

FinQuiz.com

Level III of CFA Program

Mock Exam 1

June, 2019

Revision 1

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FinQuiz.com – 1st Mock Exam 2019 (AM Session)

The morning session of the 2019 Level III Examination has 10 questions. For grading purposes, the maximum point value for each question is equal to the number of minutes allocated to that question.

Questions	Topic	Minutes
1	Portfolio Management – Individual Investor	36
2	Portfolio Management – Institutional Investors	28
3	Portfolio Management – Economics	10
4	Portfolio Management – Asset Allocation	25
5	Portfolio Management – Fixed-Income Investments	16
6	Portfolio Management – Fixed-Income Investments	13
7	Portfolio Management – Equity Investments	6
8	Portfolio Management – Risk Management	20
9	Portfolio Management – Evaluating Portfolio Performance	17
10	Portfolio Management – Performance Evaluation and Attribution	9
Total:		180

QUESTION 1 HAS FOUR PARTS (A, B, C, D) FOR A TOTAL OF 36 MINUTES.

Simon Becker is a 45 years old stock broker at P.S. Salow, a well-respected firm with a long history. Simon is sitting down with J.D. Smithson, the advisor that manages his retirement portfolio, to plan his retirement and other needs.

Simon has done well and would like to retire in ten years. He is married and his two twin boys will soon be moving out and attending college at the same time he is starting retirement. While he does not plan on paying their entire tuition, he would like to give them a one-time gift of \$25,000 each when they move out.

Simon and his wife, who works as a medical examiner, would like to retire and buy a vacation home in Miami, which will cost about \$200,000. They currently rent a home and have no significant debts or mortgages.

The Becker's currently have an investment portfolio of \$1,250,000 in a money market account. They would like to buy an annuity for \$2,000,000 when they retire that will cover their annual expenses. While the Beckers have worked hard to fund their portfolio to this point, they do not want to contribute any more for their remaining years to retirement. While he is familiar with the concept of risk and return, Mr. Becker has seen many of his coworkers lose their entire life savings to speculative investments. He feels that he and his wife have worked hard to save up and are pretty well set for their retirement.

A. Formulate each of the following constraints for Mr. Becker's investment policy statement (IPS):

- i. time horizon
- ii. unique circumstances
- iii. liquidity

(6 minutes)

B. State the return objective and risk tolerance statement for Mr. Becker's IPS. Risk tolerance should include ability, willingness and an overall tolerance.

(12 minutes)

C. Calculate the required average annual after-tax nominal rate of return for the IPS. **Show** your calculations.

(9 minutes)

Five years have passed and the Beckers have recently inherited a substantial amount of money from a relative. In addition, the Beckers have reassessed their plans in retirement and would like to live a more lavish lifestyle which will require more expenses. To accomplish this, Mr. Becker has decided to put part of their money to private equity and hedge funds.

- D.** Identify two factors that change Mr. Becker’s ability or willingness to take risk and state whether the factor increases or decreases risk tolerance.

Answer Question 1-D in the Template provided below.

(10 minutes)

Template for Question 1-D

<p>Choose whether the affect is to willingness or ability to tolerate risk</p>	<p>Choose whether the affect is an increase or decrease in risk tolerance</p>	<p>Identify two factors that change Mr. Becker's risk tolerance.</p>
<p>Ability</p> <p>Willingness</p>	<p>Increase</p> <p>Decrease</p>	
<p>Ability</p> <p>Willingness</p>	<p>Increase</p> <p>Decrease</p>	

Solution for Question 1.

A Solution:

i. Time Horizon

The Beckers have a two-stage time horizon; 10 years to planned retirement and children's college; then greater than 30 years in retirement.

ii. Unique Circumstances

Mr. Becker's job as a stock broker means his income may be correlated with the performance of the stock market so it may be appropriate to correlate his investment portfolio more closely with fixed income products and other safer investments.

iii. Liquidity

The Beckers have no immediate large one-time cash needs.

Reference:

CFA Level III, Volume 2, Study Session 5, Reading 10.

B Solution:

Return Objective

The Beckers would like to purchase an annuity product worth \$2,000,000 in ten years to fund their retirement expenses and buy a retirement home in Miami. They need to grow their current portfolio by enough to fund the purchase of the annuity and the retirement home, plus gift \$50,000 to their children.

Risk Tolerance

The Becker's risk tolerance is below average because of a lower than average willingness

Ability- The Becker's ability to tolerate risk is average given the size of their portfolio and low immediate needs for liquidity

Willingness- The Becker's willingness to tolerate risk is below average given Mr. Becker's statements about coworkers.

Reference:

CFA Level III, Volume 2, Study Session 5, Reading 10.

C Solution:

Investment Portfolio (pretax)	\$1,250,000
-------------------------------	-------------

Cash Outflows at Retirement

Gift to Children	\$50,000
Cost of Retirement Home	\$200,000
Required to Buy Annuity	<u>\$2,000,000</u>
	\$2,250,000

Required Return Calculation

Present Value	\$1,250,000
Future Value	\$2,250,000
Annual Contribution (PMT)	\$0
Number of Years (N)	10

→ Compute I/Y after-tax Nominal 6.05%

Reference:

CFA Level III, Volume 2, Study Session 5, Reading 9.

D Solution:

Template for Question 1-D

Choose whether the affect is to willingness or ability to tolerate risk	Choose whether the affect is an increase or decrease in risk tolerance	Identify two factors that change Mr. Becker's risk tolerance.
<p style="text-align: center;">Ability</p> <p>Willingness</p>	<p style="text-align: center;">Increase</p> <p>Decrease</p>	<p>The large inheritance increases their ability to take risks because it decreases the proportion of expenses to total assets.</p>
<p>Ability</p> <p style="text-align: center;">Willingness</p>	<p style="text-align: center;">Increase</p> <p>Decrease</p>	<p>Their willingness to take risk is increased by Mr. Becker's willingness to invest in riskier assets like private equity and hedge funds.</p>

Reference:

CFA Level III, Volume 2, Study Session 5, Reading 10.

QUESTION 2 HAS FOUR PARTS (A, B, C, D) FOR A TOTAL OF 28 MINUTES.

Iowa State University is a public, tax-exempt institution that receives a portion of its funding needs from an endowment. Each year, the endowment pays out 3.5% of last year’s market value to fund the current year’s spending needs. The market value of the endowment last year was \$250 million dollars, which means that this year’s funding will be approximately 15% of the university’s total needs. The university would like to maintain this level of support into the future. As a publicly funded institution the investment committee is wary of certain investments that contradict with the university’s policy of a moral and healthy lifestyle.

The inflation rate in the United States, according to the consumer price index, is expected to be 2.5% for the foreseeable future. Educational expenses have been increasing faster than consumer prices, at about 4% per year. Management expenses for the endowment are one half of a percent per year.

The markets have been especially volatile over the last few years and the university investment committee is worried that they may not be able to meet spending needs in the future. Several of the past years have seen dramatic swings in the total assets of the fund and large drawdowns after yearly spending needs. The committee has asked their portfolio advisor to look into the situation and recommend possible actions.

The last five years history for the endowment and spending is shown below. (all dollar amounts are in thousands USD)

Year Ending December	Market Value	3.5% Spending for Next Year
2007	\$200,000	\$7,000
2008	\$275,000	\$9,625
2009	\$325,000	\$11,375
2010	\$215,000	\$7,525
2011	\$250,000	\$8,750

- A. i. Formulate the return objective for the ISU endowment.
 ii. Calculate the required return for the ISU endowment. **Show** your calculations

(6 minutes)

- B.** i. Calculate the spending needs based on the three-year ruling average spending rules. **Show** your calculations.
- ii. Select whether the change in spending rule increases or decreases risk tolerance and support with one reason.

Answer Question 2-B.ii in the Template provided at the end of Question-2.

(6 minutes)

- C.** Formulate each of the following constraints for the ISU endowment's investment policy statement (IPS):
- i. Unique circumstances
 - ii. time horizon
 - iii. liquidity

(6 minutes)

The Save-a-Live Foundation is a nonprofit organization focused on providing support for the homeless in and around Minneapolis, Minnesota. The foundation has a very large investment portfolio left to it by a wealthy benefactor and receives much of its annual spending needs through donations. The foundation is tax-exempt as long as it meets minimum requirements for payment of proceeds set by the IRS.

- D.** Choose whether the risk tolerance component of the IPS is higher, lower, or no different for the Save a Life foundation relative to the ISU endowment. Discuss two reasons that support your answer.

Answer Question 2-D in the Template provided at the end of Question-2.

(10 minutes)

Template for Question 2-B ii

<p>Select whether the change in spending rule increases or decreases risk tolerance</p>	<p>Support with One reason</p>
<p style="text-align: center;">Increase</p> <p style="text-align: center;">Decrease</p>	

Template for Question 2-D

<p>Choose whether the risk tolerance component of the IPS is higher, lower, or no different for the Save a Life foundation relative to the ISU endowment.</p>	<p>Discuss two reasons that support your answer.</p>
<p style="text-align: center;">Higher</p> <p style="text-align: center;">Lower</p> <p style="text-align: center;">No Different</p>	

Solution for Question 2.

A i. Solution:

The University’s objective is to maintain the real value of the endowment to provide perpetual support to the university for about 15% of its annual budget.

A ii. Solution:

The required return for the endowment is:

$$(1.035)(1.04)(1.005) - 1 = 8.18\%$$

Reference:

CFA Level III, Volume 2, Study Session 5, Reading 17.

B i. Solution:

Average of last three years’ market values = $(\$250 + \$215 + \$325)/3 = \$263,333,000$

Spending based on 3.5% = **\$9,216,670**

B ii. Solution:

Template for Question 2-B ii

Select whether the change in spending rule increases or decreases risk tolerance	Support with One reason
<p style="text-align: center;"> <input checked="" type="radio"/> Increase <input type="radio"/> Decrease </p>	<p style="text-align: center;">Using a rolling average spending rule increases risk tolerance because there is less volatility in spending in any given year.</p>

Reference:

CFA Level III, Volume 2, Study Session 5, Reading 17.

C Solution:

i. Unique circumstances

Wary of the perception of some investments, the committee would most likely prohibit investment in ‘vice’ stocks like tobacco, alcohol, and gambling.

ii. Time horizon

The endowment has a single-stage, long-term time horizon supporting the university into perpetuity.

iii. Liquidity

The endowment is required to pay out 3.5% of its prior year market value plus management expenses each year for a total liquidity need of 4.0%.

Reference:

CFA Level III, Volume 2, Study Session 5, Reading 17.

D Solution:

Template for Question 2-D

<p>Choose whether the risk tolerance component of the IPS is higher, lower, or no different for the Save a Life foundation relative to the ISU endowment.</p>	<p>Discuss two reasons that support your answer.</p>
<p style="text-align: center;">Higher</p> <p style="text-align: center;">Lower</p> <p style="text-align: center;">No Different</p>	<p>The foundation has a higher ability to take risk because its needs are met by donations as well as having a sizeable portfolio</p> <p>The foundation has a higher willingness to take risk because it has no contractual obligation to meet specific funding goals.</p>

Reference:

CFA Level III, Volume 2, Study Session 5, Reading 17.

QUESTION 3 HAS TWO PARTS (A, B) FOR A TOTAL OF 10 MINUTES.

Paul Shannon at Emerging Investments LLC is studying a country for part of his frontier market growth portfolio. He is familiar with the country's economic fundamentals but is most concerned with the government's structural policy.

A. List five general elements of a pro-growth government structural policy.

(5 minutes)

Paul consults with one of the other analysts at the firm who has also been studying the country. The analyst has a few updates on economic fundamentals within the country.

Update #1: The government has nationalized various sectors and businesses citing public welfare.

Update #2: The government has increased the amount budgeted to increase the number and quality of public schools.

B. State whether each update is positive for economic growth in the country and which element of structural policy is related.

(5 minutes)

Solution for Question 3.

A Solution:

Five general elements of pro-growth government structural policy are:

- i. Sound fiscal policy
- ii. Competition within the private sector is encouraged
- iii. Sound tax policy
- iv. Minimal intrusion into the private sector by the government
- v. Infrastructure and human capital development are supported by the government

Reference:

CFA Level III, Volume 3, Study Session 8, Reading 16.

B Solution:

Update #1: This is a negative to economic growth. Policy- Minimal intrusion into the private sector by the government.

Update #2: This is positive for economic growth. Policy- Infrastructure and human capital development are supported by the government.

Reference:

CFA Level III, Volume 3, Study Session 8, Reading 16.

QUESTION 4 HAS THREEPARTS (A, B, C) FOR A TOTAL OF 25 MINUTES.

John Galt Investments has been experiencing some peculiarly volatile results across its portfolios over the last year and its manager, Jim Blake, is anxious to find out why. Mr. Blake speaks to each of his five portfolio managers and finds out that each manager was using a different approach to asset allocation. To further complicate matters, while the managers could describe their approach they did not know what the approach was formally called.

Below is the transcript from each manager's description of their approach:

Mr. Brown: I have developed my approach through years of work as a manager. I generally use a rule-based system that is widely used among professionals.

Ms. Emmet: I have no particular view on expected class returns and my clients have an average risk tolerance. My main goal is to design a well-diversified portfolio.

Mrs. Jenkins: After having tried other approaches, I found one that is not as sensitive to changes in input estimation. By drawing on historical averages of the inputs, I can design a portfolio around a more stable efficient frontier.

Mr. Crowley: My portfolio is designed for institutional investors like banks and insurance companies. These institutions are considered quasi-trust fiduciaries and are required to meet their financial obligations.

Ms. Jones: I have created a computer program that models possible capital market assumptions and applies thousands of possible combinations over the investing horizon. I then select the most appropriate allocation for the best long-term results.

- A.** Given the statements by each manager, decide the most likely asset allocation approach and describe one advantage of the approach. Possible allocation choices are: Resampled Mean-Variance Optimization, Black-Litterman, Monte Carlo Simulation, Asset-Liability Management, and Experienced-Based

Answer Question 4-A in the Template provided at the end of Question 4.

(15 minutes)

Mr. Blake is now looking over the portfolio of Shawn Bryan, a private wealth client who just inherited \$1,740,000 from the sale of his father’s business in the United States. Bryan plans to invest approximately \$75,000 of this amount in a friend’s start-up firm in about six months’ time. When talking to Blake about his goals, Bryan states that he would not only like to invest in his friend’s firm without eroding the initial capital, but would also like to earn a return that would at least cover inflation in the long-term. In setting Bryan’s risk objective, Blake includes a risk tolerance of 4 for him. Based on his IPS, Blake suggests three different strategic asset allocations as given in Exhibit 1.

Exhibit 1: Strategic Asset Allocations for Blake’s Portfolio

Asset Allocation	Investor’s Forecasts	
	Expected Return	Standard deviation of Return
A	13.50%	22.00%
B	8.50%	16.00%
C	5.80%	11.00%

B. Recommend the *most* appropriate strategic asset allocation for Bryan based only on his risk-adjusted expected returns. **Show** your calculations.

(5 minutes)

C. Justify a strategic asset allocation given Bryan’s threshold return and assuming a normal return distribution. **Show** your calculations.

(5 minutes)

Template for Question 4-A

Manager	Given the statements by each manager, decide the most likely asset allocation.	Describe one advantage of the approach.
Mr. Brown		
Ms. Emmet		
Mrs. Jenkins		
Mr. Crowley		
Ms. Jones		

Solution for Question 4.

A Solution:

Template for Question 4-A

Manager	Given the statements by each manager, decide the most likely asset allocation.	Describe one advantage of the approach.
Mr. Brown	Experience - Based Techniques	Easy to understand and implement
Ms. Emmet	Black-Litterman	Provides a stable efficient frontier, Allows portfolio constraints like negative weights
Mrs. Jenkins	Resampled Mean-Variance Optimization	Small changes in inputs produce only minor changes, Portfolios are better diversified than traditional mean-variance
Mr. Crowley	Asset-Liability Management	Considers asset allocation with respect to liabilities to better meet requirements,
Ms. Jones	Monte Carlo Simulation	Generates a distribution of outcomes that is more stable, Incorporates effect of various capital market assumptions

Reference:

CFA Level III, Volume 3, Study Session 8, Reading 19,

B Solution:

Bryan’s utility for the three allocations is as follows:

Asset Allocation A:

$$13.5 - 0.005(4)(22)^2 = 3.82\%$$

Asset Allocation B:

$$8.5 - 0.005(4)(16)^2 = 3.38\%$$

Asset Allocation C:

$$5.8 - 0.005(4)(11)^2 = 3.38\%$$

Based on the certainty equivalent return Asset Allocation A would be preferred.

Reference:

CFA Level III, Volume 3, Study Session 8, Reading 19.

Solution C:

The threshold return equals: $75,000/1,740,000 = 4.3103\%$

Based on this threshold return and the safety-first criterion:

Allocation A:

$$13.50 - 4.3 / 22 = 0.42$$

Allocation B:

$$8.5 - 4.3 / 16 = 0.2625$$

Allocation C:

$$5.8 - 4.3 / 13.5 = 0.111$$

Based on the minimum required return, Allocation A should be selected since it has a higher probability of meeting this return than the other allocations.

Reference:

CFA Level III, Volume 3, Study Session 8, Reading 19.

QUESTION 5 HAS TWO PARTS (A AND B) FOR A TOTAL OF 16 MARKS

Samantha Freeman is a specialized asset manager hired by The Iceberg Media House (TIMH) to manage their defined benefit pension plan. The present value of the plan's pension liabilities equals \$289 million using a discount rate of 6% and a wage growth rate of 5.5%. The plan is currently slightly overfunded, with an asset portfolio having a market value of \$299 million respectively. Freeman has estimated the effective durations of the pension obligations and the asset portfolio to equal 7.8 and 9.5 respectively.

Freeman's department has cited concerns over a predicted overheated economy, with rising inflation and increasing interest rates. Such a scenario could lead to a lower value of the pension assets, especially if the stock market is also expected to reverse after reaching its peak. Freeman favors a suggestion given to her by her financial team that involves bridging the duration gap between the pension plan's liabilities and assets to minimize losses. However, she does advise them not to sell or buy securities directly in the open market, as large transactions could significantly alter market prices and incur considerable tangible transaction costs.

Freeman assigns Charlie Robins, an immunization expert and market analyst, to identify and negotiate interest rate derivatives with a financial firm for the sole purpose of adjusting the duration gap of the pension plan. Robins negotiates the following contracts:

- i. A 10-year futures contract with a BPV of \$66.245 (per \$100,000 in par value) and a conversion factor of 0.9203.
- ii. A 20-year fixed-for-floating swap contract with a fixed rate of 5.00% and the 3-month Libor as the floating rate. Its net effective duration to the fixed-rate receiver is 19.00.
- iii. An option to enter the 20-year swap contract at a strike rate of 6.3%. The swaption premium equals 50bps per unit of the notional principal of the swap.
- iv. A swaption collar that involves the above option and another that has the same premium. The new option has a strike rate of 3.00%. The idea is to construct a zero cost strategy so that there is no upfront premium to be paid.

Robins determines that a hedging ratio of 75% would be most appropriate for the plan considering the size of the plan, the plan's stakeholders, and the expected accuracy of the interest rate predictions. The first task that Robins assigns his team is to determine the positions that the plan would have to take under each contract based on the market values of the obligations and assets.

A. **Construct** a derivatives overlay strategy using *each* of the interest rate derivatives put forth by Charlie Robins.

(12 minutes)

B. Describe *one* challenge for each of the derivative strategies determined above.

(4 minutes)

Solution for Question 5-A

First, we determine the duration gap:

BPV of pension liabilities: $289 \text{ million} \times 7.8 \times 0.0001 = \$225,420$

BPV of pension assets: $299 \text{ million} \times 9.5 \times 0.0001 = \$284,050$

The duration gap is positive.

Strategy i

The futures contract's BPV = $66.245/0.9203 = 71.98196$

Number of contracts to be traded:

$225,520 - 284,050 / 71.98196 = -813.12$

This means that to fully hedge and close the duration gap, 813 contracts should be sold. If the hedging ratio is only 75% then $0.75 (813.12) = 609.84$ or 610 contracts should be sold.

Strategy ii

Since the asset BPV is greater than the Liabilities BPV, TIMH should enter as the floating-rate receiver and fixed-rate payer. Such a swap would have negative duration to TIMH since the floating side has a much lower duration than the fixed side. The BPV will be 0.19 per 100 dollars of notional principal. The notional principal of the swap to close the duration gap to zero will be:

$284,050 + (NP \times -0.19/100) = 225,520$

$NP = -\$30,805,263$

The negative sign indicates that TIMH is the receive-floating side.

Since the hedging ratio is 75%, the appropriate notional principal would be:

$\$30,805,263 \times 0.75 = \$23,103,947$

Strategy iii

TIMH should enter a payer swaption, an option to enter the pay-fixed, receive-floating swap. The strike rate of the swaption is 6.3%. This means that the option is currently out of money. The rate has to go up to at least 6.3% from 5.0% for it to have value. The premium would equal:

$0.005 \times \$23,103,947 = \$115,520$

Strategy iv

TIMH could create a swaption collar by entering the payer swaption and writing a receiver swaption (receive floating pay fixed) at a rate of 3.00%. If rates go below 3.00%, the plan would lose as floating rates decrease. The initial premiums of both are equal, so at the time of purchase the combination would become a 'zero cost collar'

Reference:

CFA Level III, Volume 4, Study Session 10, Reading 24

Solution for Question 5-B

Challenges:

Strategy i: Futures contracts are marked to market daily and can result in realized losses on the hedged portfolio. Many of these losses would be offset by unrealized gains, and hence, could result in significant cash outflows. Volatility of cash flows is one challenge that TIMH would face if the plan is hedged using futures.

Strategy ii: One of the most important input to a swap hedging strategy is to identify the most prudent hedging ratio. The decision will be based on forecasted interest rates and the accuracy of such predictions. If interest rates do not move as desired, losses incurred on the position will be magnified the higher the hedging ratio.

Strategy iii: A swaption requires the payment of a premium that has to be paid upfront to buy the swaption. If a large position is to be hedged, this premium could be significant.

Strategy iv: Since a swaption collar includes writing an option, if interest rates move in the direction of the counterparty, the position could incur significant losses.

Reference:

CFA Level III, Volume 4, Study Session 10, Reading 24

QUESTION 6 HAS THREE PARTS (A, B, C) FOR A TOTAL OF 13 MINUTES.

Robert Jones is a fixed-income analyst who works as a part-time consultant for Azure Investments (AZIN), a multinational capital management firm with over thirty operational branches worldwide. AZIN has had considerable success as a financial advisor in the global fixed-income market. As such, many US investors are now eager to place their funds in AZIN's euro-denominated corporate bond fund. Jones has been asked by the CEO of AZIN to prepare a performance report that includes the next year's total expected return of the corporate fund in US dollars. The report will be part of a presentation to be made to AZIN's current and prospective clients. Given his expectations of the future direction of the euro fixed-income market, Jones accumulates the data in Exhibit 1.

Exhibit 1: Euro Corporate Bond Fund

Notional principal of the fund (in millions)	€275
Coupon frequency	Annual
Investment horizon	1 year
Average coupon rate per €100	3.55%
Current average bond price	€96.11
Pull to par effect per €100	€0.23
Expected average yield spread change	0.22%
Average bond convexity	0.30
Average bond modified duration	4.20
Expected credit losses	0.15%
Expect default rate	0.19%
Current \$/€ exchange rate	\$0.9758/€
Locked in forward rate	\$0.9630/€
Expected average yield change	0.10%

- A. **Determine** the total expected return of the euro-denominated corporate bond fund (in US dollars) along with the individual components' expected returns. **Show** your calculations.

(6 minutes)

The information Jones gathered helped him prepare the performance report, which he then submitted to AZIN’s CEO. He was, however, concerned about the comprehensiveness of his analysis. He wondered if he had included all factors that affected the fund’s expected returns.

- B. **List** three return components that Jones did not include in his analysis. Briefly **describe** the components and **state** the magnitude of their effects on the expected return of the bond fund. **Use** the template provided below to answer the question.

(6 minutes)

- C. **State** and **describe** two key assumptions made by Jones in his analysis.

(1 minute)

Template for Question 6 B

Return Components	Description	Magnitude of its effect on the expected return

Solution for Question 6-A.

Yield Income: $3.55/96.11 = 3.693684\%$

+Rolldown return: $0.23/96.11 = 0.239309\%$ (change in price given an unchanged yield curve and zero interest rate volatility).

+E(Change in price based on yield and yield spread view:

$$[-MD \times \Delta Yield] + [1/2 \times Convexity \times (\Delta Yield)^2]$$

The change in yield and yield spread equals: $0.22+0.10 = 0.32\%$

So:

$$[-4.20 \times 0.0032] + [1/2 \times 0.30 \times (0.0032)^2] = -1.34415\%$$

-E(credit losses) = -0.15%

+E(Currency gains or losses)

$$0.9630-0.9758/0.9758 = -1.311744\%$$

Total expected return: 1.127099% or 1.13% (sum of all components above)

Reference:

CFA Level III, Volume 3, Study Session 10, Reading 22.

Solution for Question 6-B.

Return Component	Description	Magnitude of its effect on the expected return
Reinvestment Income	The interest received on reinvested coupon payments (or income)	The magnitude of its effect will depend on the rates at which the coupon payments can be reinvested, which in turn will depend on the market interest rates.
Local richness/cheapness effects	The deviation of the individual maturity segments from the fitted yield curve.	In reality, there are likely to be very slight deviations from the curve. So, the magnitude is low.
Potential financing advantages	Advantageous repo terms to certain maturity segments in the repo market.	Mostly, financing advantages tend to be relatively small.

Reference:

CFA Level III, Volume 3, Study Session 10, Reading 22.

Solution for Question 6-C:

The two assumptions made by Jones are as follows:

- There are no taxes.
- There is no reinvestment income.

Reference:

CFA Level III, Volume 3, Study Session 10, Reading 22.

QUESTION 7 HAS FOUR PARTS (A, B, C, D) FOR A TOTAL OF 6 MINUTES.

Brian Morris is classifying the investment style of two active equity portfolio managers using “*Top down versus Bottom up and Discretionary versus Systematic*” quadrants.

- Manager A emphasizes generating alpha from factor timing and is unlikely to run concentrated portfolio.
- Manager B selects stocks of companies with good corporate governance practices using her insight. She relies on financial metrics to estimate the value of her selected stocks.

A. Based on the information provided above regarding managers A and B, identify their investment style? Justify your selection with one reason? Use the template below to answer the question.

(6 minutes)

	Investment Style	Give one Justification
Manager A		
Manager B		

Solution for Question 7.

A Solution:

	Investment Style	Justification
Manager A	Systematic top down manager	<ul style="list-style-type: none"> • As manger A is unlikely to run concentrated portfolio, he is not a discretionary portfolio manager. • Managers following top down strategy often generate returns from factor timing.
Manager B	Discretionary bottom up manager	<ul style="list-style-type: none"> • Manager B uses her insight on company-specific characteristics (firms ‘corporate governance capability) for stock selection. • Discretionary managers may rely on financial metrics to estimate the value of their selected stocks.

Reference:

CFA Level III, Volume 4, Study Session 14, Reading 29.

QUESTION 8 HAS TWO PARTS (A, B) FOR A TOTAL OF 20 MINUTES.

Allright Advisors manages a portfolio of \$200 million, allocated to 75% stocks with a beta of 1.05 and 25% in bonds with a modified duration of 6.0. The portfolio manager would like to change the allocation tactically to 60% in stocks and 40% in bonds while changing the beta of the stock position to 1.0 and the modified duration to 5.0. He will be using a stock index futures contract, priced at \$250,000 with a beta of 0.95, and a bond futures contract, priced at \$125,000 with an implied modified duration of 6.5.

- A. Determine how many stock index and bond index futures contracts the portfolio manager needs to use and whether to go long or short the contracts.

(10 minutes)

- B. At the end of the year, the stock portfolio has fallen by 3 percent and the bonds have risen by 1 percent. The stock index futures price is now \$241,250 and the price for the bond futures is now \$126,500. Determine the market value of the portfolio assuming the tactical positioning in part A, and compare it to the market value of the portfolio had the transactions been done in the securities themselves.

(10 minutes)

Solution for Question 8.

A Solution:

To revise the allocation from 75% stock (\$150 million) and 25% bonds (\$50 million) to 60% stocks (\$120 million) and 40% bonds (\$80 million), the portfolio manager must synthetically sell \$30 million of stock and buy \$30 million of bonds.

$$\begin{aligned}\text{Number of stock futures} &= ((0 - 1.05)/.95)(\$30 \text{ million}/\$250,000) \\ &= -132.63 \rightarrow \text{sell 133 stock futures contracts}\end{aligned}$$

$$\begin{aligned}\text{Number bond futures} &= ((6.0 - 0)/6.5)(\$30 \text{ million}/\$125,000) \\ &= 221.54 \rightarrow \text{buy 222 bond futures contracts}\end{aligned}$$

With these positions the manager has effectively sold \$30 million in stock and bought \$30 million in bonds to reallocate the portfolio to 60% stocks and 40% bonds.

Now the portfolio manager needs to adjust the beta and modified durations on the positions as required.

$$\begin{aligned}\text{Number of stock futures} &= ((1.0 - 1.05)/0.95)(\$120 \text{ million}/\$250,000) \\ &= -25.26 \rightarrow \text{sell 25 additional stock futures contracts}\end{aligned}$$

$$\begin{aligned}\text{Number of bond futures} &= ((5.0-6.0)/6.5)(\$80 \text{ million}/\$125,000) \\ &= -98.46 \rightarrow \text{sell 98 bond futures contracts}\end{aligned}$$

The net action that should be taken to reallocate the portfolio and adjust the beta or duration is: Sell 158 stock futures contracts and Buy 124 bond futures contracts

Reference:

CFA Level III, Volume 5, Study Session 17, Reading 32.

B Solution:

At the end of the year, the stock portfolio has fallen by 3 percent and the bonds have risen by 1 percent. The stock index futures price is now \$241,250 and the price for the bond futures is now \$126,500. Determine the market value of the portfolio assuming the tactical positioning in part A, and compare it to the market value of the portfolio had the transactions been done in the securities themselves.

The value of the stock is \$150 million $(1 - 0.03) =$ **\$145.5 million**

The profit on the stock futures = $-158 (\$241,250 - \$250,000) =$ **\$1.3825 million**

The total value of the stock position is = **\$146.8825 million**

The value of the bonds is \$50 million $(1.01) =$ **\$50.5 million**

The profit on the bond futures is = **124 (\$126,500 – \$125,000) = \$186,000**

The total value of the bond position is = **\$50.686 million**

The value of the portfolio is = **\$146.8825 + \$50.686 = \$197.5685 million**

Had the transactions been done in the securities themselves, the stock would be worth \$120 million $(1-.03)$ or **\$116.4 million** and the bonds would be worth \$80 million (1.01) or **\$80.8 million** for a total value of **\$197.2 million** and a difference of **\$368,500**.

Reference:

CFA Level III, Volume 5, Study Session 17, Reading 32.

QUESTION 9 HAS TWO PARTS (A, B) FOR A TOTAL OF 17 MINUTES.

Elena Murphy, a fund sponsor for Murphy Fund, is meeting with the portfolio managers for their yearly performance evaluation. Murphy Fund has recently adopted manager continuation policies (MCPs) to develop consistent procedures and to retain good managers.

- A. In implementing an MCP, **determine** whether a fine or coarse filter will lead Elena to commit more Type I or Type II errors. **Justify** your response.

Answer Question 9-A in the Template provided at the end of Question 9.

(6 minutes)

- B. **State** two advantages why adopting a well-written manager continuation policy (MCP) is significant for evaluations of investment managers.

(4 points)

Elena met with her friend Mark Nevins, CFO of GreenX Investments to discuss risk-adjusted performance appraisal measures. Mark told Elena that there are number of appraisal measures that explicitly take the volatility of returns into account and compare returns generated by managers with their account's corresponding risk.

- C. **List** three risk-adjusted performance appraisal measures. **Describe** briefly any two of them?

(7 points)

Template for Question 9-A

Constructing an MCP Policy using a:	Type I error or Type II error	Justify your response
<i>fine</i> filter will lead Elena to commit		
<i>coarse</i> filter will lead Elena to commit		

Solution for Question 9-A

Template for Question 8-A

Constructing an MCP Policy using a:	Type I error or Type II error	Justify your response
fine filter will lead Elena to commit:	Type II error	A fine filter can lead Elena to commit Type II error (firing managers with positive value-added when it is incorrect). This can happen when Elena will apply her manager monitoring guidelines rigidly. She may accidentally remove some managers who temporarily perform poorly but could have given superior results later.
coarse filter will lead Elena to commit	Type I error	A coarse filter can lead to Type I error (keeping managers with zero value added). This can happen when Elena may overlook managers' poor performance, with the expectations that those managers will eventually perform better in long-term.

Reference:

CFA Level III, Volume 5, Study Session 19, Reading 36.

Solution for Question 9-B

Following are some advantages of manager continuation policy (MCP):

- To retain superior managers and to remove inferior managers
- To minimize manager turnover
- To develop procedure that will be consistently applied regardless of investment committee and staff managers

Reference:

CFA Level III, Volume 5, Study Session 19, Reading 36.

Solution for Question 9-C

Three risk-adjusted performance appraisal measures are:

- Ex-post alpha (Jensen's alpha)
- Treynor measure
- Sharpe Ratio

Ex-post Alpha (Jensen's alpha):

The ex post alpha or Jensen's alpha measures the excess of the portfolio's return over that predicted by the CAPM during the evaluation period i.e.

Alpha = Actual return on the portfolio during evaluation period – Expected return on the portfolio given its systematic risk (measured by its beta).

$$\alpha = r_P - [r_f + \beta_P(r_M - r_f)]$$

Treynor Measure (reward-to-volatility or excess return to non-diversifiable risk):

Treynor's measure is used to measure portfolio's average excess return per unit of *systematic risk*.

$$T_A = \frac{\bar{R}_A - \bar{r}_f}{\hat{\beta}_A}$$

Sharpe Ratio (reward-to-variability):

Sharpe ratio measures the portfolio's average excess return per unit of total risk (measured by standard deviation of returns) i.e.

$$S_A = \frac{\bar{R}_A - \bar{r}_f}{\hat{\sigma}_A}$$

Reference:

CFA Level III, Volume 5, Study Session 19, Reading 36.

QUESTION 10 HAS THREE PARTS (A, B, C) FOR A TOTAL OF 9 MINUTES

Strategic Associates (SA) is a U.S. based asset management firm. SA is running two funds- VentureCap, a venture capital fund structured as a limited partnership providing funds to start-ups, and a global equity fund. VentureCap is being managed by Nelson Gatch, a SA employee. The timing of capital calls and distribution of earnings is based on Gatch's judgment. The table below shows the cash flows earned by the fund as well as beginning and ending fund market values for the most recent month. Gatch would like to assess how the fund performed over the evaluation period.

Table: VentureCap's Cash Flows and Beginning and Ending Market Value

	\$'000
Beginning market value – Day 1	1,500
Contribution – Day 7	45
Contribution – Day 20	30
Ending market value – Day 30	1,630

- A. Identify** the *most* suitable method for calculating VentureCap's fund return over the evaluation period and calculate the return accordingly. **Show** your calculations.

(3 minutes)

- B.** Gatch suspects that his performance evaluation of VentureCap may be subject to data quality issues. **Determine** whether his suspicions are justified and if yes, identify one potential data quality issue.

Answer Question 10-B in the Template provided at the end of Question-10.

(2 minutes)

The global equity fund is divided into two regions, North America and Europe. Each segment is managed by two junior portfolio managers. SA's chief appraiser is comparing the performances of the two individuals, managing the North American region. He has collected risk-adjusted performance appraisal measures for the two managers

Table: Risk-adjusted Performance Appraisal Measures

	North American Manager I	North American Manager II
Treynor Measure	0.8	1.1
Sharpe ratio	4.2	3.0

- C. i) **Comment** on the differences between the performances of the two managers paying particular attention to risk and assume reported rates of return are similar (no calculations are required).
- ii) **Identify** two criticisms of the appraisal measures used.

(4 minutes)

Template for Question 10-B

Are Gatch's suspicions justified?	If yes, identify one potential data quality issue.
Yes	
No	N/A

Solution for Question 10.

A Solution:

The most suitable method for calculating VentureCap's fund return is the money-weighted rate of return. This is because Gatch retains discretion over the timing of cash flows into and out of the fund.

Money-weighted rate of return calculation:

CF0: 1,500,000

C01: 0

F01: 6*

C02: 45,000

F02: 1

C03: 0

F03: 12**

C04: 30,000

F04: 1

C05: 0

F05: 9***

C06: - 1,630,000

CPT IRR: 0.116723%

Monthly IRR: $(1 + 0.00116723)^{30} - 1 = 3.56\%$

*Period between beginning of the month and first contribution = $7 - 1 = 6$ days

**Period between first and second contribution = $20 - 8 = 12$ days

***Period between end of month and second contribution = $30 - 21 = 9$ days

Reference:

CFA Level III, Volume 6, Study Session 19, Reading 36.

B Solution:

Template for Question 10-B

Are Gatch's suspicions justified?	If yes, identify one potential data quality issue.
	Potential issues include: <ul style="list-style-type: none"> • Venture capital funds are illiquid and thus infrequently priced which complicates estimation of reported rates of returns. • The underlying valuations may be suspect thereby invalidating reported returns. • Due to inaccuracy inherent in the estimation techniques, an investor may not be able to enter or leave the venture capital fund close to the reported valuations.
No	

Reference:

CFA Level III, Volume 6, Study Session 19, Reading 36.

C Solution :

- i. Manager I has a higher level of systematic risk exposure relative to Manager II. This is because Manager I reports a lower Treynor measure. The denominator of the Treynor measure comprises of beta, a measure of systematic risk. The higher the systematic risk (and beta), the lower the Treynor measure. Due to a higher Sharpe ratio, Manager I has taken on a lower level of total risk relative to Manager II. With a higher level of total risk and a lower level of systematic risk, Manager II is undertaking a higher level of nonsystematic risk.

ii. Possible answers include:

- Appropriateness of the assumptions underlying the CAPM model is questionable.
- The reliance of the Treynor model on CAPM has come under attack due to the single-index nature of the model.
- Using a proxy for the true market portfolio will mean that slight changes in the proxy can distort performance appraisal results.
- Using a market index or custom benchmark makes it difficult for the manager to precisely replicate the benchmark's return over a period of time.
- Stability of the parameters is an issue.
- There may be estimation error involved in estimating the parameters underlying risk-adjusted performance appraisal measures.

Reference:

CFA Level III, Volume 6, Study Session 19, Reading 36.