constraints of foundations, endowments, insurance companies, and banks;
   j)　prepare an investment policy statement for a foundation, an endowment, an insurance company, and a bank;
   k)　contrast investment companies, commodity pools, and hedge funds to other types of institutional investors;
   l)　discuss the factors that determine investment policy for pension funds, foundations, endowments, life and nonlife insurance companies, and banks;
   m)　compare the asset/liability management needs of pension funds, foundations, endowments, insurance companies, and banks;

LEVEL III

Question: 6
Topic: Institutional Portfolio Management
Minutes: 34

n) compare the investment objectives and constraints of institutional investors given relevant data, such as descriptions of their financial circumstances and attitudes toward risk.

LOS:
2012-III-2-16-a–c
"Linking Pension Liabilities to Assets"
The candidate should be able to:
a) **contrast the assumptions concerning pension liability risk in asset-only and liability-relative approaches to asset allocation;**
b) **discuss the fundamental and economic exposures of pension liabilities and identify asset types that mimic these liability exposures;**
c) **compare pension portfolios built from a traditional asset-only perspective to portfolios designed relative to liabilities and discuss why corporations may choose not to implement fully the liability mimicking portfolio.**

LOS:
2012-III-2-17-a
"Allocating Shareholder Capital to Pension Plans"
The candidate should be able to:
a) **compare funding shortfall and asset/liability mismatch as sources of risk faced by pension plan sponsors;**
b) explain how the weighted average cost of capital for a corporation can be adjusted to incorporate pension risk and discuss the potential consequences of not making this adjustment;
c) explain, in an expanded balance sheet framework, the effects of different pension asset allocations on total asset betas, the equity capital needed to maintain equity beta at a desired level, and the debt-to-equity ratio.

LEVEL III

Question:	6
Topic:	Institutional Portfolio Management
Minutes:	34

Guideline Answer:

Part A

Aquiline has been experiencing declining profitability, and the company is concerned about the negative impact that future contributions to the Plan would have on the stock price. Although the funding surplus was eliminated because of the recent economic slowdown, the Plan is currently fully funded.

The company's <u>return objective</u> is to earn a return that will, at a minimum, "defease" the Plan's liability (keep the value of the fund's assets equal to the present value of liabilities). Because the Plan is currently fully funded, the return objective is the discount rate used to calculate the present value of the Plan's liabilities.

Therefore, the minimum <u>return requirement</u> for the Plan is 5% because this is the rate that is used to calculate the present value of the liabilities. (Note that expected future liabilities already incorporate expected inflation-related adjustments to benefits for Plan participants.)

Aquiline may consider earning a return in excess of the 5% required minimum. Achieving a higher return would reduce the probability of a future funding deficit and the need to make additional contributions.

Part B

Factors that contribute to the Plan's low risk tolerance are:
* Aquiline has declining profitability. This limits the ability of the company to make contributions to the Plan.
* Aquiline's operating earnings are positively correlated with pension asset returns. Low or negative asset returns could occur when the firm is least capable of making contributions.
* The new provision for early retirement reduces the duration of Plan liabilities and increases the liquidity requirement.
* The relatively older workforce (average age of 54) results in a short duration of Plan liabilities.
* The diminished funding status for the Plan increases the probability of shortfall risk, which could require Aquiline to make additional contributions.
* There is a risk that actual inflation could exceed expected inflation. This would lead to a greater need to pay the inflation-indexed retirement benefits for current retirees and certain former employees.

LEVEL III

Question:	6
Topic:	Institutional Portfolio Management
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Part C

The current asset allocation may lead to a funding shortfall because:
- The realized returns on the portfolio may not equal the expected return. While expected return is stable, realized returns can be volatile. As the Plan is fully funded (but no longer in a surplus situation), the Plan could experience shortfall between assets and the present value of liabilities if realized returns are less than the expected return.
- The company is partially funding debt-like liabilities with equities. While equities may have higher return potential than debt assets, equities exhibit higher market risk.

Part D

i.   Under Trout's asset-only approach, the primary characteristic of low-risk investments would be low correlation with the Plan's assets. Under this approach, the focus is on creating efficient frontier portfolios; therefore, low-risk investments are those that have low correlation with plan assets.

ii.   Under Rayburn's liability-relative approach (which seeks to match assets with economic liabilities), the primary characteristic of low-risk investments would be a high positive correlation with the Plan's liabilities. The investment portfolio's assets should mimic the liabilities in market-related exposures and expected cash flows. This approach should minimize shortfall risk now and in the future.

LEVEL III

Question: 6
Topic: Institutional Portfolio Management
Minutes: 34

Part E
Template for Question 6-E

Weighting	Determine which asset class (equities, nominal bonds, or real-rate bonds) in Rayburn's recommended portfolio should have the: (circle one)	Justify *each* response with *one* reason.
i. highest weighting	equities nominal bonds ~~real-rate bonds~~ (circled)	Under the liability-relative approach, the asset allocation of the investment portfolio should be determined by the risk-return characteristics of liabilities. All liabilities subject to inflationary effects should be matched with real-rate bonds, i.e., bonds with yields that reflect risk premium and inflation. In Aquiline's case, this includes the inflation indexed payments for current retirees, deferred benefits, and future wage inflation.
ii. lowest weighting	equities (circled) nominal bonds real-rate bonds	Future real wage growth is correlated with the return on domestic equity securities through the relationship between productivity growth and stock market returns. Therefore, the allocation to equities is the lowest allocation, because future real wage growth is the smallest component of the Plan's benefit payments.

LEVEL III

Question: 6
Topic: Institutional Portfolio Management
Minutes: 34

Part F

i. Advantages to Aquiline:
*   In the Defined Contribution setting, Aquiline does not have the responsibility to set objectives and constraints; rather, the plan participants set their own risk and return objectives and constraints.
*   Aquiline does not bear the risk of investment results; employees and beneficiaries bear the risk.
*   Aquiline's future pension obligations are more stable and predictable.
*   Aquiline does not need to recognize any additional pension liabilities on its balance sheet under the new plan.
*   As long as Aquiline provides a wide range of investment choices and periodically evaluates them, it fulfills its fiduciary responsibilities as the plan sponsor.

ii. Advantages to Employees:
*   The participant is able to choose a risk and return objective reflecting his or her own personal financial circumstances, goals, and attitudes toward risk.
*   Defined contribution plan assets are more readily portable.
*   Under Aquiline's defined contribution plan, employees are immediately vested.
*   Defined contribution plans do not present early termination risk, i.e., the risk that the plan is terminated by the plan sponsor.
*   Participants can rebalance and re-allocate investments.
*   Defined contribution plans reduce participants' exposure to Aquiline's financial condition.
*   Account balances legally belong to participants.

LEVEL III

Question: **7**
Topic: Fixed Income
Minutes: 23

Reading References:

Level III, Volume 4, Study Session 10, Reading 25
"Fixed-Income Portfolio Management – Part II," Ch. 6, H. Gifford Fong and Larry D. Guin, CFA, *Managing Investment Portfolios: A Dynamic Process*, Third Edition (CFA Institute, 2007).

Level III, Volume 4, Study Session 10, Reading 26
"Hedging Mortgage Securities to Capture Relative Value," Ch. 23, Kenneth B. Dunn, Roberto M. Sella, and Frank J. Fabozzi, CFA, *Fixed Income Readings for the Chartered Financial Analyst*[®] (CFA Institute, 2005).

LOS:
2012-III-4-25-a, b, d, f
"Fixed-Income Portfolio Management – Part II"
    The candidate should be able to:
    a)   **evaluate the effect of leverage on portfolio duration and investment returns;**
    b)   **discuss the use of repurchase agreements (repos) to finance bond purchases and the factors that affect the repo rate;**
    c)   critique the use of standard deviation, target semivariance, shortfall risk, and value at risk as measures of fixed-income portfolio risk;
    d)   **demonstrate the advantages of using futures instead of cash market instruments to alter portfolio risk;**
    e)   formulate and evaluate an immunization strategy based on interest rate futures;
    f)   **explain the use of interest rate swaps and options to alter portfolio cash flows and exposure to interest rate risk;**
    g)   compare default risk, credit spread risk, and downgrade risk and demonstrate the use of credit derivative instruments to address each risk in the context of a fixed-income portfolio;
    h)   explain the potential sources of excess return for an international bond portfolio;
    i)   evaluate 1) the change in value for a foreign bond when domestic interest rates change and 2) the bond's contribution to duration in a domestic portfolio, given the duration of the foreign bond and the country beta;
    j)   recommend and justify whether to hedge or not hedge currency risk in an international bond investment;
    k)   describe how breakeven spread analysis can be used to evaluate the risk in seeking yield advantages across international bond markets;
    l)   discuss the advantages and risks of investing in emerging market debt;
    m)   discuss the criteria for selecting a fixed-income manager.

LEVEL III

Question: **7**
Topic: Fixed Income
Minutes: 23

LOS:
2012-III-4-26-a, b
"Hedging Mortgage Securities to Capture Relative Value"
> The candidate should be able to:
> **a)**   **demonstrate how a mortgage security's negative convexity will affect the performance of a hedge;**
> **b)**   **explain the risks associated with investing in mortgage securities and discuss whether these risks can be effectively hedged;**
> c)   contrast an individual mortgage security to a Treasury security with respect to the importance of yield-curve risk;
> d)   compare duration-based and interest rate sensitivity approaches to hedging mortgage securities.

LEVEL III

Question: 7
Topic: Fixed Income
Minutes: 23

Guideline Answer:

Part A

i.
The return on the total funds invested (initial plus borrowed) equals the return on the borrowed funds less borrowing costs, plus the return on the initial funds, divided by the size of the fund.

$$R_P = [B \times (r_F - k) + E \times r_F] / E$$

Where:
   r_F = return on invested funds = 3.20%
   k = cost of borrowing = 2.40%
   E = initial (or Equity) funds = 200,000,000
   B = borrowed funds
   R_P = Required return on initial (equity) funds, after leveraging = 4.40%

Solving the above equation for the B:

$$B = (R_P \times E - E \times r_F) / (r_F - k) = E (R_P - r_F) / (r_F - k)$$

$$= 200,000,000 \times (0.044 - 0.032) / (0.032 - 0.024)$$

$$= USD\ 300,000,000$$

ii.
Let D_E = duration of the initial (equity) funds
      D_A = duration of the assets (the bond portfolio)
      D_L = duration of the liabilities (borrowed funds)
      A = value of bond portfolio (initial funds plus borrowed funds)
      L = value of liabilities (borrowed funds)
      $E = A - L$ = value of equity

Therefore:

$$D_E = (D_A A - D_L L)/E$$

$$= [8.50 \times (200,000,000 + 300,000,000) - 0.8 \times 300,000,000] / 200,000,000$$

$$= 20.05.$$

LEVEL III

Question: 7
Topic: Fixed Income
Minutes: 23

Part B

Factor	Determine, for *each* factor that Brown has identified, the characteristic that would lead to a lower repo rate. (circle one)	Justify *each* response with *one* reason.
availability of the collateral	easy to obtain ~~difficult to obtain~~ has no effect	When the collateral security is difficult to obtain, the buyer (lender) in the repo transaction is willing to accept a lower repo rate in order to access the scarce collateral, for example, to cover a short sale. This "special" collateral is valuable to the lender of funds.
quality of the collateral	~~high quality~~ low quality has no effect	Higher quality collateral reduces the risk (default, credit, liquidity, etc.) of the collateral and therefore, fund lenders are willing to accept a lower repo rate.

LEVEL III

Question: 7
Topic: Fixed Income
Minutes: 23

Part C

Let D_T = target portfolio duration = 11.00
        D_I = initial portfolio duration = 8.50
        P_I = initial market value of the portfolio = 211,000,000
        D_{CTD} = duration of the cheapest-to-deliver bond = 16.70
        P_{CTD} = price of the cheapest-to-deliver bond = 100,000

        Conversion factor = 1.02

Therefore, the number of futures contracts required to increase the portfolio's duration to 11.0 equals:

$= [(D_T - D_I) \times P_I] / (D_{CTD} \times P_{CTD}) \times$ Conversion factor

$= [(11.00 - 8.50) \times 211,000,000] / (16.70 \times 100,000) \times 1.02$

$= 322.19$.
Brown should buy 322 futures contracts.

Part D

The duration of the 90-day call option equals:

 $=$ (delta of call option) $\times$ (duration of underlying) $\times$ (price of underlying) / (price of call option)

$= 0.4 \times 16.93 \times 1,037,560 / 27,568 = 254.87$ or approximately 255.

Part E

Since Brown believes that the actual future volatility will be higher than implied volatility, she should use options hedging. She is confident that volatility will increase, and if she is correct, the value of the options will increase as volatilities rise.
Dynamic hedging, buying futures after rates have declined, and selling futures after rates have risen, is not appropriate when volatility is expected to rise. This approach would not benefit from the rise in the option's value.

LEVEL III

Question:	8
Topic:	Derivatives
Minutes:	13

Reading References:

Level III, Volume 5, Study Session 15, Reading 36
"Risk Management Applications of Forward and Futures Strategies," Don M. Chance, CFA, *Analysis of Derivatives for the Chartered Financial Analyst® Program* (AIMR, 2003).

LOS:
2012-III-5-36-a, d, e
"Risk Management Applications of Forward and Futures Strategies"
  The candidate should be able to:
  a) **demonstrate the use of equity futures contracts to achieve a target beta for a stock portfolio and calculate and interpret the number of futures contracts required;**
  b) construct a synthetic stock index fund using cash and stock index futures (equitizing cash);
  c) explain the use of stock index futures to convert a long stock position into synthetic cash;
  d) **demonstrate the use of equity and bond futures to adjust the allocation of a portfolio between equity and debt;**
  e) **demonstrate the use of futures to adjust the allocation of a portfolio across equity sectors and to gain exposure to an asset class in advance of actually committing funds to the asset class;**
  f) explain exchange rate risk and demonstrate the use of forward contracts to reduce the risk associated with a future receipt or payment in a foreign currency;
  g) explain the limitations to hedging the exchange rate risk of a foreign market portfolio and discuss two feasible strategies for managing such risk.

LEVEL III

Question: 8
Topic: Derivatives
Minutes: 13

Guideline Answer:

Part A

i. Equity targets

Patheo effectively needs to sell $28 million of stock by converting it to cash using stock index futures and buy $28 million of bonds by using bond futures. This would effectively convert the stock into cash and then convert that cash into bonds. Of course, this entire series of transactions will be synthetic; the actual stock and bonds in the portfolio will stay in place.

In order to achieve the equity targets, Patheo must determine the number of equity futures necessary to:
1. Reduce the equity allocation by $28 million and
2. Decrease the equity beta to 0.90

In both cases Patheo will rely on the following relationship:
$N_{fe} = [(\beta_T - \beta_P) / (\beta_f)] \times (E / f_e)$

Where:
N_{fe} = number of equity futures to be traded
β_T = the beta being targeted
β_P = the starting beta of the relevant portfolio or portfolio component
β_f = the beta of the relevant futures contract
E = the size of the relevant equity portfolio or portfolio component
f_e = the price of the relevant equity futures contract

To Reduce the Equity Allocation by $28 million:

Patheo wants to reduce equities by USD 28,000,000, so the target beta is the beta of cash, which is assumed to be zero. The portfolio's current beta is 1.08 and the futures' beta is 0.97.

Therefore, $N_{fe} = [(0 - 1.08) / (0.97)] \times (28,000,000 / 129,000) = -241.67$.
Patheo should **sell 242** equity futures contracts.

To Decrease the Equity Beta to 0.90:

Next, Patheo needs to decrease the equity beta from 1.08 to 0.90 on what is <u>now</u> a USD 154,000,000 equity portfolio.

Therefore $N_{fe} = [(0.90 - 1.08) / (0.97)] \times (154,000,000 / 129,000) = -221.53$
Patheo should **sell 222** equity futures contracts.

Question: 8
Topic: Derivatives
Minutes: 13

To achieve the equity targets, Patheo should **sell 242 + 222 = 464** equity futures contracts.

ii. Bond targets

In order to achieve the bond targets, Patheo must determine the number of bond futures necessary to:

1. Increase the bond allocation by $28 million and
2. Decrease the modified duration to 6.0

In both cases Patheo will rely on the following relationship:
$N_{fb} = [(MDUR_T - MDUR_P) / MDUR_f] \times (B / f_b)$

Where:

N_{fb} = number of bond futures to be traded
$MDUR_T$ = the modified duration being targeted
$MDUR_P$ = the modified duration of the relevant portfolio or portfolio component
$MDUR_f$ = the implied modified duration of the relevant bond futures contract
B = the size of the relevant bond portfolio or portfolio component
f_b = the price of the relevant bond futures contract

To Increase the Bond Allocation by $28 Million:

Patheo wants to increase bond exposure by USD 28,000,000. The starting position for this is the synthetic cash which has been raised by the sale of equity futures, so the modified duration of this component is zero.

Therefore $N_{fb} = [(7.20 - 0.00) / 7.70] \times (28,000,000 / 103,000) = 254.19$
Patheo should **buy 254** bond futures contracts.

To Decrease the Modified Duration to 6.0:

Next, Patheo needs to change the modified duration from 7.20 to 6.00 on what is now a USD 126,000,000 bond portfolio.

$N_{fb} = [(6.00 - 7.20) / 7.70] \times (126,000,000 / 103,000) = -190.64$
Patheo should **sell 191** bond futures contracts.

To achieve the bond targets, Patheo should **buy 254 – 191 = 63** bond futures contracts.

LEVEL III

Question: 8
Topic: Derivatives
Minutes: 13

Part B

The initial value of the Peterson portfolio equals:

- Equity securities position = USD 46,000,000
- Bond securities position = USD 32,000,000

The rebalancing transactions are as follows:

- Equity futures position (long)= 42 × 160,000 = USD 6,720,000
- Bond futures position (short) = –35 × 190,000 = –USD 6,650,000

Profit/Loss Over the Past Three Months:

Profit/Loss on equity securities = 3% × USD 46,000,000 = +USD 1,380,000

Profit/Loss on bond securities = –2.40% × USD 32,000,000 = –USD 768,000

Profit/Loss on equity futures = 42 × (165,000 – 160,000) = +USD 210,000

Profit/Loss on bond futures = –35 × (185, 250 – 190,000) = +USD 166,250

Total Net Profit/Loss = 1,380,000 – 768,000 + 210,000 + 166,250 = USD 988,250
              Or 988,250 / 78,000,000 = 1.27%

LEVEL III

Question:	9
Topic:	Derivatives
Minutes:	12

Reading References:
Level III, Volume 5, Study Session 15, Reading 37
"Risk Management Applications of Options Strategies," Don M. Chance, CFA, *Analysis of Derivatives for the Chartered Financial Analyst® Program* (AIMR, 2003).

LOS:
2012-III-5-37-e, f
"Risk Management Applications of Option Strategies"
    The candidate should be able to:
    a)   compare the use of covered calls and protective puts to manage risk exposure to individual securities;
    b)   calculate and interpret the value at expiration, profit, maximum profit, maximum loss, breakeven underlying price at expiration, and general shape of the graph for the major option strategies (bull spread, bear spread, butterfly spread, collar, straddle, box spread);
    c)   calculate the effective annual rate for a given interest rate outcome when a borrower (lender) manages the risk of an anticipated loan using an interest rate call (put) option;
    d)   calculate the payoffs for a series of interest rate outcomes when a floating rate loan is combined with 1) an interest rate cap, 2) an interest rate floor, or 3) an interest rate collar;
    e)   explain why and how a dealer delta hedges an option position, why delta changes, and how the dealer adjusts to maintain the delta hedge;
    f)   interpret the gamma of a delta-hedged portfolio and explain how gamma changes as in-the-money and out-of-the-money options move toward expiration.

LEVEL III

Question: 9
Topic: Derivatives
Minutes: 12

Guideline Answer:

Part A

i.
Delport needs to *sell* shares in the underlying equity.
By selling put options to his client, Delport is net long the underlying equity. Therefore, the hedge needs to be a short position. He must sell shares to hedge his exposure.

ii.
Delport's current exposure from selling the put options = # contracts × spot price × option delta
= –2,000 × $1,340 × –0.3088
= $827,584 (long)

Therefore, the number of shares that must be sold equals $827,584 / $1,340 = 617.60 or 618 shares.

Part B

The change in the price of put options will be greater for an instantaneous *decrease* in the price of the underlying equity than for an instantaneous *increase* in the price of the underlying equity of equal size.

For put options, the delta will underestimate the price effect of decreases in the underlying equity and will overestimate the price effect of increases in the underlying equity. This is due to the convex relationship between put option prices and the price of the underlying equity. This can be addressed by adjusting the put option price for the effect of gamma, which is analogous to the convexity adjustment of a bond's price.

LEVEL III

Question: 9
Topic: Derivatives
Minutes: 12

Part C

Delport's current hedged position consists of a long position in equities and a short position in call options. His net cash outlay equals:
= (# of shares bought × price per share) – (# of call options sold × option premium)
= 1,322 × 800 – (3,000 × 29.42)
= $969,340

The value of Delport's performance benchmark continuously compounded at 2.25%, for five days equals:
= $969,340 \times e^{(0.0225 \times 5 / 365)}$
= $969,638.82

The value of Delport's long equity position in five days equals:
= 1,322 × 815 = $1,077,430

The value of Delport's short call option position in five days equals:
= –3,000 × 35.30 = –$105,900

The value of Delport's hedged position equals:
= 1,077,430 – 105,900 = $971,530.

Therefore, the percentage difference between the hedged position's value and Delport's performance benchmark equals:
(971,530 – 969,638.82) / 969,638.82 = 0.195%