Exam 1
Morning Session Answers

Question 1

Source: Study Session 4, LOS 8.e, f, g, h, l; LOS 9.a, b, e, i

A. She is dependent on a yearly employment contract, which reduces ability to bear risk.

Candidate discussion:

2 points. The children are not a good factor because they are provided for financially through college. Her willingness is not a good reason for lower risk because she holds a moderately aggressive stock and bond portfolio.

B.

i. Time horizon is one stage, 22 years till retirement to meet her goal. She should also think of a second and longer retirement stage.

ii. She should seek legal advice regarding the desired education trust for the children.
- $175,000 within the next year for the education trust. It should come from the taxable account to avoid tax penalties.
- Save $50,000 annually, with the max allowed going into the tax-exempt portfolio and the balance to the taxable portfolio.

Candidate discussion:

2 points for each item. Regarding time horizon, the one-stage time horizon pertains to her goal of planning for retirement as stated in the vignette. An acceptable alternative answer could also be a two stage time horizon with the first stage consisting of 22 years until retirement and the second stage being retirement. For liquidity, the correct location for the withdrawal is required to receive full points

C. Investable base:

Tax-exempt account stocks and bonds	450,000
Taxable account	400,000
Less funding education trust	–175,000
	675,000

Annual contribution to tax-exempt portfolio (or to the taxable portfolio if necessary): 50,000 (= 150,000 after-tax income less living of 100,000)

Goal in 22 years: 2,000,000

Required return:

PV = –675,000, PMT = –50,000, n = 22, FV = 2,000,000

CPT I/Y required return = 0.8%

Candidate discussion:

2 points for showing the components and calculating the base; 1 point each for the annual saving amount, goal amount, showing the annuity set up, and for the correct final calculation. It may seem odd that the case had no information regarding inflation and real or nominal return, but a similar question has occurred. There is no value in commenting on whether the return seems realistic because that is not asked for. Focus on answering what is asked.

D. Stocks in the taxable portfolio because their return will mostly be taxed at the lower capital gains rate and the tax can be deferred until sold.

Bonds in the tax-exempt portfolio where Guthrie will not be subject to the otherwise higher tax rates on bonds that derive their return from income.

Candidate discussion:

1 point for correct locations and 2 points for the explanation.

E. Hold in the taxable portfolio because the case states that tax exempt account withdrawals before age 60 are subject to a very high tax penalty.

Candidate discussion:

1 point each for the correct decision and explanation.

QUESTION 2

Source: Study Session 4, LOS 8.k
Study Session 5, LOS 11.b, c, e, f, h, j, l; 12.a
Study Session 8, LOS 17.b

A. The decision increased her allocation to human capital for two reasons.

1. While underemployed and spending money on the MBA, she was spending financial capital (FC) and decreasing it as a percentage of total wealth (TW).

2. The MBA could increase her future earning potential and its PV [i.e.. her human capital (HC)].

If the increase in HC due to better education exceeded the reduction in FC, her TW increased.

Candidate discussion:

1 point each for: it increased her allocation to HC and for each reason. 2 points for why TW could have increased.

B. As a private and recent startup, it would be most similar to small-cap equity. It is stock, so it is not like a money market or bond. It is small company, so it is not like large cap.

As a concentrated position, it is included in the aspirational risk bucket.

From a strategic perspective, the employer stock allocation should be reduced. As a percentage, it is too large and represents a concentrated position. Also, it is too risky to have financial assets tied to her employment and human capital. From a tactical perspective, it is restricted stock and cannot currently be sold.

Candidate discussion:

1 point for it being small-cap equity and 2 points for the explanation. 1 point each for it being in the aspirational risk bucket, the SAA, and TAA recommendation.

C.

i. An estate tax freeze is intended to transfer tax liability on future appreciation to another party. The owner could restructure the company and retain voting preferred stock while transferring nonvoting common stock (and future appreciation) to another party. No immediate funds are generated.

ii. A collateralized bank loan just uses the stock as collateral to take out a loan.

The loan is more appropriate for two reasons:
- Guthrie is a senior executive but does not have control of the company and, therefore, cannot restructure the stock.
- She wants to diversify, and only the loan provides funds for this purpose.

Candidate discussion:

2 points each for explaining the two strategies. 1 point each for selecting the loan and giving two reasons.

D.

1. MCS can quantify the probability that Guthrie will have sufficient assets to last for her expected lifetime (i.e., it can determine probability of ruin).

2. It can incorporate path dependency issues such as how a change in inflation would affect portfolio value and the need for distributions.

3. It can help Guthrie focus on her primary risk, which is outliving her assets instead of short-term risk analysis focusing on volatility of return.

VonLee should prepare two reports: one showing how long the portfolio will last if Guthrie retires now and another showing how the portfolio can grow over next three years and how long it would then last if retirement is delayed three years. Guthrie can then compare the expected point when the portfolio is exhausted under the two approaches.

Candidate discussion:

1 point each for two reasons, plus 2 points for explaining the two different reports and how they will be used.

E. The return objective will increase because there is no longer labor income, and Guthrie will be more dependent on the portfolio.

For the same reasons, the ability to bear risk should decline.

Candidate discussion:

1 point each for four items, return needs increase and ability to take risk declines with the same reasons applying to both.

QUESTION 3

Source: Study Session 16, LOS 29.a, d, f, g, h, j, k

A. Brokers are an agent with a fiduciary responsibility to the customer. They are compensated with an explicit commission.

Dealers are adversaries who make a market and provide liquidity. They trade from their own account and seek to make a profit by selling at the higher asked price and buying at the lower bid price.

Candidate discussion:

1 point each for the four required items.

Answer for Question 3-B

Component	**Explain**	**Cost or negative cost (circle one)**	**Observable or inferred (circle one)**
Market impact	The impact on the market of seeking quick execution	Can be either	Inferred
Delay	The change in the market price if the order is not executed quickly on shares that are subsequently executed	Can be either	Inferred
Unrealized gain/loss	The change in the market price on any part of the order that is never executed	Can be either	Inferred
Explicit cost	Fees and commissions	Cost	Observable

Candidate discussion:

1 point each for the twelve required items.

C.

Trade 1: Market, quick execution is needed to capitalize on proprietary information before the expected downgrade is reflected in market price.

Trade 2: Market, quick execution is needed to restore duration, and Treasury securities would be highly liquid. Failing to match duration leaves the portfolio exposed to the major risk for most bond portfolios, which is interest rate risk.

Candidate discussion:

1 point each for the four required items.

D. VWAP can be gamed by selectively executing or not executing orders received late in the day. For example, if the price is rising during the day and a buy order is received and executed, the price is likely to be above the average price for the day and show a high cost. Don't execute, and cost is hidden.

With IS, the failure to purchase quickly in a rising market will lead to higher delay or missed trade costs.

Candidate discussion:

1 point for explaining how gaming affects VWAP and 1 point each for the two components that might increase in IS analysis.

QUESTION 4

Source: Study Session 3, LOS 5.a, b, c, d; LOS 6.a, b, c, d

A:

Client	Concept best exhibited (circle the most appropriate concept):
1	Loss Aversion
2	Friedman-Savage Double Inflection Function
3	Goal Based Investing
4	Bounded Rationality
5	Efficient Market Hypothesis

Candidate discussion:

2 points each for the five required matches.

B. The terms are similar in that myopic loss aversion is a consequence of loss aversion.

- Loss aversion observes that investors prefer to hold on to securities that have declined but sell those that have appreciated. It is about individuals' behavior.
- Myopic loss aversion postulates that this individual behavior affects overall markets. Investors will underown risky equity keeping stock prices too low and, therefore, the equity risk premium too high.

Candidate discussion:

1 point for explaining that myopic loss aversion derives from loss aversion and 1 point each to describe how they differ.

C. The client shows emotional biases in overestimating his role at his company and assuming very high past returns will continue. Believing there is a perfect asset allocation also sounds like an emotional statement.

Simms needs to educative the client on the need for a new plan because there is a serious problem. The client does not have sufficient capital to meet the planned expenditures.

Candidate discussion:

1 point for determining this is primarily emotional and 2 points for supporting that decision. 1 point each for stating educate and then explaining why education is required.

QUESTION 5

Source: Study Session 6, LOS 13.i, j, k, n

A.

i. The objectives are to fund distributions to fund young skiers and maintain the real value of the portfolio.

ii. (1.04)(1.035)(1.0075) – 1 = 8.45% to cover 4% real return, 3.5% relevant inflation rate, and 0.75% operating expenses.

iii. 0.04 × $25 million = $1 million for students and another 0.0075 × 25 million = 187,500 will be distributed for operating expenses.

Candidate discussion:

1 point each for the two objectives, the three components of return, and the two distribution amounts. Calculating the nominal return target requires knowing the distribution rate. The case states that a real return of 4% is targeted and the real return is what can be sustainably distributed (the distribution rate). While addition of component returns is accepted, compounding for foundations is preferred.

B. The perpetual time horizon of the foundation increases ability to bear risk.

The need to maintain intergenerational equality and the real value of the portfolio requires taking additional risk.

One other factor:
- Yearly grants can be adjusted quickly, which increases the ability to take risk.
- There is no legally required distribution, which increases the ability to take risk.
- Distribution inflation costs that are higher than the general level of inflation increase the need to take risk.
- The trustee's desire for a minimum annual income return may indicate less willingness to take risk.

Candidate discussion:

1 point each for the three required items.

QUESTION 6

Source: Study Session 6 LOS 13.j, k, n

A. If rates increase, the earnings on the bond assets will be locked in, but the rate paid on the liabilities will increase. This will reduce earnings and surplus accumulation.

An alternate explanation for the decline in surplus is that the increase in rates will decrease the value of the fixed-rate assets, but the liability costs will float upward and their value will not decrease. The net result is lower surplus.

Candidate discussion:

1 point each for the directional affect on earnings and surplus. 1 point each for explaining both.

B. Any two reasons related to the ones below:

- Silts is offering two distinct products, life insurance and GICs, even if they are marketed in combination.
- Segmenting allows assets to be selected that match the life insurance characteristics from separate assets to match the potentially upward floating rate on the GIC liabilities.
- Segmenting would reveal the very different characteristics of life insurance and GICs, which should reduce Silt's confusion that what will benefit the customers will automatically benefit the company.
- Segmenting is generally favored by regulators.
- Segmenting allows for analysis of risk and profitability of each product.

Candidate discussion:

2 points each for any two reasons.

C. If rates fall, the 5-year assets and liabilities are both essentially fixed rate, have similar duration, and surplus should not be significantly affected.

Candidate discussion:

1 point each for explaining how liabilities, assets, and, therefore, surplus is affected.

The key requirement for your answer is to recognize the company liabilities and proposed assets are coupon bearing, due in five years, and therefore have comparable durations. It is true that the liabilities (GICs) have a provision for the coupon rate to reset upward, but that is two years into their life. This means their effective duration is less in an increasing interest rate environment. In that environment, the coupon would reset upward, one time only, and the price would approximate par. In other words, there would be little price downside and duration. However, this consideration has little relevance here. The question deals with declining rates. Theoretically, you could argue this feature makes the effective duration of the liabilities somewhat less than that of the assets. That is a more complex argument and not advised in this question. If you make that argument, you answer must make it clear the coupon reset is out-of-the-money in a declining rate environment and any duration differentials and effect on surplus are going to be small. Theoretically, it can lead to a small increase in surplus in a declining rate environment if D_A exceeds D_L.

QUESTION 7

Source: Study Session 7 LOS 15.l
Study Session 8 LOS 17.h, i, j, k
Study Session 9 LOS 18.a, e

A. Real rate bonds are a distinct asset class because:

- All real rate bonds are similar in that their coupon cash flow will increase with rising inflation as their principal increases.
- They are distinctly different from traditional fixed-rate bonds whose coupon is fixed and whose price declines with rising inflation and interest rates.
- They offer a diversification benefit.

They are most directly useful for the DB plans because such plans generally have part of their liabilities directly indexed to future inflation, making real rate bonds a key asset for liability mimicking.

Candidate discussion:

1 point each for the five required items.

B. The analysis should consider the correlation of the addition to the existing portfolio. Add the asset class if the NAC's Sharpe ratio exceeds the product of the Sharpe of the existing portfolio and the addition's correlation to the existing portfolio.

For NAC 2, he must be correct. The highest correlation is +1, so $0.856 > 1 \times (0.806)$

For NAC 1, he could be correct or incorrect depending on the correlation. With very high correlation to the existing portfolio, it would not be added. However, with lower correlation, it would be added.

Candidate discussion:

1 point each for the two decisions and 2 points each for the supporting explanations.

C. Hedging currency risk is more important for bonds.

- Bond and currency returns are generally positively correlated, which makes returns to the firm's clients more volatile. As a result, hedging the currency risk in bonds is more appropriate.

Or

- Bond returns and risk are generally lower than for equity, which makes currency volatility proportionately a greater issue for bonds.

Candidate discussion:

1 point for stating it is more important for bonds and 2 points for the explanation.

QUESTION 8

Source: Study Session 8 LOS 17.p, r

A. The asset allocation output of MVO is heavily dependent on the asset class inputs. Small changes in the estimated returns of asset classes can produce large changes in the recommended asset allocation. This instability of the efficient frontier does not inspire confidence and would lead to high turnover and transaction costs as the portfolio is rebalanced. No credit is given for explaining resampling because that was not requested by the question. You just had to realize that instability is the issue resampling addresses.

Candidate discussion:

2 points for stating the issue is input return sensitivity and returns in particular, 2 points for explaining the consequence is variability in recommended asset allocation, and 1 point for why that matters.

B. Both are used in determining strategic asset allocation.

Black-Litterman starts with standard deviations, correlations, and market asset class weights. From these inputs, consensus expected returns by asset class are derived. The manager can view adjust those consensus expected returns upward or downward if the manager has opinions and then use MVO analysis based on those view-adjusted returns to solve for optimal portfolios.

ALM, in contrast, refers to modeling and analyzing surplus and surplus volatility instead of focusing only on asset return and asset volatility. ALM could, in fact, be done using the Black-Litterman approach or with more basic MVO analysis.

Candidate discussion:

1 point for explaining they are both used in SAA. 2 points each for a discussion of each approach that highlights how they differ.

C. It makes more sense to include risk free as an asset class in EF analysis.

In EF analysis, "risk free" is treated like any asset class that can be historically analyzed and modeled as having an expected return, a non-zero standard deviation, and correlation with other asset classes.

However, in CAL analysis, the risk-free rate is a borrowing or lending rate with zero standard deviation. A long-term strategic use of leverage is not part of most portfolios, so the results are not a realistic SAA.

Candidate discussion:

2 points for concluding EF is more suitable and 2 points for discussing how it is used in EF versus CML to support that conclusion. An acceptable alternative explanation is: A true risk-free asset has a known return and zero standard deviation. In a multiperiod ongoing portfolio, this does not exist. The risk-free return changes over time and a stable CAL does not exist.

QUESTION 9

Source: Study Session 12 LOS 23.b, i, m, n, r

A. Worthington is incorrect. As strategies move from passive to semiactive to full active, both active return and tracking risk tend to increase; however, the ratio of the two, the IR, tends to be maximized at semiactive.

Carlos is incorrect. Tracking risk is higher for full-blown active management. Selective hedging would only add value and reduce risk if the manager were always correct, which is an unreasonable assumption.

Candidate discussion:

1 point for each conclusion and 1 point for each discussion of what is incorrect.

B.

Statement by:	Discuss what is correct	Discuss what is incorrect
Worthington	Correct that LCV is the largest positive exposure	Both SCV and LCV have large positive weights, indicating this is a value manager more than LC. The regression also indicates negative weights to LCG and SCG, further suggesting the focus is on value and not market cap.
Carlos	Large positive (1.23 + 1.45) exposure to value offset by large negative (–0.61 – 0.85) exposure to growth, which is consistent with long value and short growth.	The data indicates net long exposure. Comparing to equity returns is more appropriate than money market. Note that if there were equal long and short positions, that would be more consistent with market neutral and comparison to money market returns plus a spread.

Candidate discussion:

1 point each for the two discussions of what is correct and 2 points each for what is incorrect.

C. Active return is a simple weighted average: $0.8(–0.10\%) + 0.2(2.71\%) = 0.46\%$

Active risk uses the standard portfolio variance formula with the default assumption of 0 correlation:

$0.8^2(0.01^2) + 0.2^2(4.55^2) + 2(0.8)(0.2)(0)(0.01)(4.55)$ = variance = 0.8282

Active risk = $0.8282^{0.5} = 0.91\%$

IR = 0.46% / 0.91% = 0.51

Candidate discussion:

For each calculation, 1 point for a correct setup and 1 point for a correct calculation.

D. This is core-satellite.

- Alternative 1 is most likely an index fund given the small active return and risk.
- Alternative 2 is a small allocation to an active management to add value given the positive active return of Alternative 2.
- If it were a completeness fund approach, then the allocations should have offsetting active return and risk to achieve more index-like characteristics.

Candidate discussion:

1 point for core-satellite and 2 points each for two reasons.

QUESTION 10

Source: Study Session 17 LOS 31.c, e, i, k, l
Study Session 18 LOS 32.c, d

A. True time weight return (geometric linking of subperiods) is most accurate for performance measurement, with subperiods defined by date of ECF.

Period 1 = (116.2 – 86.3 – 15.0) / 86.3 = 17.27%

Period 2 = (107.9 – 116.2) / 116.2 = –7.14%

Monthly return = (1.1727)(.9286) – 1 = 8.90%

Candidate discussion:

1 point each for the three correct calculations.

B. Kozlov could be correct in some cases where other methods will reasonably approximate geometric linking. The other methods include Original Dietz, Modified Dietz, and MIRR.

He is incorrect in this case because the path of returns was erratic: high positive return in the first subperiod but negative in the second.

Candidate discussion:

1 point for theoretically correct and 1 point for why he is incorrect in this case.

C. Benchmark 2. Style and manager value added return should be uncorrelated in order to determine what value added the manager contributes independent of style,which could be obtained with a passive index fund. Benchmark 2 is least correlated with –0.04.

Candidate discussion:

1 point for selecting benchmark 2 and 2 points for using correlation to explain why it was selected.

D. The equity team lost value 8.97 – 9.53% = –56 b.p.

The fixed-income team added value of 17.63 – 15.33% = + 230 b.p.

Candidate discussion:

1 point for each statement of who added or lost value and 1 point for each correct supporting calculation.

E.

i. Value added is portfolio return less benchmark return:

Portfolio return is: 0.176(4.50) + 0.453(6.71) + 0.222(5.99) + 0.149(3.22) = 5.64%

Value added is: 5.64 – 4.98 = 66 b.p.

ii. Pure sector is the sum of over/under weight times benchmark sector return less benchmark total return:

(0.176 – 0.197)(6.70 – 4.98) = –0.04%

(0.453 – 0.483)(7.52 – 4.98) = –0.08%

(0.222 – 0.134)(6.57 – 4.98) = +0.14%

(0.149 – 0.186)(–4.59 – 4.98) = +0.35%

Sum = +0.38%

iii. Value was added in stock selection for Energy.

Value was lost in Industrial, Consumer, and Finance.

Candidate discussion:

1 point each for: portfolio return, total value added, 4 pure sector subcomponents and the sum, plus 1 point each for correct sectors where stock selection added and lost value.

F. The 15 b.p. are a residual plug. An attribution model rarely works perfectly. The analysis assumes the weights, and assets did not change during the period. Thus, the 15 b.p. could be interpreted as a trading effect.

Candidate discussion:

2 points for indicating it is a residual plug and 1 point for explaining why it might occur or what it might represent.