**CIFA INTERMEDIATE LEVEL**

**PORTFOLIO MANAGEMENT**

**THURSDAY: 5 December 2024. Morning Paper.** **Time Allowed: 3 hours.**

**Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings. Do NOT write anything on this paper.**

**QUESTION ONE**

(a) Explain **THREE** effects of the number of assets in a multi asset portfolio on the diversification benefits. (6 marks)

(b) William Wesonga, a financial analyst has recently been tasked to evaluate tax impacts on Kenzi Ltd. investments and has gathered the following information:

- Kenzi Ltd. made an investment of Sh.100,000 and forecast to earn an annual rate of return of 12% in fully deferred capital gains. The anticipated increase in capital gains taxes are 20% with a cost basis of Sh.80,000.
- If the investment is not sold, capital gains will not be paid but it will be subject to a wealth tax of 3% and no other taxes will be paid. Due to longer investment horizon, the investment is expected to make an annual return of 14%.



**Required:**
Advise William Wesonga on the following:

(i) The expected future value of the investment in 10 years time with deferred capital gains and cost basis only. (3 marks)

(ii) The expected future value of the investment in 15 years with wealth-based tax only. (3 marks)

(c) The following weights are available for a portfolio invested in the treasury bills and in the market index:

| Weight of the treasury bills (%) | Weight of the market index (%) |
|---|---|
| 0 | 100 |
| 20 | 80 |
| 40 | 60 |
| 60 | 40 |
| 80 | 20 |
| 100 | 0 |

**Additional information:**

1. The current treasury bill rate is 5%.
2. The return on the market index is 13%.
3. The standard deviation of the market index is 20%.
4. The utility level formula is $U = E(r) - 0.5 \times \text{risk aversion coefficient} \times \delta^2$.
5. The investor has a risk aversion coefficient of 3.

**Required:**
Recommend the appropriate portfolio for the investor using the utility theory approach. (8 marks)

**(Total: 20 marks)**

**QUESTION TWO**

(a) Examine **THREE** roles of case studies in portfolio management. (6 marks)

(b) The following information is available for an actively managed portfolio and its benchmark:

| Security | Portfolio weight (%) | Benchmark weight (%) | Expected return (%) |
|---|---|---|---|
| Alpha | 22 | 25 | 12 |
| Beta | 20 | 25 | -6 |
| Chat | 21 | 25 | 4 |
| Delta | 37 | 25 | 19 |

**Required:**

The ex-ante active return. (6 marks)

(c) An investor has identified five portfolios whose details are as outlined below:

| Portfolio | Expected return (%) | Standard deviation (%) |
|---|---|---|
| A | 10 | 16 |
| B | 16 | 24 |
| C | 12 | 13 |
| D | 14 | 31 |
| E | 11.7 | 19 |

**Additional information:**

1. The expected return on the market portfolio is 13%.
2. The standard deviation of the market is 10%.
3. The risk free rate of return is 6%.

**Required:**

(i) The required rate of return for each portfolio. (5 marks)

(ii) Determine which of the above portfolios is efficient, inefficient or super-efficient. (3 marks)

**(Total: 20 marks)**



**QUESTION THREE**

(a) In relation to investment industry documentation:

(i) Differentiate between "internal" and "external" documents. (4 marks)

(ii) During the client on boarding, companies in the investment industry have an obligation to identify the client by means of know your client (KYC) process.

**Required:**

State **FOUR** requirements of a client in the KYC process. (4 marks)

(b) Mambo Investment Ltd. uses a single factor model to evaluate assets. The information provided below relates to three portfolios:

| Portfolio | Expected return (%) | Beta |
|---|---|---|
| A | 10 | 1.0 |
| B | 20 | 2.0 |
| C | 13 | 1.50 |

**Required:**

Compute the arbitrage opportunity from the above transaction. (4 marks)

(c) Cedar African Beverages Limited has invested in four securities whose details are as follows:

| Security | Market return (%) | Expected return(%) | Standard deviation (%) | Correlation with the markets |
|---|---|---|---|---|
| $S_1$ | 28 | 10 | 15 | 0.5 |
| $S_2$ | 16 | 18 | 20 | 0.7 |
| $S_3$ | 32 | 15 | 14 | 0.8 |
| $S_4$ | 25 | 13 | 16 | 0.62 |

**Additional information:**

1. Risk free rate is 5%.
2. The market rate of return is 14% per annum.
3. The standard deviation in the market is 13%.

**Required:**

(i) Calculate and interpret the beta for each security. (4 marks)

(ii) Determine the required rate of return for each security. (2 marks)

(iii) Indicate which of the four securities is undervalued, correctly valued or overvalued based on your results in (c) (ii) above. (2 marks)

**(Total: 20 marks)**

**QUESTION FOUR**

(a) In relation to active portfolio management:

(i) Enumerate **THREE** assumptions of the fundamental law of active management. (3 marks)

(ii) A manager has an information coefficient of 0.1. The manager wants to achieve an information ratio of 0.4.

**Required:**

Determine the number of shares that he would need to make quarterly bet basis. (2 marks)

(b) Alex Ndege is 50 years old, single and a self-employed management consultant. Alex Ndege owns assets worth Sh.25 million, the majority of which is invested in small capitalisation stocks. Over the past 4 years, his portfolio has generated an average annual total return of 18%. Alex Ndege hopes that the portfolio will continue to generate a similarly high return. He considers his own risk tolerance to be average. When a friend points out to him that the risk of small capitalisation stocks is high, he is surprised by this statement.



Alex Ndege would like to retire at the age of 65. His current income by far exceeds the cost of living. Upon retirement, he plans to sell his consulting business for Sh.10 million. The income is subject to a corporation tax at a rate of 30%.

**Required:**

Discuss the following to be included in a long-term investment policy statement (IPS) for Alex Ndege:

(i) Return objective. (2 marks)

(ii) Risk objectives. (2 marks)

(iii) Constraints. (3 marks)

(c) Dawa Ltd. plans to buy shares of Miop Ltd. that are currently selling at Sh.20 each at the National Securities Exchange. The forecasted price per share and probability of their occurrence on different states of nature are as follows:

| State of nature | Probability | Forecasted share price (Sh.) |
|---|---|---|
| Excellent | 0.30 | 25 |
| Normal | 0.20 | 22 |
| Poor | 0.35 | 21 |
| Very poor | 0.15 | 19 |

**Required:**

(i) Expected rate of return of the company's shares. (3 marks)

(ii) Standard deviation of returns. (3 marks)

(iii) Coefficient of variation of returns. (2 marks)

**(Total: 20 marks)**

**QUESTION FIVE**

(a) Explain **FOUR** advantages of performance standards in portfolio management. (4 marks)

(b) Explain **THREE** limitations of behavioural finance models in portfolio management. (6 marks)

(c) Consider a portfolio consisting of equities as one asset class and bonds as another. The expected return on the portfolio's equities portion is 12% with a standard deviation of 22%. The expected return on the bond portion is 5%, with a standard deviation of 7%. All of these figures are annual. The correlation between the two assets classes is 0.15. The portfolio's market value is Sh.150 million and is allocated 65% to equities and 35% to bonds.

**Required:**
Determine the value at risk (VAR) using the analytical method for the following cases:

(i) A 5% yearly VAR. (3 marks)

(ii) A 1% yearly VAR. (3 marks)

**Hint:**
The Z-value at 5% is 1.65 and 2.33 at 1% confidence interval.

(d) The following information relates to historic geometric rates of return for various assets classes:

| **Asset class** | **Geometric rate of return (%)** |
|---|---|
| Equities | 14 |
| Corporate bonds | 12 |
| Treasury bills | 6.5 |
| Inflation rates | 4.5 |

**Required:**

(i) The real rate of return for equities. (2 marks)

(ii) The risk premium for equities. (2 marks)

**(Total: 20 marks)**

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**CIFA INTERMEDIATE LEVEL**

**PORTFOLIO MANAGEMENT**

**THURSDAY: 22 August 2024. Morning Paper.** **Time Allowed: 3 hours.**

**Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings. Do NOT write anything on this paper.**

**QUESTION ONE**

(a) Enumerate **FOUR** assumptions of the Capital Asset Pricing Model (CAPM). (4 marks)

(b) Mumbi Wafula, a 47 year old widowed mother of two daughters, ages 7 years and 10 years, recently sold a business for Sh.5.5 million net of taxes and put the proceeds into a money market account. Her other assets include a tax deferred retirement account worth Sh.3 million, a Sh.500,000 after tax account designated for her daughter's education, a Sh.400,000 after tax account for unexpected needs and her home which she owns outright.

Her living expenses are fully covered by her job. Mumbi Wafula wants to retire in 15 years and to fund her retirement from existing assets. As an orphan who experienced childhood financial hardships, she places a high priority on retirement security and wants to avoid losing money in any of her three accounts.



**Required:**
Demonstrate how Mumbi Wafula is exhibiting the following biases:

(i) Mental accounting bias. (2 marks)

(ii) Availability bias. (2 marks)

(c) A local pension fund has employed three investment managers each of whom is responsible for investing in one-third of all asset classes so that the pension fund is well diversified portfolio. Information about the managers is given below:

| Manager | Average return (%) | Standard deviation (%) | Beta |
|---|---|---|---|
| K | 10 | 20 | 1.1 |
| L | 11 | 10 | 0.7 |
| N | 12 | 25 | 0.6 |

**Additional information:**
1. The market average return is 9%.
2. The market standard deviation is 19%.
3. The expected risk free rate (Rf) is 3%.

**Required:**
(i) Sharpe ratio. (3 marks)

(ii) Treynor ratio. (3 marks)

(iii) Modigliani - Modigliani ($M^2$) risk-adjusted performance measure. (3 marks)

(iv) Jensen's alpha. (3 marks)

**(Total: 20 marks)**

**QUESTION TWO**

(a) Describe the following strategies for determining the asset mix of a portfolio:

(i) Tactical asset allocation. (2 marks)

(ii) Insured asset allocation. (2 marks)

(iii) Integrated asset allocation. (2 marks)

(b) Edwin Mwaranjau gathers the following information of Waafrika Ltd. shares and compares its performance against the market share index over the last three years as follows:

| Year | Market index return | Waafrika Ltd. return |
|---|---|---|
| 2021 | 8% | 10% |
| 2022 | 10% | 11% |
| 2023 | 12% | 12% |

The applicable risk free rate is 6%.

**Required:**

(i) Covariance between the market return and Waafrika Ltd. share return. (3 marks)

(ii) The Beta of Waafrika Ltd. shares. (2 marks)

(iii) The expected return for the year 2024 using the Capital Asset Pricing Model (CAPM) given that Edwin Mwaranjau estimates that the market index return in the year 2024 is 14%. (2 marks)

(c) Kwetu Limited is planning to equally invest in a combination of two securities and has gathered data for three securities chosen based on an investment recommendation they have received as follows:

| Company | Annual return | Standard deviation of returns |
|---|---|---|
| X | 11% | 17% |
| Y | 20% | 29% |
| Z | 14% | 21% |

| Company | Correlation coefficient between returns |
|---|---|
| X and Y | 0.00 |
| X and Z | 0.62 |
| Y and Z | 0.40 |



Kwetu Limited determines that the most optimal combination will be chosen as having the highest return per given risk criteria.

**Required:**

Using suitable computations, advise Kwetu Limited on the most efficient portfolio to select. (7 marks)

**(Total: 20 marks)**

**QUESTION THREE**

(a) With respect to investing in international markets:

(i) Outline **THREE** strategic advantages of investing in international markets. (3 marks)

(ii) State **THREE** potential challenges of investing in international markets. (3 marks)

(b) With respect to document management within the investment sector, discuss the following aspects of document management:

(i) Access. (2 marks)

(ii) Security. (2 marks)

(iii) Retention. (2 marks)

(c) An initial investment of Sh.500,000 is forecasted to earn an annual average return of 14%. The investment account is subject to a wealth-based tax of 3% and no other taxes are paid on the account.

**Required:**

(i) The after tax value of the investment account in 15 years. (3 marks)

(ii) The appropriate tax drag in percentage terms. (5 marks)

**(Total: 20 marks)**

**QUESTION FOUR**

(a) Discuss **THREE** effects of augmenting original investment strategy with other investment strategies or information changes. (6 marks)

(b) Daniel Bundi is a portfolio manager with Royal Capital. Daniel Bundi a market timer, makes quarterly asset allocation decisions based on his forecast of the direction of the market. Bundi's forecasts are right 55% of the time.

Mercy Nanjala is an equity analyst focusing on technology shares. Nanjala, a security selector, typically makes 50 active equity selections annually. Nanjala has an information coefficient of 0.04.

Both professionals construct unconstrained portfolios.

**Required:**

(i) The appropriate Transfer Coefficient (RC) applicable in analysing Daniel Bundi's portfolio. (2 marks)

(ii) Mercy Nanjala's information ratio (IR). (2 marks)

(iii) Daniel Bundi's information ratio (IR). (2 marks)



(c) Jayson Mwenda bought 1,000 Uwezo Ltd. shares for Sh.40 per share at the beginning of January 2022. He bought another 1,000 shares of the same company for Sh.50 per share at the beginning of January 2023. He sold all the shares each for Sh.60 at the end of December 2023. Uwezo Ltd. shares paid dividends of Sh.1 per share at the end of year 2022 and 2023. Jayson Mwenda did not withdraw money in his investment account of Uwezo Limited shares.

**Required:**

(i) Calculate the relevant cash flows in the two sub-periods. (4 marks)

(ii) Compute the Holding Period Return (HPR) for each sub-period. (2 marks)

(iii) Determine the compound annual rate that would have produced a total return to the return on the account over the 2-year period. (2 marks)

**(Total: 20 marks)**

**QUESTION FIVE**

(a) Evaluate **THREE** investment strategies used to implement strategic asset allocation. (6 marks)

(b) (i) State **TWO** extensions associated with value at risk (VaR). (2 marks)

(ii) A portfolio manager expects to earn a return of 6.5% over the next year with a standard deviation of 9%. The portfolio is currently valued at Sh.64 million.

**Required:**

Calculate the 5% annual value at risk (VaR) of the portfolio. (2 marks)

(c) An investor has an investment fund of Sh.2,000,000. He intends to apportion this fund to two securities, security X and security Y as follows:

Sh.500,000 in security X and Sh.1,500,000 in security Y.

The return on each security is dependent on the state of the economy as shown below:

| State of economy | Probability | Return on security X (%) | Return on security Y (%) |
|---|---|---|---|
| Boom | 0.40 | 18 | 24 |
| Average | 0.50 | 14 | 22 |
| Recession | 0.10 | 12 | 21 |

**Required:**

(i) Expected return on portfolio. (2 marks)

(ii) Standard deviation for each security. (3 marks)

(iii) Covariance between security X and security Y. (2 marks)

(iv) Assess the extent of risk diversification by the investor through the portfolio holding. (3 marks)

**(Total: 20 marks)**

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**CIFA INTERMEDIATE LEVEL**

**PORTFOLIO MANAGEMENT**

**THURSDAY: 25 April 2024. Morning Paper.** **Time Allowed: 3 hours.**

**Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings. Do NOT write anything on this paper.**

**QUESTION ONE**

(a) Kemikali Ltd. is a locally incorporated firm operating in the field of investments and asset management with its asset under management (AUM) in excess of Sh.5 billion. Teddy Kioko is a high net worth individual and is seeking to invest Sh.150 million mainly in bonds and other long-term investments through the firm.

**Required:**

Evaluate the **FOUR** major steps in the portfolio management process that are expected to be followed while investing the client's funds. (4 marks)

(b) As a portfolio manager of XYZ Ltd., you have been tasked to prepare an outline to be used by new entrants to portfolio management on investment performance standards.



**Required:**

Prepare the outline covering **FIVE** features of investment performance standards. (5 marks)

(c) James Kimani, a security broker gathers the following information relating to three securities:

| Security | Beta | Current price | Expected price | Expected dividend |
|---|---|---|---|---|
| | | Sh. | Sh. | Sh. |
| Unix (U) | 0.85 | 22 | 24 | 0.75 |
| Nice (N) | 1.25 | 48 | 51 | 2.00 |
| Dent (D) | -0.20 | 37 | 40 | 1.25 |

**Additional information:**

1. The expected risk free rate in 10%.

2. The expected market return is 14%.

**Required:**

(i) Determine the required rate of return for security Unix, Nice and Dent using the Security Market Line (SML). (4 marks)

(ii) Determine the expected return using the holding period return for security Unix, Nice and Dent. (3 marks)

(iii) Using appropriate justification, advise James Kimani on the appropriate action to take on security Unix, Nice and Dent. (4 marks)

**(Total: 20 marks)**

**QUESTION TWO**

(a) Stephen Kirumba, a private wealth manager is meeting with a client, Peter Kalibo, in order to create an Investment Policy Statement (IPS) for Kalibo's upcoming retirement. Kalibo estimates that he will require Sh.2 million per year, with annual increases for inflation, during retirement. Kalibo's primary spending goals during retirement are to provide for his family's needs and maintain his retirement style. His secondary goals are to fund his philanthropic activities and leave a significant inheritance to his children. During his retirement, Kalibo will receive union pension payments of Sh.500,000 per year with annual increases for inflation. In his spare time, he runs a small business that provides him with an annual income of Sh.1.2 million and is valued at Sh.10 million. He will continue running his business during retirement. Kalibo holds a portfolio of securities valued at Sh.40 million. The portfolio primarily contains dividend paying securities and interest bearing bonds. Kalibo has reinvested all these distribution back into his portfolio but anticipates that after retirement he may need to use some of the distributions to fund his expenses. Kalibo plans to buy a vacation home in three years. His budget for the vacation home is Sh.14 million. Kalibo has not decided yet how he will fund this purchase.

**Required:**

Prepare the investment objectives section of Kalibo's Investment Policy Statement (IPS). (4 marks)

(b) Outline **SIX** principles underlying the ethical responsibilities relating to providers of portfolio management services and clients. (6 marks)

(c) An investor has decided to invest Sh.1 million in two securities, namely; security KLM and security AQR. The projections of returns from the two securities along with their probabilities are as follows:

**Projected Returns**

| Probabilities | Security KLM (%) | Security AQR (%) |
|---|---|---|
| 0.20 | 12 | 16 |
| 0.25 | 14 | 10 |
| 0.25 | -7 | 28 |
| 0.30 | 28 | -2 |

**Required:**

(i) Expected return of security KLM and security AQR. (2 marks)

(ii) Standard deviation of security KLM and security AQR. (4 marks)

(iii) Covariance of security KLM and security AQR. (2 marks)

(iv) The proportion of security KLM and security AQR to formulate a minimum risk portfolio. (2 marks)

**(Total: 20 marks)**



**QUESTION THREE**

(a) Describe **THREE** document classification systems. (6 marks)

(b) An investor is considering four individual securities whose active returns are assumed to be uncorrelated with each other and have active return volatilities. The investor believes the first two securities will outperform the other two over the next year and thus assigns score of +1 and -1 to the first and second groups, respectively. The scores and the active return volatilities for the four securities are as follows:

| Security | Score | Volatility (%) |
|---|---|---|
| 1 | 1.0 | 25 |
| 2 | 1.0 | 50 |
| 3 | -1.0 | 25 |
| 4 | -1.0 | 50 |

**Additional information:**

1. The information coefficient is 0.20.

2. The investor wants to maximise the expected active return of the portfolio subject to an active risk constraint of 9.0%.

The investor uses the following formula:

$$\Delta W_1 = \frac{U_1}{\sigma^2_1} \times \frac{\sigma A}{IC\sqrt{BR}}$$

**Required:**
Calculate the active weights that should be assigned to each of the securities using the formula above. (4 marks)

(c) Consider the following annual returns generated by two different active equity portfolio managers, A and B as well as those of the security index:

| Period (n) | Manager A (%) | Manager B (%) | Security Index (%) |
|---|---|---|---|
| 1 | 12.8 | 13.9 | 11.8 |
| 2 | -2.1 | -4.2 | -2.2 |
| 3 | 15.6 | 13.5 | 18.9 |
| 4 | 0.8 | 2.9 | -0.5 |
| 5 | -7.9 | -5.9 | -3.9 |
| 6 | 23.2 | 26.3 | 21.7 |
| 7 | -10.4 | -11.2 | -13.2 |
| 8 | 5.6 | 5.5 | 5.3 |
| 9 | 2.3 | 4.2 | 2.4 |
| 10 | 19.0 | 18.8 | 19.7 |

**Required:**

(i) Determine whether any of the manager outperformed or underperformed the index subject to the benchmark. (2 marks)

(ii) Calculate the tracking error for each manager in relation to the index. (6 marks)

(iii) Based on your answer in (c) (ii) above, explain which of the two managers performed better. (2 marks)

**(Total: 20 marks)**



**QUESTION FOUR**

(a) In relation to contemporary issues and emerging markets:

(i) Describe the concept of security lending. (2 marks)

(ii) Analyse **THREE** contemporary issues shaping the security lending practice in your country. (6 marks)

(b) Mwanahamisi Zaid is an investment practitioner with Wetu Capital Ltd. and is analysing the likely investment performance for her clients' accounts whose details has been presented below:

1. Account A11 – An investment account subject to accrual taxes only. Sh.100,000 is to be invested for 20 years and is likely to earn a before tax return of 10%. The estimated tax rate is 30% with no withdrawals.
2. Account A12 – An investment account with deferred capital gains taxes only. Sh.400,000 to be invested for 20 years and likely to earn a pre-tax return of 10%. Capital gains tax rate estimated is 30% with no withdrawals.
3. Account A13 – Effect of cost basis on capital gains taxes. Sh.500,000 is to be invested for 20 years at a return of 10%. The estimated capital gains tax is 30% and a cost basis of Sh.375,000.
4. Account A14 – Account based on wealth based taxes only. Sh.1 million will be invested for 20 years and is estimated to earn a return of 10%. The account will be subject to only wealth based tax estimated at 2%. No withdrawals.
5. Account A15 – Combined effect of multiple taxes. Sh.100,000 is to be invested at the beginning of the year and it is estimated to earn 10% with no withdrawals or additional contributions. During the year, estimated dividends of Sh.4,000 interest of Sh.300 and Sh.2,200 realised capital gains are highly likely and all proceeds will be re-invested into the portfolio. The estimated tax rates on interest, dividends and capital gains are 30%, 20% and 20% respectively.

Mwanahamisi Zaid seeks your help to determine the after tax value of each investment account to be estimated.

**Required:**

(i) The after tax value of investment account A11 in 20 years. (2 marks)

(ii) The after tax value of investment account A12 in 20 years. (2 marks)

(iii) The after tax value of investment account A13 in 20 years. (2 marks)

(iv) The after tax value of investment account A14 in 20 years. (2 marks)

(v) The realised after tax return (RATR) and the investment account balance after payment of taxes with respect to account A15. (4 marks)

**(Total: 20 marks)**

**QUESTION FIVE**

(a) A portfolio manager has encountered the following situations:

1. Following a major security market crash, investors are less inclined to invest in equity funds and more inclined to invest in bond funds.
2. An investor select investment funds on the basis of strong past performance.

**Required:**

Identify **TWO** behavioural biases and describe how they influence people's decision making in the situations described above. (8 marks)

(b) An investor uses a macro-economic model to calculate the tracking error and mean active return of the following three portfolios:

| Portfolio | Tracking error (%) | Mean active return (%) |
|---|---|---|
| 1 | 1.50 | 1.50 |
| 2 | 1.30 | -0.50 |
| 3 | 1.00 | 0.50 |

**Required:**

Determine which portfolio has the highest information ratio. (3 marks)

(c) A portfolio consist of equally weighted securities that has an identical correlation coefficient of 0.4 between all pairs of securities. Each security has the same variance of 0.0625.

**Required:**

Determine the standard deviation of the equity portfolio for the following securities:

(i) 30 securities. (2 marks)

(ii) Unlimited number of securities. (2 marks)

(d) Berline Anyangwa, a portfolio manager, manages a portfolio that is 60% invested in security Apple and 40% invested in security Bold. The following information is also available:

| Security | Standard deviation of daily returns | Mean daily return | Covariance of daily return |
|---|---|---|---|
| Apple | 0.0158 | 0.0004 | 0.000106 |
| Bold | 0.0112 | 0.0003 | |

Critical Z-value at 5% = 1.65

Hint $VaR = \left( E(RP) - (Z)(\delta) \right) \times Vp$

**Required:**

(i) The 5% daily value at Risk (VaR). (3 marks)

(ii) Assuming the distribution of daily returns is constant over the year, that there are 250 trading days in one year and that daily returns are independently distributed. Calculate the 5% daily and annual VaR for a portfolio of Sh.10 million. (2 marks)

**(Total: 20 marks)**

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**CIFA INTERMEDIATE LEVEL**

**PORTFOLIO MANAGEMENT**

**THURSDAY: 7 December 2023. Morning Paper.** **Time Allowed: 3 hours.**

**Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings. Do NOT write anything on this paper.**

**QUESTION ONE**

(a) Summarise **FOUR** benefits that could accrue to investors who includes pooled investment products in their portfolio. (4 marks)

(b) With respect to program trading in portfolio management:

(i) Explain the concept of program trading. (2 marks)

(ii) Highlight **FOUR** characteristics of program trading. (4 marks)

(c) The following annual returns are available for a portfolio with an active strategy and the corresponding benchmark of the same investment style:

| Year | Portfolio return (%) | Benchmark return (%) |
|---|---|---|
| 2018 | 4.0 | 6.0 |
| 2019 | 8.0 | 3.0 |
| 2020 | 5.5 | 7.5 |
| 2021 | 2.0 | 4.0 |
| 2022 | 6.5 | 2.0 |



**Required:**

Calculate the average annual information ratio from the year 2018 to year 2022 assuming sample of return data. (4 marks)

(d) The returns of Omega Ltd. have statistically been shown to be influenced by three risk factors; $\theta_1$, $\theta_2$ and $\theta_3$ where;

$\theta_1$ - An index reflecting energy cost
$\theta_2$ - Changes in the level of market share prices
$\theta_3$ - Changes in the exchange rate of the local currency

**Additional information:**

1. The risk factors, risk premiums and beta factors are given as follows:

| Risk factor | Risk premium (%) | Beta factor |
|---|---|---|
| $\theta_1$ | 4.5 | 0.7 |
| $\theta_2$ | 7.5 | 0.3 |
| $\theta_3$ | 11.25 | 1.1 |

2. The risk free rate is 8.25%.

**Required:**

(i) Calculate the required return of Omega Ltd. using the Arbitrage Pricing Theory (APT) model. (3 marks)

(ii) Outline **THREE** merits of the Arbitrage Pricing Theory (APT). (3 marks)

**(Total: 20 marks)**

**QUESTION TWO**

(a) Summarise **SIX** objectives of documentation within the investments industry. (6 marks)

(b) Gabriel Otiti is a portfolio manager with Penda investment firm. He is interested in using Value at Risk (VaR) model to monitor the risk exposure of Penda's government bond portfolio.

He gathers the following information:

| **Item** | **Measure** |
|---|---|
| Portfolio value (Sh.) | 1.4 Billion |
| Expected annualised rate of return | 6% |
| Standard deviation of annualised rate of return | 7% |
| Standard normal distribution Z – Values – 0.05 | 1.65 |
| – 0.01 | 2.33 |

**Required:**

(i) Determine the monthly expected return. (1 mark)

(ii) Compute the monthly standard deviation. (1 mark)

(iii) Determine the expected loss at % monthly VaR. (2 marks)

(iv) Determine the 1% monthly (VaR) in shillings for the government bond portfolio. (2 marks)

(c) Eldah Kendi obtains the following information from her portfolio of two stocks trading in the securities exchange:

| **Market return (%)** | **Lima Ltd. (%)** | **Tech Ltd. (%)** |
|---|---|---|
| 6 | 2 | 8 |
| 20 | 30 | 16 |

**Additional information:**

1. The risk free rate is 7%.
2. The market is expected to make a return of 6% and 20% and each of those occurrences have an equal chance.



**Required:**

Compute the following for Eldah Kendi's equally weighted portfolio:

(i) Beta for each company shares. (2 marks)

(ii) Expected weighted average return for each company shares. (2 marks)

(iii) Estimate the security market line (SML). (2 marks)

(iv) Alpha for each company's share. (2 marks)

**(Total: 20 marks)**

**QUESTION THREE**

(a) Examine **THREE** benefits of a well written investment policy statement (IPS). (6 marks)

(b) Tamu Capital has to engage an investment manager whose details are as follows:

**Manager M:** Follows 500 share index with annual forecasts and with an information coefficient (IC) for each forecast is 0.03.

**Manager N:** Follows 100 share index with annual forecasts and the information coefficient (IC) is 0.06 for each forecast.

**Required:**

(i) Explain the term "fundamental law of active management". (2 marks)

(ii) Determine the Information Ratio (IR) for manager N and manager M. (3 marks)

(iii) Advise Tamu Capital on which manager to select using the fundamental law of active management. (1 mark)

(c) Eva Njuki is carrying out a portfolio performance review of their main investment, Fedha Fund for the month of October 2023 and she obtains the following data:

| | Fedha Fund | Market |
|---|---|---|
| Expected return (%) | 14 | 12 |
| Beta coefficient | 1.2 | 1.0 |
| Standard deviation (%) | 28 | 26 |

The risk free rate is 5%

**Required:**
Evaluate the performance of Fedha Fund and the market using:

(i) Treynor's ratio. (2 marks)

(ii) Sharpe's measure. (2 marks)

(iii) Jensen's (Alpha) measure. (2 marks)

(iv) Explain whether Fedha Fund outperformed the market using the results above. (2 marks)

**(Total: 20 marks)**

**QUESTION FOUR**

(a) In relation to behavioural finance, explain the following emotional biases that could affect the financial decisions:

(i) Loss aversion bias. (2 marks)

(ii) Over confidence bias. (2 marks)

(iii) Self control bias. (2 marks)

(b) The tangent portfolio of risky assets, which lies on the most efficient capital allocation line, has an expected return of 12% and a standard deviation of returns of 30%. The yield on non-interest treasury bills is 2%. The investor has a risk aversion coefficient of 4.



**Required:**

(i) Determine the weights of the tangent portfolio and the risk free rates in the client's optimal portfolio that lies on the most efficient capital allocation line. (2 marks)

(ii) Calculate the expected return and standard deviation of returns of the optimal portfolio. (2 marks)

(iii) Calculate the Sharpe ratio of the optimal portfolio. (2 marks)

(c) Smith Wanjala, a wealthy individual, is planning his estate. His total assets are valued at Sh.10 million. He wishes to understand the potential impact of estate taxes and the distribution of his wealth, taking into account the various elements of estate planning including basic concepts of domestic estate planning and non-tax issues like the legal system, a family's core capital and excess capital.

**Additional information:**

1. Estate tax rate is at 40%.
2. Smith Wanjala decides to use the annual exclusion gifts to reduce his taxable estate with annual exclusion gift limit of Sh.15,000 per recipient.
3. Smith Wanjala resides in a jurisdiction where a 5% legal fees of the total estate for probate and legal processes are applicable.
4. Smith Wanjala requires 20% of his assets as core capital.

**Required:**

(i) Calculate the legal fees applicable to Smith Wanjala's estate. (1 mark)

(ii) Estimate Smith Wanjala's estate tax liability. (2 marks)

(iii) If Smith Wanjala decides to use his annual exclusion gifts to reduce his taxable estate, calculate the maximum amount he can gift each of his two children without incurring gift taxes. (2 marks)

(iv) Calculate the shilling value of his estate designated as core capital and excess capital. (3 marks)

**(Total: 20 marks)**

**QUESTION FIVE**

(a) Distinguish between "Strategic Asset Allocation (SAA)" and "Tactical Asset Allocation (TAA)". (4 marks)

(b) An investment advisor gathers the following data for a new client:

1. Age: 40
2. Family: Married but divorce proceedings are pending; three children aged 14 years, 16 years and 18 years.
3. Hobbies: Scuba diving
4. Profession: Derivatives trader at an investment bank
5. Net worth: Sh.10 million in a non-diversified portfolio and a house worth Sh.4 million
6. Planned retirement: At the age of 65 years
7. Current income: Cost of living slightly exceeds current income
8. Future expected expenses: Education cost of Sh.200,000 per year per child; the capital settlement expected from the divorce for the wife amounts to half of the net worth.

**Required:**
Discuss the following as they relate to the long-term investment policy statement (IPS) for the client:

(i) Risk objectives. (3 marks)

(ii) Liquidity. (3 marks)

(iii) Investment horizon. (3 marks)

(c) An investor is considering four individual securities whose active returns are uncorrelated with each other and forecasts are independent from year to year. The relevant data for the four securities is provided below:

| Security | Expected active return (%) | Active return volatility (%) | Active weight (%) |
|---|---|---|---|
| A | – 5 | 25.0 | 10 |
| B | – 10 | 25.0 | 5 |
| C | 5 | 25.0 | –10 |
| D | 10 | 25.0 | – 5 |

The benchmark portfolio for these four securities is equally weighted and the forecasted return on the benchmark portfolio is 12%.



**Required:**
Calculate the following for the managed portfolio:

(i) The forecasted total return. (3 marks)

(ii) The active return. (1 mark)

(iii) The active risk. (3 marks)

**(Total: 20 marks)**

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**CIFA INTERMEDIATE LEVEL**

**PORTFOLIO MANAGEMENT**

**THURSDAY: 24 August 2023. Morning Paper.** **Time Allowed: 3 hours.**

**Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings. Do NOT write anything on this paper.**

**QUESTION ONE**

(a) Enumerate **FIVE** elements of portfolio management. (5 marks)

(b) Summarise **FIVE** components of investment policy statement. (5 marks)

(c) Peter Wafula is evaluating five portfolios with the following characteristics:

| Portfolio | Portfolio expected return (%) | Portfolio standard deviation (%) |
|---|---|---|
| A | 19 | 8 |
| B | 25 | 12 |
| C | 16 | 6 |
| D | 32 | 16 |
| E | 22.5 | 10 |



**Additional information:**

1. The expected return on the market portfolio is 12%.
2. The standard deviation of the market portfolio is 4%.
3. The risk free rate of return is 5%.

**Required:**

(i) Using the capital market line (CML), determine the expected rate of return for each portfolio. (5 marks)

(ii) Identify the portfolios that are efficient, super-efficient or in-efficient. (3 marks)

(iii) In the case of an inefficient portfolio in (c) (ii) above, state what the standard deviation should be for efficiency to be achieved with the given expected return. (2 marks)

**(Total: 20 marks)**

**QUESTION TWO**

(a) Highlight **FIVE** criteria for specifying asset classes. (5 marks)

(b) The following information relates to Simon Mwangi portfolio:

1. The asset allocation mix:

| Asset allocation | Expected rate of return (%) | Standard deviation (%) |
|---|---|---|
| A | 11.5 | 18 |
| B | 8 | 14 |
| C | 6 | 10 |

2. The risk aversion (RA) co-efficient is 5.
3. The annual spending rate will be 5%.
4. The expected annual inflation rate will be 2.4%.
5. The annual expenses incurred while investing portfolio is 60 basis points.

**Required:**

(i) Expected return of Simon Mwangi using multiplicative model. (3 marks)

(ii) Using risk-adjusted rate of return, advise the investor on the appropriate asset mix. (4 marks)

(c) A financial analyst is considering investing in the stocks of three companies; X Ltd., Y Ltd. and Z Ltd. The following information relates to the stocks of the three companies:

| **Company** | **Sensitivity of stock's returns to changes in:** | | |
|---|---|---|---|
| | **Market index** | **Inflation rate** | **Economic growth rate** |
| X Ltd. | 1.60 | –0.15 | 0.60 |
| Y Ltd. | 0.93 | 0.14 | 0.70 |
| Z Ltd. | 1.14 | –0.45 | 0.90 |

During the year 2023, it is expected that the market index will increase in performance by 3.0% up from its current 5%. The risk free rate of return in the market will be 7% on average and the inflation and economic growth rates will be 11% and 6% respectively.

**Required:**

(i) Expected returns for the three stocks in year 2023 using the capital asset pricing model (CAPM). (3 marks)

(ii) Expected returns for the three stocks in year 2023 using the arbitrage pricing theory (APT). (3 marks)

(iii) State the reason why a financial analyst would get different returns estimates in (c) (i) and (c) (ii) above. (2 marks)

**(Total: 20 marks)**

**QUESTION THREE**

(a) Discuss **THREE** ways in which behavioural factors could affect investment adviser and client interactions. (6 marks)

(b) James Wakaba and his wife Sarah Nina are planning for retirement and want to compare the past performance of a few mutual funds they are considering for investment. They believe that a 5-year comparison period would be appropriate and the following data from Sage Mutual Fund has been availed to them:

| **Year** | **Asset under management (AUM) at beginning of the year Sh."million"** | **Net return (%)** |
|---|---|---|
| 1 | 300 | 15 |
| 2 | 450 | –5 |
| 3 | 200 | 10 |
| 4 | 250 | 15 |
| 5 | 350 | 3 |



**Required:**

(i) Calculate the holding period return for the five-year period. (1 mark)

(ii) Calculate the arithmetic mean annual return. (1 mark)

(iii) Calculate the geometric mean annual return. (2 marks)

(iv) Based on your answer in (b) (ii) and (b) (iii) above, determine the most appropriate measure of portfolio return. (2 marks)

(c) Hellen Auma, a research analyst at Bao Capital is examining the prospects of several portfolios: Simba Fund, Twiga Fund and the Delta benchmark. The selected data is presented below:

| | |
|---|---|
| Simba Fund information ratio (S) | 0.12 |
| Twiga Fund information ratio (T) | 0.25 |
| Benchmark sharpe ratio | 0.30 |
| Benchmark total risk(s) | 20% |

**Required:**
Calculate:

(i) The highest possible Sharpe ratio for a portfolio consisting of a combination of Simba Fund and the benchmark. (3 marks)

(ii) The optimal level of active risk for an investor in Twiga Fund. (2 marks)

(iii) The total excess return over risk free rate for an investor in Twiga Fund. (3 marks)

**(Total: 20 marks)**

**QUESTION FOUR**

(a) Explain **THREE** advantages of stock lending to an investor. (6 marks)

(b) Andrew Mwakirunge has been given the following sample probability distribution of annual returns on a portfolio with a market value of Sh.10 million:

| **Return on portfolio** | **Probability** |
|---|---|
| Less than – 50% | 0.005 |
| –50% to –40% | 0.005 |
| –40% to –30% | 0.010 |
| –30% to –20% | 0.015 |
| –20% to –10% | 0.015 |
| –10% to –5% | 0.165 |
| –5% to 0% | 0.250 |
| 0% to 5% | 0.250 |
| 5% to 10% | 0.145 |
| 10% to 20% | 0.075 |
| 20% to 30% | 0.025 |
| 30% to 40% | 0.020 |
| 40% to 50% | 0.015 |
| Greater than 50% | 0.005 |
| | 1.000 |



**Required:**
Based on this probability distribution, determine the following:

(i) 1 percent yearly value at risk (VaR). (3 marks)

(ii) 5 percent yearly value at risk (VaR). (3 marks)

(c) A fund receives investment funds at the beginning of each year and generates returns as shown in the following table:

| **Year of investment** | **Amount of investment funds Sh."000"** | **Return during year of investment** |
|---|---|---|
| 1 | 1,000 | 15% |
| 2 | 4,000 | 14% |
| 3 | 45,000 | –4% |

**Required:**
Calculate the following:

(i) Time weighted rate of return (TWRR). (2 marks)

(ii) Money weighted rate of return (MWRR). (4 marks)

(iii) Highlight **TWO** advantages of money weighted rate of return. (2 marks)

**(Total: 20 marks)**

**QUESTION FIVE**

(a) Differentiate between "core capital" and "excess capital" as used in personal financial management. (4 marks)

(b) In relation to documentation in the investment sector:

(i) Explain the term "external documentation". (2 marks)

(ii) Identify **FOUR** parties that are involved in external documents. (4 marks)

(c) The following information relates to a portfolio held by Waridi Limited:

1. The risk free rate is 3% and the expected return of the market portfolio is 13%.
2. The standard deviation of the portfolio is 23%.
3. Waridi Limited has a standard deviation of 50% and a correlation of 0.65 with the market.

**Required:**

(i) The beta of Waridi Limited. (2 marks)

(ii) The expected return of the portfolio. (2 marks)

(d) Jewel Muthoni is carrying out an evaluation of one of her client's from her private wealth portfolio and has gathered the following information:

1. Investment Alpha of Sh.100,000,000 earned an annual interest of 5% (with no capital gains). Accrual taxes of 30% are applied to interest income from Alpha investment.
2. Investment Belta of Sh.10,000,000 earned an annual return of 14%. The wealth based tax for this investment is 3% and no other taxes are applicable to Belta investment.
3. Jewel Muthoni's overall portfolio generates a total return of 15%. The tax rates on interest, dividends and capital gains are 35%, 20% and 20% respectively. The proportion of the portfolio return from interest, dividends and realised capital gains are 10%, 25% and 35% respectively.

**Required:**

Evaluate Jewel Muthoni's investments based on the following criteria:

(i) The expected after-tax value of Alpha investment in 10 years. (2 marks)

(ii) The after-tax value of Belta investment in 15 years. (2 marks)

(iii) The net return of Jewel Muthoni's overall portfolio after all taxes. (2 marks)

**(Total: 20 marks)**

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**CIFA INTERMEDIATE LEVEL**

**PORTFOLIO MANAGEMENT**

**THURSDAY: 27 April 2023. Morning Paper.** **Time Allowed: 3 hours.**

**Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings. Do NOT write anything on this paper.**

**QUESTION ONE**

(a) An investment consultant firm has been appointed to advise Kedog Asset Managers on document management.

**Required:**
Discuss **THREE** areas of document management that the investment consultant should cover. (6 marks)

(b) Peter Kamau has an investment capital of Sh.2,000,000. He wishes to invest in two securities; A and B in the following proportion; Sh.600,000 in security A and Sh.1,400,000 in security B.

The returns on these two securities depend on the state of the economy as shown below:

| State of economy | Probability | Returns | |
|---|---|---|---|
| | | Security A (%) | Security B (%) |
| Recession | 0.40 | 9 | 12 |
| Normal | 0.50 | 7 | 11 |
| Boom | 0.10 | 6 | 10 |



**Required:**
Compute:

(i) The portfolio expected return. (3 marks)

(ii) The actual portfolio risk. (3 marks)

(iii) The weighted portfolio risk. (1 mark)

(c) John Namu who is 65 years old, retired five years ago after a long career in the telecommunications industry. John and his wife Anastacia Wambura live in Kakamega County. His wife is now 63 years old and retired three years ago. Even though they are retired, they prefer to maintain their current lifestyle with spending needs of Sh.80,000 per year in real terms. Inflation is expected to be 3% with nominal risk free rate equal to 5%. John and Anastacia survival probabilities for the next two years are as shown below:

| | John Namu | | Anastacia Wambura | |
|---|---|---|---|---|
| Year | Age | Probability of survival | Age | Probability of survival |
| 1 | 66 | 0.992 | 64 | 0.997 |
| 2 | 67 | 0.982 | 65 | 0.987 |

**Required:**

(i) The probability that either John or Anastacia will survive for the next two years. (2 marks)

(ii) The real risk free rate that will be used to discount future cash flows. (2 marks)

(iii) Present value of core spending needs at the end of year two. (3 marks)

**(Total: 20 marks)**

**QUESTION TWO**

(a) Highlight **THREE** assumptions of Fundamental law of active management. (3 marks)

(b) With respect to Fundamental law of active management, distinguish between "information co-efficient (IC)" and "Transfer coefficient (TC)". (4 marks)

(c) An actively managed portfolio has a transfer coefficient (TC) of 0.60 and unconstrained information ratio of 0.35. The benchmark portfolio has a Sharpe ratio of 0.45 and a risk of 20%

**Required:**
Determine the optimal amount of aggressiveness in the actively managed portfolio. (3 marks)

(d) The returns on stock Z and market portfolio for a period of 5 years are as follows:

| Year | Return on stock Z (%) | Return on market portfolio (%) |
|---|---|---|
| 1 | 15 | 10 |
| 2 | 12 | 11 |
| 3 | 10 | 12 |
| 4 | –5 | –4 |
| 5 | –2 | –3 |

**Required:**
Calculate:

(i) The beta of the security (4 marks)

(ii) The alpha of the security. (2 marks)

(iii) The security characteristic line. (1 mark)

(iv) The systematic risk. (2 marks)

(v) The unsystematic risk. (1 mark)

**(Total: 20 marks)**

**QUESTION THREE**

(a) Summarise **FOUR** practical limitations of the Capital Asset Pricing Model (CAPM). (4 marks)

(b) In relation to program trading in portfolio management:

(i) Explain the term "fintech". (2 marks)

(ii) Describe **THREE** applications of fintech technology in the investment industry. (6 marks)

(c) BB Investments Firm is in possession of two asset classes: long term bonds issued by Australian government and long-term Canadian government bonds. The expected monthly return on Australian bonds is 0.85% with a standard deviation of 3.2%.

Expected monthly return on Canadian bonds is 0.95% with a standard deviation of 5.26%: The portfolio's market value is Sh.100 million and is equally weighted between the two asset classes.

**Additional information:**
1. There are 52 weeks in a year of 12 months.
2. Monthly portfolio variance is estimated at 0.001242.

**Required:**

(i) Weekly portfolio return. (2 marks)

(ii) Weekly standard deviation. (2 marks)

(iii) 5% weekly value at risk (VaR). (2 marks)

(iv) 1% weekly VaR. (2 marks)

**(Total: 20 marks)**

**QUESTION FOUR**

(a) Examine **TWO** differences between "macroeconomic factors" and "fundamental factors" in relation to multifactor models. (4 marks)

(b) Milton Opiyo is a local investor who is keen in investing on various financial instruments. One of his key objectives is to maintain capital preservation by ensuring that after-tax returns on his wealth is maximised and if possible invest in products that are tax exempt.

As his appointed investment analyst, the following information has been availed to you:

1. A taxable investment with a yield of 9.5% per annum is available.
2. A risk-free treasury bill tax-exempt yielding 6.8% per annum is also available.
3. Income tax bracket for individual investors is currently at 30%.

**Required:**

(i) Determine the after tax returns of the taxable security that Milton Opiyo could earn. (1 mark)

(ii) Advise Milton Opiyo on the gross interest that he must target to earn from the taxable investment in order to earn the same rate as the tax exempt investment. (2 marks)

(c) The Fanaka Pension Fund was valued at Sh.50 million at the start of the month and Sh.52,750,000 at the month end. During the month, there was a cash flow injection of Sh.380,000 on day 11 and Sh.220,000 injection on day 20. The valuation of the Fund account was Sh.52,335,000 and Sh.52,530,000 on day 11 and day 20 respectively.

**Required:**

Calculate the Time Weighted Rate of Return (TWRR) assuming 30 days in a month. (3 marks)

(d) Lewis Guantai has been an investor in the securities exchange for the last five years. Lewis is planning to construct a minimum variance portfolio comprising the shares of two quoted companies; X Ltd. and Y Ltd.



Due to uncertainties surrounding the economic environment, he is projecting the shares returns under three macro-economic factors as follows:

| **Macroeconomic factors** | **Probability** | **X Ltd. (%)** | **Y Ltd. (%)** |
|---|---|---|---|
| Hyper Inflation | 0.20 | 17 | 11 |
| Moderate (both inflation and interest) | 0.45 | 15 | 13 |
| High interest | 0.35 | 10 | 14 |

**Required:**

(i) The weight of security X and security Y in the minimum variance portfolio. (6 marks)

(ii) The expected return of the minimum variance portfolio. (2 marks)

(iii) The standard deviation for the minimum variance portfolio. (2 marks)

**(Total: 20 marks)**

**QUESTION FIVE**

(a) Describe **THREE** ethical responsibilities that are expected of a portfolio manager. (3 marks)

(b) Explain how the following changes could affect the relationship between risk and required rate of return for either an individual investment or group of investments:

(i) A movement along the security market line (SML). (2 marks)

(ii) A change in the slope of the security market line (SML). (2 marks)

(iii) A shift in the SML. (2 marks)

(c) Albert Korir uses the arbitrage pricing theory (APT) as a basis for evaluating the strategies he uses for the portfolio he manages.

The following data is available for the three funds:

| Fund | Expected return | Factor sensitivity |
|---|---|---|
| A | 0.02 | 0.5 |
| B | 0.04 | 1.5 |
| C | 0.03 | 0.9 |

Albert Korir believes that an arbitrage opportunity exists in fund C.

**Required:**

(i) Calculate the expected return of the portfolio assuming a weighing of 50% for fund A and 50% for Fund B. (1 mark)

(ii) Calculate the expected return of the portfolio using a weighting of 60% for fund A. (1 mark)

(iii) Using your results in (c) (i) and (c) (ii) above, determine how the arbitrage opportunity may be exploited, if any. (3 marks)

(d) The following information relates to the two portfolios XYZ and QPT:

| | Portfolio XYZ | Portfolio QPT |
|---|---|---|
| Average rate of return (%) | 16 | 10 |
| Standard deviation (%) | 23 | 32 |
| Beta | 1.05 | 0.99 |

The risk free rate is 6% and the benchmark standard deviation is 12%.

**Required:**

For each portfolio, calculate the following measures of performance:

(i) Sharpe measure. (2 marks)

(ii) Treynor measure. (2 marks)

(iii) Highlight two benefits of risk adjusted performance measures. (2 marks)

**(Total: 20 marks)**

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**CIFA INTERMEDIATE LEVEL**

**PORTFOLIO MANAGEMENT**

**THURSDAY: 8 December 2022. Morning Paper.** **Time Allowed: 3 hours.**

**Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings. Do NOT write anything on this paper.**

**QUESTION ONE**

(a) Explain **THREE** behavioural factors that affect portfolio construction. (6 marks)

(b) Johnson Sakwa and Alex Mwiti both have Sh.100,000 each split evenly between a tax deferred account and a taxable account. Johnson Sakwa chooses to put shares with an expected rate of return of 7% in the tax deferred account and bonds yielding 4% in the taxable account. Alex Mwiti chooses the reverse, putting shares in the taxable account and bonds in the deferred account as follows.

**Johnson Sakwa and Alex Mwiti asset location:**

| **Tax profile** | **Johnson Sakwa** | **Alex Mwiti** |
|---|---|---|
| Taxable account | Sh.50,000 (bonds) | Sh.50,000 (shares) |
| Tax deferred account | Sh.50,000 (shares) | Sh.50,000 (bonds) |
| Total (before tax) | 100,000 | 100,000 |



**Additional information:**

1. When held in taxable account, equity returns will be taxed entirely as capital gains at a 5% rate while interest income is taxed annually at 15%.
2. The tax rate applicable to withdrawals from the tax deferred account will be 30%.
3. Cost basis is equal to market value on asset held in taxable account.

**Required:**

Calculate the after tax accumulation after 20 years for:

(i) Johnson Sakwa. (3 marks)

(ii) Alex Mwiti. (3 marks)

(c) Nancy Wafula estimates that her revised annual living expenses including a new studio and an apartment will average Sh.132,500 (excluding her child education costs). If necessary, she could combine her apartment and studio to reduce spending by Sh.32,500. She does not want her financial security to be dependent on further gifting from her parents and is pleased that, after the sale of Sawa apartment, she will be able to meet her new living expenses with proceeds from art sales amounting to Sh.50,000 and the expected total return of the proposed investment portfolio of Sh.82,500. Because of the uncertainty of art sales, Nancy plans to establish an emergency reserve fund equal to one year's living expenses. Her after tax proceeds from the sale of Sawa apartment are expected to be Sh.1,200,000 (1 – 0.15) = Sh.1,020,000. She also holds Sh.75,000 in balanced mutual funds and Sh.25,000 in a money market fund. Nancy intends to revaluate her policy statement and asset allocation guidelines every three years.

**Required:**

(i) Discuss Nancy's liquidity requirements. (4 marks)

(ii) Determine Nancy's return requirement. (2 marks)

(iii) Evaluate whether Nancy's portfolio can satisfy that requirement if inflation average 3% annually and she reduces her annual living expenses to Sh.100,000 by combining her apartment and studio. (2 marks)

**(Total: 20 marks)**

**QUESTION TWO**

(a) Propose **THREE** key trends in the global asset management industry. (6 marks)

(b) Explain **THREE** differences between individual investors and institutional investors. (6 marks)

(c) Two assets A and B are known to lie on the security market line (SML). Asset A has a beta of 0.5 and a risk premium of 4%. Asset B has an expected rate of return of 20% and a beta of 1.75. You are considering the following securities which are available in the market:

| Security | Expected return (%) | Beta |
|---|---|---|
| A | 20 | 2.00 |
| B | 14 | 0.75 |
| C | 15 | 1.25 |
| D | 12 | –0.25 |
| E | 31 | 3.25 |

**Required:**

(i) Determine the risk free rate of return. (2 marks)

(ii) Calculate the required rate of return of each security. (4 marks)

(iii) Identify which security is undervalued, overvalued or correctly valued. (2 marks)

**(Total: 20 marks)**

**QUESTION THREE**

(a) Describe **TWO** approaches for undertaking stress testing in portfolio risk management. (4 marks)

(b) The following data relates to portfolio L return:

| Period | Portfolio L return (%) |
|---|---|
| 1 | –3 |
| 2 | –2 |
| 3 | 5 |
| 4 | 8 |

The risk free rate is 1%.

**Required:**

Calculate portfolio L Sortino ratio. (4 marks)



(c) Michael Bundi wants to invest in stock market. He has gathered the following information about individual securities:

| Security | Expected return (%) | Beta | Standard deviation (%) |
|---|---|---|---|
| A | 15 | 1.5 | 40 |
| B | 12 | 2 | 20 |
| C | 10 | 2.5 | 30 |
| D | 9 | 1 | 10 |
| E | 8 | 1.2 | 20 |
| F | 14 | 1.5 | 30 |

The market variance is 10% and the risk free rate is 7%.

**Required:**

(i) Excess return to beta ratio. (4 marks)

(ii) Cut-off point. (6 marks)

(iii) Optimum portfolio assuming no short sales. (2 marks)

**(Total: 20 marks)**

**QUESTION FOUR**

(a) Explain the following types of asset allocation:

(i) Tactical asset allocation. (2 marks)

(ii) Dynamic asset allocation. (2 marks)

(iii) Insured asset allocation. (2 marks)

(b) Highlight **SEVEN** stages of a typical client interaction cycle with respect to documentation. (7 marks)

(c) The following information relates to the market price per share of Nebo Limited over a period of five years:

| **Year** | **Market price per share (Sh.)** |
|---|---|
| 2021 | 35 |
| 2020 | 29 |
| 2019 | 25 |
| 2018 | 32 |
| 2017 | 35 |

**Required:**

(i) The expected return of the shares of the company. (5 marks)

(ii) Comment on the performance of the company based on the movement of its share price over the last five years. (2 marks)

**(Total: 20 marks)**

**QUESTION FIVE**

(a) Simon Mwakirungo is an investment manager of Heko Investment Ltd. Simon manages portfolio of three investors; Paul Wafula, Stephen Nabukwesi and Solomon Njoroge. Paul, Stephen and Solomon has risk aversion coefficient of 1, 0 and –1 respectively.

**Required:**

Identify the risk category of each investor, giving **ONE** reason. (6 marks)



(b) James Mwathi is a market timer who makes monthly asset allocation decisions. His decisions are based on his forecast of the direction of the market. James Mwathi's forecast are right 72% of the time. James normally constructs unconstrained portfolio.

**Required:**

The information ratio for James Mwathi. (4 marks)

(c) The following information is available for Milele fund for the year 2021:

1. On 1 January 2021, Milele fund had a market value of Sh.100 million.
2. During the period, 1 January 2021 to 30 April 2021, the stock in the fund showed a capital gain of Sh.10 million.
3. On 1 May 2021, the stocks in the fund paid a total dividend of Sh.2 million. All dividends were reinvested in additional shares.
4. As the fund performance has been exceptional, investors invested an additional Sh.20 million in the fund on 1 May 2021.
5. On 31 December 2021, the fund received total dividends of Sh.2.64 million. The fund's market value on 31 December 2021, not including the Sh.2.64 million in dividends was Sh.140 million.
6. The fund made no other interim cash payments during the year 2021.

**Required:**

Calculate:

(i) The time weighted rate of return (TWRR). (4 marks)

(ii) The money weighted rate of return (MWRR). (4 marks)

(iii) Outline **TWO** differences between time weighted rate of return and money weighted rate of return. (2 marks)

**(Total: 20 marks)**

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**CIFA INTERMEDIATE LEVEL**

**PILOT PAPER**

**PORTFOLIO MANAGEMENT**

**December 2021.** **Time Allowed: 3 hours.**

**Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings.**

**QUESTION ONE**

(a) Stanley Oloo observes the strong demand for online cashless transactions being offered by Fahari Ltd. and wants to invest in the company's shares. Unfortunately, Stanley Oloo doesn't know the return he should expect from his investment. He has been given a risk-free rate of 3%, a market return of 10%, and company's beta of 1.5.

**Required:**

(i) The expected return of the company. (5 marks)

(ii) An analyst looking at the same information decides that the past performance of Fahari Ltd. is not representative of its future performance. He decides that, given the increase in Fahari Ltd's. Market capitalization, Fahari Ltd. acts much more like the market than before and thinks Fahari Ltd.'s beta should be closer to 1.1. What is the analyst's expected return for Fahari Ltd.'s shares? (5 marks)

(b) Describe three considerations that a well-conceived investment policy statement should specify. (5 marks)

(c) Discuss the relationship between stock prices and investors' beliefs about the business cycle. (5 marks)

**(Total: 20 marks)**

**QUESTION TWO**

(a) What are some of the important prerequisites to investing? (5 marks)

(b) Describe the major differences between individual and institutional investors. (5 marks)

(c) Africa Natural Resources (ANR), a Kenyan listed mining company, buys a large but privately held mining company in Rwanda. As a result of the cross-border acquisition of a private company, ANR's standard deviation of returns is reduced from 50% to 30% and its correlation with the market falls from 0.95 to 0.75. Assume that the standard deviation and return of the market remain unchanged at 25% and 10%, respectively, and that the risk-free rate is 3%.

**Required:**

(i) Calculate the beta of ANR stock and its expected return before the acquisition. (5 marks)

(ii) Calculate the expected return after the acquisition. (5 marks)

**(Total: 20 marks)**

**QUESTION THREE**

Kamau and his wife, Awino, are planning for retirement and want to compare the past performance of a few mutual funds they are considering for investment. They believe that a comparison over a five-year period would be appropriate. They are given the following information about the Nairobi Valley Superior Fund that they are considering.

| Year | Assets Under Management at the Beginning of Year | Net Return |
|---|---|---|
| 1 | 30 million | 15% |
| 2 | 45 million | –5% |
| 3 | 20 million | 10% |
| 4 | 25 million | 15% |
| 5 | 35 million | 3% |

The Kamau's are interested in aggregating this information for ease of comparison with other funds.

(i) Compute the holding period return for the five-year period. (5 marks)

(ii) Compute the arithmetic mean annual return. (5 marks)

(iii) Compute the geometric mean annual return. How does it compare with the arithmetic mean annual return? (5 marks)

(iv) The Kamau's want to earn a minimum annual return of 5%. Is the money weighted annual return greater than 5%? (5 marks)

**(Total: 20 marks)**

**QUESTION FOUR**

(a) Fixed weightings, flexible weightings, and tactical asset allocation are three approaches to asset allocation. Compare and contrast these three different approaches. (5 marks)

(b) Explain the concept of bond immunization and the benefits derived from using this technique. (5 marks)

(c) Explain the basic concept of bond duration and why this measure is meaningful to investors. (5 marks)

(d) Discuss at least three differences between investing in stocks and investing in bonds. (5 marks)

**(Total: 20 marks)**

**QUESTION FIVE**

(a) Briefly explain the holding period return (HPR) and give several characteristics of this measure. (5 marks)

(b) Which type of risks cannot be avoided by carefully researching a company's business prospects and financial statements? (5 marks)

(c) Explain the relationship between risk, the expected rate of return and the actual rate of return. (5 marks)

(d) Explain the relationship between correlation, diversification, and risk reduction. (5 marks)

**(Total: 20 marks)**

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**CIFA INTERMEDIATE LEVEL**

**PORTFOLIO MANAGEMENT**

**TUESDAY: 2 August 2022. Morning paper.** **Time Allowed: 3 hours.**

**Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings. Do NOT write anything on this paper.**

**QUESTION ONE**

(a) Explain four benefits of having a well written investment policy statement (IPS) in portfolio management. (4 marks)

(b) Propose three actions that the chairman of an investment committee could implement in order to improve its effectiveness. (3 marks)

(c) Explain three determinants of required rate of return of an investment. (6 marks)

(d) Perigon Investment firm employs different financial analysts who devise and implement various trading strategies. Martin Biko, a portfolio manager at the firm is trying to evaluate three trading strategies that have been used for different periods of time by three financial analysts as follows:

- Kepha believes that he can predict share price movements based on earnings announcements. In the last 100 days, he has earned a return of 6.2%.
- Thomas has been very successful in predicting daily movements of the Kenya Shillings and the US dollar based on carry trade. In the last four weeks, he has earned 2% after accounting for all transaction costs.
- Lisa follows the fashion industry and luxury retailers. She has been investing in these companies for the last three months. Her return is 5%.

Assume that a year has 365 days or 52 weeks.

**Required:**

(i) Annual rate of return for Kepha. (2 marks)

(ii) Annual rate of return for Thomas. (2 marks)

(iii) Annual rate of return for Lisa. (2 marks)

(iv) Advise Martin Biko on the best performing financial analyst. (1 mark)

**(Total: 20 marks)**

**QUESTION TWO**

(a) Outline two consequences of the confirmation bias in the financial markets. (2 marks)

(b) Describe five investor personality types as postulated by Bailard, Biehl and Kaiser Five Way Model. (5 marks)

(c) In the context of behavioural finance, discuss two heuristic driven biases that impair judgement of the investors when considering investment opportunities. (4 marks)

(d) You are provided with the following expected return vector and variance-covariance matrix for three assets, A, B and C held by Nancy Wamuyu:

$$\text{Expected return vector (\%)} = \begin{matrix} A \\ B \\ C \end{matrix} \begin{pmatrix} 10.1 \\ 7.8 \\ 5.0 \end{pmatrix} \quad \text{Variance covariance matrix} = \begin{matrix} \\ A \\ B \\ C \end{matrix} \begin{matrix} \begin{matrix} A & B & C \end{matrix} \\ \begin{pmatrix} 210 & 60 & 0 \\ 60 & 90 & 0 \\ 0 & 0 & 0 \end{pmatrix} \end{matrix}$$

Nancy Wamuyu's risky portfolio is split equally 50 – 50 between the two risky assets.

**Required:**

(i) Identify the risk free asset. Give a reason for your answer. (2 marks)

(ii) Compute the expected return and standard deviation of the portfolio. (4 marks)

(iii) Given that the weight of the risk free asset is 25%, compute the portfolio expected return and portfolio standard deviation. (3 marks)

**(Total: 20 marks)**

**QUESTION THREE**

(a) Outline five assumptions of the Markowitz Portfolio Theory. (5 marks)

(b) Describe three reasons why domestic investors should consider constructing global investment portfolio. (3 marks)

(c) The monthly total returns for NSE (the stock market index) and MSC, a listed company are presented below:

| | Return (%) | |
|---|---|---|
| **Date** | **NSE** | **MSC** |
| January | – 4.96 | – 0.70 |
| February | – 0.13 | – 6.99 |
| March | 6.78 | 8.55 |
| April | 0.39 | – 9.70 |
| May | 1.80 | 7.03 |
| June | 0.26 | – 3.45 |
| July | 3.69 | 10.77 |
| August | 0.14 | 2.01 |
| September | 0.02 | 0.24 |
| October | – 1.82 | 4.03 |
| November | 3.70 | 1.23 |
| December | 1.97 | 3.12 |



The returns are computed using month end closing prices and includes dividend payment.

**Required:**

Calculate the following:

(i) Standard deviation of MSC. (3 marks)

(ii) Standard deviation of NSE. (3 marks)

(iii) Correlation coefficient of MSC and NSE index. (2 marks)

(iv) The beta for MSC. (2 marks)

(v) The intercept between MSC and the NSE index. (2 marks)

**(Total: 20 marks)**

**QUESTION FOUR**

(a) Describe three document classification systems as used in portfolio management. (6 marks)

(b) Pamela Mboya claims that her information coefficient is 0.20 on monthly bets on 10 stocks in the banking industry. Her bets have a correlation coefficient of 0.45 as opposed to being truly independent.

**Required:**

(i) Information ratio assuming independent bets. (3 marks)

(ii) Information ratio if bets are correlated. (3 marks)

(iii) Reduction in the information ratio. (2 marks)

(c) Private wealth managers leverage their expectation in various fields to help high network individuals (HNI) manage their wealth effectively.

**Required:**
In relation to the above statement, discuss three major services offered by private wealth management firms.
(6 marks)
**(Total: 20 marks)**

**QUESTION FIVE**

(a) Assess three factors that could affect the extent of asset allocation when constructing a portfolio for an individual investor. (6 marks)

(b) Tropical Limited's share is expected to increase in value from Sh.50 to Sh.100 over a five year period. The applicable capital gain tax rate is 5%.

**Required:**
Calculate the expected after tax value of the share in five years. (2 marks)

(c) Simon Njoroge invests Sh.1,500,000 in a tax deferred account (TDA). The pretax return is 11% and the tax rate is 15%.

**Required:**
Determine the after tax balance in the account after 20 years. (2 marks)

(d) Outline four principles of an effective risk management in relation to portfolio management. (4 marks)

(e) Simon Mwakirunge has a portfolio of shares whose market value is Sh.10 million. He performed a Monte Carlo simulation to estimate the value at risk (VaR) for his portfolio. He chose to perform this simulation using a normal distribution of returns for the portfolio, with an expected annual return of 14.8% and a standard deviation of 20.5%. He generated 700 random outcomes of annual return for this portfolio of which the worst 40 outcomes are given below.

| | | | |
|---|---|---|---|
| – 0.400 | – 0.320 | – 0.295 | – 0.247 |
| – 0.398 | – 0.316 | – 0.282 | – 0.233 |
| – 0.397 | – 0.314 | – 0.277 | – 0.229 |
| – 0.390 | – 0.310 | – 0.273 | – 0.226 |
| – 0.355 | – 0.303 | – 0.273 | – 0.223 |
| – 0.350 | – 0.301 | – 0.261 | – 0.222 |
| – 0.347 | – 0.301 | – 0.259 | – 0.218 |
| – 0.344 | – 0.300 | – 0.253 | – 0.216 |
| – 0.343 | – 0.298 | – 0.251 | – 0.215 |
| – 0.333 | – 0.296 | – 0.248 | – 0.211 |

The outcomes have been ranked from the highest loss of Sh. – 0.400 to the lowest loss of Sh. – 0.211.

**Required:**
Using the above information, compute the following:

(i) 5 per cent annual VaR. (3 marks)

(ii) 1 per cent annual VaR. (3 marks)
**(Total: 20 marks)**

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**CIFA INTERMEDIATE LEVEL**

**PORTFOLIO MANAGEMENT**

**MONDAY: 4 April 2022. Morning paper.** **Time Allowed: 3 hours.**

**Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings. Do NOT write anything on this paper.**

**QUESTION ONE**

(a) Discuss four stages of the portfolio management process. (8 marks)

(b) In relation to Capital Market Theory:

(i) Describe three assumptions of the Arbitrage Pricing Theory (APT). (3 marks)

(ii) Highlight three uses of multifactor models in portfolio management. (3 marks)

(c) An investor holds the following portfolio:

| Share/Bond | Beta | Initial price Sh. | Dividends/interest Sh. | Market price at end of year Sh. |
|---|---|---|---|---|
| Equitrust | 0.8 | 25 | 2 | 50 |
| Standard | 0.7 | 35 | 2 | 60 |
| Horizon | 0.5 | 45 | 2 | 135 |
| Government Bond | 0.99 | 1,000 | 140 | 1,005 |

**Required:**

The average return of the portfolio given a risk free rate of 14%. (6 marks)

**(Total: 20 marks)**

**QUESTION TWO**

(a) Jane Kisire has an investment portfolio worth Sh.5 million. She is 68 years old, retired and has no children. After her death, she wishes to leave her portfolio to a local play theatre that has given her relatively free access to play performance over the past decade. Her health is better than average and she maintains an active lifestyle consisting of frequent swimming, biking and hiking. She estimates that to maintain her standard of living, she needs approximately Sh.500,000 per year. Expenses are expected to grow at an expected inflation rate of 5%. She states that as a retiree, her tolerance for risk is "below average".

**Required:**

(i) Determine the investor's return objective. (2 marks)

(ii) Discuss the investor's ability to take risk. (2 marks)

(iii) Explain the time horizon and liquidity constraints for the investor. (3 marks)

(b) Reno Management Company has availed you the following information regarding an investment being considered by one of their clients:

| Period | 1 January Sh. | 31 December Sh. | Holding period returns | Holding period yields |
|---|---|---|---|---|
| 2019 | 100.00 | 115.00 | 1.15 | 0.15 |
| 2020 | 115.00 | 138.00 | 1.20 | 0.20 |
| 2021 | 138.00 | 110.40 | 0.80 | -0.20 |

**Required:**

(i) Compute the arithmetic mean (AM) and the geometric mean (GM). (4 marks)

(ii) Give a reason why GM is considered a more superior measure than AM. (1 mark)

(c) An investor is considering three assets, Q, R and S to include in a portfolio. He is intending to invest different amounts of money in each asset since he has been informed that the expected returns and risks for each security are different as shown below:

| Security | Q | R | S |
|---|---|---|---|
| Amount invested | Sh.40,000 | Sh.25,000 | Sh.35,000 |
| Expected returns | 11% | 25% | 30% |
| Standard deviation | 15% | 20% | 25% |

In addition to the above information, the correlation between the securities is as follows:

1. Q and R = 0.30
2. Q and S = 0.10
3. R and S = 0.50

**Required:**

(i) Determine the covariances of securities Q and R, Q and S and R and S. (4 marks)

(ii) The portfolio risk based on Markowitz model. (4 marks)

**(Total: 20 marks)**

**QUESTION THREE**

(a) In the investment sector, requirement and importance of documentation cannot be overemphasised as they form the backbone on which solid contracts are sealed.

In relation to the above statement, evaluate the rationale of internal and external documents within the investment industry and for each category, give suitable examples that are applicable in your country. (4 marks)

(b) The following information relates to the performance of three portfolios; X, Y and Z during the year ended 31 December 2021:

| Portfolio | Average return (%) | Standard deviation (%) | Covariance of portfolio returns with market returns |
|---|---|---|---|
| X | 17.55 | 30 | 0.0088 |
| Y | 13.26 | 34 | 0.0750 |
| Z | 9.34 | 28 | 0.0021 |

**Additional information:**

1. The market return and the risk-free rate averaged 14% and 7% respectively during the year ended 31 December 2021.
2. The standard deviation of the market return is 10%.

**Required:**

Evaluate the performance of the three portfolios using:

(i) Sharpe's performance measure. (3 marks)

(ii) Treynor's performance measure. (3 marks)

(c) The following information relates to four individual securities whose active returns are uncorrelated with other and forecasts are independent from year to year:

| Security | Expected active return (%) | Active return volatility (%) | Active weight (%) |
|---|---|---|---|
| A | 5 | 25 | 16 |
| B | 10 | 50 | 7 |
| C | -5 | 25 | -16 |
| D | -10 | 50 | -7 |

**Additional information:**

1. The benchmark portfolio for these four securities is equally weighted.
2. The forecasted return on the benchmark portfolio is 10%.

**Required:**

(i) Calculate the portfolio weights and total expected returns of each of the four securities. (4 marks)

(ii) Determine the total return and active return of the managed portfolio. (2 marks)

(iii) Evaluate the active risk of managed portfolio. (2 marks)

(iv) Given the information coefficient of 0.20, a breadth of 4 and active risk of 7.5%, determine the information ratio (IR) using the law of active management. (2 marks)

**(Total: 20 marks)**

**QUESTION FOUR**

(a) With respect to behavioural finance, explain the following terminologies as they impact making portfolio decisions:

(i) Overconfidence bias. (2 marks)

(ii) Belief perseverance bias. (2 marks)

(iii) Regret avoidance bias. (2 marks)

(iv) Explain four strategies that a portfolio manager could employ in order to overcome psychological biases in (a) (i) to (iii) above. (4 marks)



(b) Explain the following fintech terms as used in investment management:

(i) Text analytics and natural language processing. (1 mark)

(ii) High frequency trading. (1 mark)

(iii) Distributed ledger technology. (1 mark)

(iv) Cryptocurrency. (1 mark)

(c) The following information relates to a portfolio that is invested 60% in Security A and 40% in Security B:

| Security | Standard deviation of daily returns | Mean daily return | Covariance of daily returns |
|---|---|---|---|
| Security A | 0.0158 | 0.0004 | 0.000106 |
| Security B | 0.0112 | 0.0003 | 0.000106 |

There are 250 tradings in a year, and the portfolio has a value of Sh.10 million.

The following standard deviation are made available:

| | |
|---|---|
| 5% | 1.65 |
| 1% | 2.31 |

**Required:**

Calculate the 5% annual value at risk (VaR). (6 marks)

**(Total: 20 marks)**

**QUESTION FIVE**

(a) Summarise four differences between "securities market line (SML)" and "capital market line (CML)". (4 marks)

(b) Explain the following terms as used in the fundamental law of active management:

(i) Information Coefficient (IC). (1 mark)

(ii) Breath. (1 mark)

(iii) Transfer Coefficient (TC). (1 mark)

(iv) Active risk. (1 mark)

(c) In relation to private wealth management:

(i) Explain the term "estate planning" (2 marks)

(ii) Differentiate between a "revocable trust" and an "irrevocable trust". (2 marks)

(d) Josephat Musyoka is determining the impact of taxes on his expected investment returns and wealth accumulations. Musyoka's applicable tax jurisdiction requires a flat tax rate of 20% which applies to all types of income and is taxed annually. Musyoka expects a 7% per year return on his investment over a 20 year time horizon and his initial portfolio value is set at Sh.100,000.

**Required:**

(i) Evaluate Musyoka's expected wealth at the end of 20 years. (2 marks)

(ii) Calculate the tax drag in percentage terms. (2 marks)

(iii) If the return comes in form of deferred capital gains tax affected at the end of the investment horizon, evaluate Musyoka's expected wealth after 20 years. (2 marks)

(iv) Musyoka has a current investment with market value of Sh.100,000 and a cost of Sh.80,000. Evaluate Musyoka's expected wealth after 20 years. (2 marks)

**(Total: 20 marks)**

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Present Value Interest factor of 1 Received at the End of *n* Periods at r Percent:

$$PVIF_{r,n} = 1 / (1+r)^{n} = (1+r)^{-n}$$

| Period | 1% | 2% | 3% | 4% | 5% | 6% | 7% | 8% | 9% | 10% | 11% | 12% | 13% | 14% | 15% | 16% | 20% | 24% | 25% | 30% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.9901 | 0.9804 | 0.9709 | 0.9615 | 0.9524 | 0.9434 | 0.9346 | 0.9259 | 0.9174 | 0.9091 | 0.9009 | 0.8929 | 0.8850 | 0.8772 | 0.8696 | 0.8621 | 0.8333 | 0.8065 | 0.8000 | 0.7692 |
| 2 | 0.9803 | 0.9612 | 0.9426 | 0.9246 | 0.9070 | 0.8900 | 0.8734 | 0.8573 | 0.8417 | 0.8264 | 0.8116 | 0.7972 | 0.7831 | 0.7695 | 0.7561 | 0.7432 | 0.6944 | 0.6504 | 0.6400 | 0.5917 |
| 3 | 0.9706 | 0.9423 | 0.9151 | 0.8890 | 0.8638 | 0.8396 | 0.8163 | 0.7938 | 0.7722 | 0.7513 | 0.7312 | 0.7118 | 0.6931 | 0.6750 | 0.6575 | 0.6407 | 0.5787 | 0.5245 | 0.5120 | 0.4552 |
| 4 | 0.9610 | 0.9238 | 0.8885 | 0.8548 | 0.8227 | 0.7921 | 0.7629 | 0.7350 | 0.7084 | 0.6830 | 0.6587 | 0.6355 | 0.6133 | 0.5921 | 0.5718 | 0.5523 | 0.4823 | 0.4230 | 0.4096 | 0.3501 |
| 5 | 0.9515 | 0.9057 | 0.8626 | 0.8219 | 0.7835 | 0.7473 | 0.7130 | 0.6806 | 0.6499 | 0.6209 | 0.5935 | 0.5674 | 0.5428 | 0.5194 | 0.4972 | 0.4761 | 0.4019 | 0.3411 | 0.3277 | 0.2693 |
| 6 | | | | | | | | | | | | | | | | | | | | |
| 7 | 0.9420 | 0.8880 | 0.8375 | 0.7903 | 0.7462 | 0.7050 | 0.6663 | 0.6302 | 0.5963 | 0.5645 | 0.5346 | 0.5066 | 0.4803 | 0.4556 | 0.4323 | 0.4104 | 0.3349 | 0.2751 | 0.2621 | 0.2072 |
| 8 | 0.9327 | 0.8706 | 0.8131 | 0.7599 | 0.7107 | 0.6651 | 0.6227 | 0.5835 | 0.5470 | 0.5132 | 0.4817 | 0.4523 | 0.4251 | 0.3996 | 0.3759 | 0.3538 | 0.2791 | 0.2218 | 0.2097 | 0.1594 |
| 9 | 0.9235 | 0.8535 | 0.7894 | 0.7307 | 0.6768 | 0.6274 | 0.5820 | 0.5403 | 0.5019 | 0.4665 | 0.4339 | 0.4039 | 0.3762 | 0.3506 | 0.3269 | 0.3050 | 0.2326 | 0.1789 | 0.1678 | 0.1226 |
| 10 | 0.9143 | 0.8368 | 0.7664 | 0.7026 | 0.6446 | 0.5919 | 0.5439 | 0.5002 | 0.4604 | 0.4241 | 0.3909 | 0.3606 | 0.3329 | 0.3075 | 0.2843 | 0.2630 | 0.1938 | 0.1443 | 0.1342 | 0.0943 |
| 11 | 0.9053 | 0.8203 | 0.7441 | 0.6756 | 0.6139 | 0.5584 | 0.5083 | 0.4632 | 0.4224 | 0.3855 | 0.3522 | 0.3220 | 0.2946 | 0.2697 | 0.2472 | 0.2267 | 0.1615 | 0.1164 | 0.1074 | 0.0725 |
| 12 | | | | | | | | | | | | | | | | | | | | |
| 13 | 0.8963 | 0.8043 | 0.7224 | 0.6496 | 0.5847 | 0.5268 | 0.4751 | 0.4289 | 0.3875 | 0.3505 | 0.3173 | 0.2875 | 0.2607 | 0.2366 | 0.2149 | 0.1954 | 0.1346 | 0.0938 | 0.0859 | 0.0558 |
| 14 | 0.8874 | 0.7885 | 0.7014 | 0.6246 | 0.5568 | 0.4970 | 0.4440 | 0.3971 | 0.3555 | 0.3186 | 0.2858 | 0.2567 | 0.2307 | 0.2076 | 0.1869 | 0.1685 | 0.1122 | 0.0757 | 0.0687 | 0.0429 |
| 15 | 0.8787 | 0.7730 | 0.6810 | 0.6006 | 0.5303 | 0.4688 | 0.4150 | 0.3677 | 0.3262 | 0.2897 | 0.2575 | 0.2292 | 0.2042 | 0.1821 | 0.1625 | 0.1452 | 0.0935 | 0.0610 | 0.0550 | 0.0330 |
| 16 | 0.8700 | 0.7579 | 0.6611 | 0.5775 | 0.5051 | 0.4423 | 0.3878 | 0.3405 | 0.2992 | 0.2633 | 0.2320 | 0.2046 | 0.1807 | 0.1597 | 0.1413 | 0.1252 | 0.0779 | 0.0492 | 0.0440 | 0.0254 |
| 17 | 0.8613 | 0.7430 | 0.6419 | 0.5553 | 0.4810 | 0.4173 | 0.3624 | 0.3152 | 0.2745 | 0.2394 | 0.2090 | 0.1827 | 0.1599 | 0.1401 | 0.1229 | 0.1079 | 0.0649 | 0.0397 | 0.0352 | 0.0195 |
| 18 | | | | | | | | | | | | | | | | | | | | |
| 19 | 0.8528 | 0.7284 | 0.6232 | 0.5339 | 0.4581 | 0.3936 | 0.3387 | 0.2919 | 0.2519 | 0.2176 | 0.1883 | 0.1631 | 0.1415 | 0.1229 | 0.1069 | 0.0930 | 0.0541 | 0.0320 | 0.0281 | 0.0150 |
| 20 | 0.8444 | 0.7142 | 0.6050 | 0.5134 | 0.4363 | 0.3714 | 0.3166 | 0.2703 | 0.2311 | 0.1978 | 0.1696 | 0.1456 | 0.1252 | 0.1078 | 0.0929 | 0.0802 | 0.0451 | 0.0258 | 0.0225 | 0.0116 |
| 21 | 0.8360 | 0.7002 | 0.5874 | 0.4936 | 0.4155 | 0.3503 | 0.2959 | 0.2502 | 0.2120 | 0.1799 | 0.1528 | 0.1300 | 0.1108 | 0.0946 | 0.0808 | 0.0691 | 0.0376 | 0.0208 | 0.0180 | 0.0089 |
| 22 | 0.8277 | 0.6864 | 0.5703 | 0.4746 | 0.3957 | 0.3305 | 0.2765 | 0.2317 | 0.1945 | 0.1635 | 0.1377 | 0.1161 | 0.0981 | 0.0829 | 0.0703 | 0.0596 | 0.0313 | 0.0168 | 0.0144 | 0.0068 |
| 23 | 0.8195 | 0.6730 | 0.5537 | 0.4564 | 0.3769 | 0.3118 | 0.2584 | 0.2145 | 0.1784 | 0.1486 | 0.1240 | 0.1037 | 0.0868 | 0.0728 | 0.0611 | 0.0514 | 0.0261 | 0.0135 | 0.0115 | 0.0053 |
| 24 | | | | | | | | | | | | | | | | | | | | |
| 25 | 0.8114 | 0.6598 | 0.5375 | 0.4388 | 0.3589 | 0.2942 | 0.2415 | 0.1987 | 0.1637 | 0.1351 | 0.1117 | 0.0926 | 0.0768 | 0.0638 | 0.0531 | 0.0443 | 0.0217 | 0.0109 | 0.0092 | 0.0040 |
| 26 | 0.8034 | 0.6468 | 0.5219 | 0.4220 | 0.3418 | 0.2775 | 0.2257 | 0.1839 | 0.1502 | 0.1228 | 0.1007 | 0.0826 | 0.0680 | 0.0560 | 0.0462 | 0.0382 | 0.0181 | 0.0088 | 0.0074 | 0.0031 |
| 27 | 0.7954 | 0.6342 | 0.5067 | 0.4057 | 0.3256 | 0.2618 | 0.2109 | 0.1703 | 0.1378 | 0.1117 | 0.0907 | 0.0738 | 0.0601 | 0.0491 | 0.0402 | 0.0329 | 0.0151 | 0.0071 | 0.0059 | 0.0024 |
| 28 | 0.7876 | 0.6217 | 0.4919 | 0.3901 | 0.3101 | 0.2470 | 0.1971 | 0.1577 | 0.1264 | 0.1015 | 0.0817 | 0.0659 | 0.0532 | 0.0431 | 0.0349 | 0.0284 | 0.0126 | 0.0057 | 0.0047 | 0.0018 |
| 29 | 0.7798 | 0.6095 | 0.4776 | 0.3751 | 0.2953 | 0.2330 | 0.1842 | 0.1460 | 0.1160 | 0.0923 | 0.0736 | 0.0588 | 0.0471 | 0.0378 | 0.0304 | 0.0245 | 0.0105 | 0.0048 | 0.0038 | 0.0014 |
| 30 | | | | | | | | | | | | | | | | | | | | |
| 31 | 0.7419 | 0.5521 | 0.4120 | 0.3083 | 0.2314 | 0.1741 | 0.1314 | 0.0994 | 0.0754 | 0.0573 | 0.0437 | 0.0334 | 0.0256 | 0.0196 | 0.0151 | 0.0116 | 0.0042 | 0.0018 | 0.0012 | * |
| 35 | 0.7059 | 0.5000 | 0.3554 | 0.2534 | 0.1813 | 0.1301 | 0.0937 | 0.0676 | 0.0490 | 0.0356 | 0.0259 | 0.0189 | 0.0139 | 0.0102 | 0.0075 | 0.0055 | 0.0017 | 0.0005 | * | * |
| 36 | 0.6989 | 0.4902 | 0.3450 | 0.2437 | 0.1727 | 0.1227 | 0.0875 | 0.0626 | 0.0449 | 0.0323 | 0.0234 | 0.0169 | 0.0123 | 0.0089 | 0.0065 | 0.0048 | 0.0014 | * | * | * |
| 40 | 0.6717 | 0.4529 | 0.3066 | 0.2083 | 0.1420 | 0.0972 | 0.0668 | 0.0460 | 0.0318 | 0.0221 | 0.0154 | 0.0107 | 0.0075 | 0.0053 | 0.0037 | 0.0026 | 0.0007 | * | * | * |
| 45 | 0.6080 | 0.3715 | 0.2281 | 0.1407 | 0.0872 | 0.0543 | 0.0339 | 0.0213 | 0.0134 | 0.0085 | 0.0054 | 0.0035 | 0.0022 | 0.0014 | 0.0009 | 0.0006 | * | * | * | * |
| 50 | 0.6080 | 0.3715 | 0.2281 | 0.1407 | 0.0872 | 0.0543 | 0.0339 | 0.0213 | 0.0134 | 0.0085 | 0.0054 | 0.0035 | 0.0022 | 0.0014 | 0.0009 | 0.0006 | * | * | * | * |



Present Value Interest factors for Annuity of 1 Discounted at r Percent for *n* Periods:

$$PVIFA_{r,n} = [1 - 1/(1+r)^{n}]/r$$

| Period | 1% | 2% | 3% | 4% | 5% | 6% | 7% | 8% | 9% | 10% | 11% | 12% | 13% | 14% | 15% | 16% | 20% | 24% | 25% | 30% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.9901 | 0.9804 | 0.9709 | 0.9615 | 0.9524 | 0.9434 | 0.9346 | 0.9259 | 0.9174 | 0.9091 | 0.9009 | 0.8929 | 0.8850 | 0.8772 | 0.8696 | 0.8621 | 0.8333 | 0.8065 | 0.8000 | 0.7692 |
| 2 | 1.9704 | 1.9416 | 1.9135 | 1.8861 | 1.8594 | 1.8334 | 1.8080 | 1.7833 | 1.7591 | 1.7355 | 1.7125 | 1.6901 | 1.6681 | 1.6467 | 1.6257 | 1.6052 | 1.5278 | 1.4568 | 1.4400 | 1.3609 |
| 3 | 2.9410 | 2.8839 | 2.8286 | 2.7751 | 2.7232 | 2.6730 | 2.6243 | 2.5771 | 2.5313 | 2.4869 | 2.4437 | 2.4018 | 2.3612 | 2.3216 | 2.2832 | 2.2459 | 2.1065 | 1.9813 | 1.9520 | 1.8161 |
| 4 | 3.9020 | 3.8077 | 3.7171 | 3.6299 | 3.5460 | 3.4651 | 3.3872 | 3.3121 | 3.2397 | 3.1699 | 3.1024 | 3.0373 | 2.9745 | 2.9137 | 2.8550 | 2.7982 | 2.5887 | 2.4043 | 2.3616 | 2.1662 |
| 5 | 4.8534 | 4.7135 | 4.5797 | 4.4518 | 4.3295 | 4.2124 | 4.1002 | 3.9927 | 3.8897 | 3.7908 | 3.6959 | 3.6048 | 3.5172 | 3.4331 | 3.3522 | 3.2743 | 2.9906 | 2.7454 | 2.6893 | 2.4356 |
| 6 | | | | | | | | | | | | | | | | | | | | |
| 7 | 5.7955 | 5.6014 | 5.4172 | 5.2421 | 5.0757 | 4.9173 | 4.7665 | 4.6229 | 4.4859 | 4.3553 | 4.2305 | 4.1114 | 3.9975 | 3.8887 | 3.7845 | 3.6847 | 3.3255 | 3.0205 | 2.9514 | 2.6427 |
| 8 | 6.7282 | 6.4720 | 6.2303 | 6.0021 | 5.7864 | 5.5824 | 5.3893 | 5.2064 | 5.0330 | 4.8684 | 4.7122 | 4.5638 | 4.4226 | 4.2883 | 4.1604 | 4.0386 | 3.6046 | 3.2423 | 3.1611 | 2.8021 |
| 9 | 7.6517 | 7.3255 | 7.0197 | 6.7327 | 6.4632 | 6.2098 | 5.9713 | 5.7466 | 5.5348 | 5.3349 | 5.1461 | 4.9676 | 4.7988 | 4.6389 | 4.4873 | 4.3436 | 3.8372 | 3.4212 | 3.3289 | 2.9247 |
| 10 | 8.5660 | 8.1622 | 7.7861 | 7.4353 | 7.1078 | 6.8017 | 6.5152 | 6.2469 | 5.9952 | 5.7590 | 5.5370 | 5.3282 | 5.1317 | 4.9464 | 4.7716 | 4.6065 | 4.0310 | 3.5655 | 3.4631 | 3.0190 |
| 11 | 9.4713 | 8.9826 | 8.5302 | 8.1109 | 7.7217 | 7.3601 | 7.0236 | 6.7101 | 6.4177 | 6.1446 | 5.8892 | 5.6502 | 5.4262 | 5.2161 | 5.0188 | 4.8332 | 4.1925 | 3.6819 | 3.5705 | 3.0915 |
| 12 | | | | | | | | | | | | | | | | | | | | |
| 13 | 10.368 | 9.7868 | 9.2526 | 8.7605 | 8.3064 | 7.8869 | 7.4987 | 7.1390 | 6.8052 | 6.4951 | 6.2065 | 5.9377 | 5.6869 | 5.4527 | 5.2337 | 5.0286 | 4.3271 | 3.7757 | 3.6564 | 3.1473 |
| 14 | 11.255 | 10.575 | 9.9540 | 9.3851 | 8.8633 | 8.3838 | 7.9427 | 7.5361 | 7.1607 | 6.8137 | 6.4924 | 6.1944 | 5.9176 | 5.6603 | 5.4206 | 5.1971 | 4.4392 | 3.8514 | 3.7251 | 3.1903 |
| 15 | 12.134 | 11.348 | 10.635 | 9.9856 | 9.3936 | 8.8527 | 8.3577 | 7.9038 | 7.4869 | 7.1034 | 6.7499 | 6.4235 | 6.1218 | 5.8424 | 5.5831 | 5.3423 | 4.5327 | 3.9124 | 3.7801 | 3.2233 |
| 16 | 13.004 | 12.106 | 11.296 | 10.563 | 9.8986 | 9.2950 | 8.7455 | 8.2442 | 7.7862 | 7.3667 | 6.9819 | 6.6282 | 6.3025 | 6.0021 | 5.7245 | 5.4675 | 4.6106 | 3.9616 | 3.8241 | 3.2487 |
| 17 | 13.865 | 12.849 | 11.938 | 11.118 | 10.380 | 9.7122 | 9.1079 | 8.5595 | 8.0607 | 7.6061 | 7.1909 | 6.8109 | 6.4624 | 6.1422 | 5.8474 | 5.5755 | 4.6755 | 4.0013 | 3.8593 | 3.2682 |
| 18 | | | | | | | | | | | | | | | | | | | | |
| 19 | 14.718 | 13.578 | 12.561 | 11.652 | 10.838 | 10.106 | 9.4466 | 8.8514 | 8.3126 | 7.8237 | 7.3792 | 6.9740 | 6.6039 | 6.2651 | 5.9542 | 5.6685 | 4.7296 | 4.0333 | 3.8874 | 3.2832 |
| 20 | 15.562 | 14.292 | 13.166 | 12.166 | 11.274 | 10.477 | 9.7632 | 9.1216 | 8.5436 | 8.0216 | 7.5488 | 7.1196 | 6.7291 | 6.3729 | 6.0472 | 5.7487 | 4.7746 | 4.0591 | 3.9099 | 3.2948 |
| 21 | 16.398 | 14.992 | 13.754 | 12.659 | 11.690 | 10.828 | 10.059 | 9.3719 | 8.7556 | 8.2014 | 7.7016 | 7.2497 | 6.8399 | 6.4674 | 6.1280 | 5.8178 | 4.8122 | 4.0799 | 3.9279 | 3.3037 |
| 22 | 17.226 | 15.678 | 14.324 | 13.134 | 12.085 | 11.158 | 10.336 | 9.6036 | 8.9501 | 8.3649 | 7.8393 | 7.3658 | 6.9380 | 6.5504 | 6.1982 | 5.8775 | 4.8435 | 4.0967 | 3.9424 | 3.3105 |
| 23 | 18.046 | 16.351 | 14.877 | 13.598 | 12.462 | 11.470 | 10.594 | 9.8181 | 9.1285 | 8.5136 | 7.9633 | 7.4694 | 7.0248 | 6.6231 | 6.2593 | 5.9288 | 4.8696 | 4.1103 | 3.9539 | 3.3158 |
| 24 | | | | | | | | | | | | | | | | | | | | |
| 25 | 18.857 | 17.011 | 15.415 | 14.029 | 12.821 | 11.764 | 10.836 | 10.017 | 9.2922 | 8.6487 | 8.0751 | 7.5620 | 7.1016 | 6.6870 | 6.3125 | 5.9731 | 4.8913 | 4.1212 | 3.9631 | 3.3198 |
| 26 | 19.660 | 17.658 | 15.937 | 14.451 | 13.163 | 12.042 | 11.061 | 10.201 | 9.4424 | 8.7715 | 8.1757 | 7.6446 | 7.1695 | 6.7429 | 6.3587 | 6.0113 | 4.9094 | 4.1300 | 3.9705 | 3.3230 |
| 27 | 20.456 | 18.292 | 16.444 | 14.857 | 13.489 | 12.303 | 11.272 | 10.371 | 9.5802 | 8.8832 | 8.2664 | 7.7184 | 7.2297 | 6.7921 | 6.3988 | 6.0442 | 4.9245 | 4.1371 | 3.9764 | 3.3254 |
| 28 | 21.243 | 18.914 | 16.936 | 15.247 | 13.799 | 12.550 | 11.489 | 10.529 | 9.7066 | 8.9847 | 8.3481 | 7.7843 | 7.2829 | 6.8351 | 6.4338 | 6.0726 | 4.9371 | 4.1428 | 3.9811 | 3.3272 |
| 29 | 22.023 | 19.523 | 17.413 | 15.622 | 14.094 | 12.783 | 11.654 | 10.675 | 9.8226 | 9.0770 | 8.4217 | 7.8431 | 7.3300 | 6.8729 | 6.4641 | 6.0971 | 4.9476 | 4.1474 | 3.9849 | 3.3286 |
| 30 | | | | | | | | | | | | | | | | | | | | |
| 31 | 25.806 | 22.396 | 19.600 | 17.292 | 15.372 | 13.765 | 12.409 | 11.258 | 10.274 | 9.4269 | 8.6938 | 8.0552 | 7.4957 | 7.0027 | 6.5660 | 6.1772 | 4.9789 | 4.1601 | 3.9950 | 3.3321 |
| 35 | 29.409 | 24.999 | 21.487 | 18.665 | 16.374 | 14.498 | 12.948 | 11.655 | 10.567 | 9.6442 | 8.8552 | 8.1755 | 7.5856 | 7.0700 | 6.6166 | 6.2153 | 4.9915 | 4.1644 | 3.9984 | 3.3330 |
| 36 | 30.108 | 25.489 | 21.832 | 18.908 | 16.547 | 14.621 | 13.035 | 11.717 | 10.612 | 9.6765 | 8.8786 | 8.1924 | 7.5979 | 7.0790 | 6.6231 | 6.2201 | 4.9929 | 4.1649 | 3.9987 | 3.3331 |
| 40 | 32.835 | 27.355 | 23.115 | 19.793 | 17.159 | 15.046 | 13.332 | 11.925 | 10.757 | 9.7791 | 8.9511 | 8.2438 | 7.6344 | 7.1050 | 6.6418 | 6.2335 | 4.9966 | 4.1659 | 3.9995 | 3.3332 |
| 45 | 36.095 | 31.424 | 25.730 | 21.482 | 18.256 | 15.762 | 13.801 | 12.233 | 10.962 | 9.9148 | 9.0417 | 8.3045 | 7.6752 | 7.1327 | 6.6605 | 6.2463 | 4.9995 | 4.1666 | 3.9999 | 3.3333 |
| 50 | 39.196 | 31.424 | 25.730 | 21.482 | 18.256 | 15.762 | 13.801 | 12.233 | 10.962 | 9.9148 | 9.0417 | 8.3045 | 7.6752 | 7.1327 | 6.6605 | 6.2463 | 4.9995 | 4.1666 | 3.9999 | 3.3333 |

kasneb

**CIFA INTERMEDIATE LEVEL**

**PORTFOLIO MANAGEMENT**

**WEDNESDAY: 15 December 2021.** **Time Allowed: 3 hours.**

**Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings.**

**QUESTION ONE**

(a) Explain the term "market portfolio". (2 marks)

(b) Benson Kilonzo is considering investing his funds equally in four different securities whose details are as indicated below:

| Security | Expected return % | Variance % | Covariance |
|---|---|---|---|
| P | 18 | 0.72 | 0.30 |
| Q | 16 | 0.4 | 0.35 |
| R | 10 | 0 | 0 |
| Z | 30 | 1.6 | 0.38 |

**Additional information:**

1. The risk free rate of return is 10%.
2. The expected rate of return of the market is 15%.
3. The variance of the market is 20%.

**Required:**

(i) The portfolio beta. (3 marks)
(ii) The required rate of return of the portfolio. (1 mark)
(iii) The required rate of return of each security and comment on its valuation. (5 marks)

(c) Samuel Juma uses arbitrage pricing theory (APT) for evaluating investment strategies and from his earlier analysis, he knows that fund A and B shown below are well diversified and believes that an arbitrage opportunity exist for fund C. The expected return and factor sensitivities for the funds are shown below:

| Fund | Expected return | Factor sensitivity |
|---|---|---|
| A | 0.02 | 0.5 |
| B | 0.04 | 1.5 |
| C | 0.03 | 0.9 |

Further, Samuel Juma estimates the three funds sensitivity to inflation and Gross Domestic Product (GDP) growth. The information is presented below and he assumes a zero value for the error terms when working with the selected two factor model:

| | | Factor Sensitivity | |
|---|---|---|---|
| Fund | Expected return | Inflation | GDP growth rate |
| A | 0.02 | 0.5 | 1.0 |
| B | 0.04 | 1.6 | 0.0 |
| C | 0.03 | 1.0 | 1.1 |

The selected data on factor is provided below:

| Factor | Forecasted value | Actual value |
|---|---|---|
| Inflation | 2.0% | 2.2% |
| GDP growth rate | 1.5% | 1.0% |

**Required:**

(i) Demonstrate how to exploit the arbitrage opportunity identified by Samuel Juma. (3 marks)

(ii) Determine which surprises has the greatest effect on fund returns. (3 marks)

(iii) Determine which fund is most sensitive to the combined surprises in inflation and GDP growth. (3 marks)

**(Total: 20 marks)**

**QUESTION TWO**

(a) Summarise five avenues for diversification in portfolio management. (5 marks)

(b) The following information is provided on the market, risk free rate and two stocks A and O:

| | Expected return | Correlation with market | Standard deviation |
|---|---|---|---|
| Treasury bill rate | 4% | 0.00 | 0.00 |
| S & P 500 Index | 11% | 1.00 | 15.00 |
| Stock A | 14% | 0.70 | 25.00 |
| Stock O | 9% | 0.40 | 20.00 |

**Required:**

(i) Draw the capital market line (CML). (3 marks)

(ii) Calculate the betas of the stocks. (2 marks)

(iii) Plot the stocks relative to the CML and comment. (3 marks)

(iv) Calculate the alphas ($\alpha$) of the stocks. (2 marks)

(c) Benson Mwangi is considering two different portfolio strategies. The first is an active market timing trading strategy that is expected to yield a pretax return of 12%. All gains will be recognised each year and taxed at a short term capital gain rate of 5%. Alternatively, a less active tactical asset allocation trading strategy is expected to yield a pretax return of 18%. All gains will be recognised each year but will be taxed at 30%.

**Required:**

(i) Using suitable computations, determine the strategy that is likely to produce a better after tax return. (3 marks)

(ii) Calculate the pretax return that is required on the market timing strategy to produce the same after tax return as the tactical asset allocation strategy. (2 marks)

**(Total: 20 marks)**

**QUESTION THREE**

(a) Evaluate four limitations of fundamental law of active management. (4 marks)

(b) Cliford Kirwa and his wife Melisha Kirwa are planning for retirement and would like to compare the past performance of few mutual funds that they are considering for investment. They believe that a comparison over a five year period would be appropriate. They are given the following information about a superior fund they are considering:

| Year | Assets under management (AUM) at the beginning of year (Sh."million") | Net return (%) |
|---|---|---|
| 1 | 30 | 15 |
| 2 | 45 | -5 |
| 3 | 30 | 15 |
| 4 | 25 | 10 |
| 5 | 45 | 8 |

**Required:**

Calculate the money weighted rate of return (MWRR) of the fund (8 marks)

(c) A portfolio manager has provided the following average portfolio and benchmark returns over the past 12 months:

Average portfolio return, $R_P$ = 0.0076

Average benchmark return, $R_B$ = 0.0059

Standard deviation of the portfolio = 0.0063

**Required:**

(i) The information ratio (IR) of the portfolio. (2 marks)

(ii) Interpret your results in (c) (i) above. (2 marks)

(d) Explain the following terms as used in portfolio management:

(i) Crowdfunding. (2 marks)

(ii) Program trading. (2 marks)

**(Total: 20 marks)**

**QUESTION FOUR**

(a) (i) Describe three methods that could be used in estimating value at risk (VaR) of a portfolio. (6 marks)

(ii) Explain the purpose of (VaR) in portfolio management. (2 marks)

(b) Compare and contrast "diversification of judgement" and "diversification of style" as used in portfolio management. (4 marks)

(c) Robinson Murimi is managing a balanced portfolio of fixed income securities and equities securities worth Sh.1 million. The portfolio's pretax expected return is 6.0%. The percentage of return composed of interest dividends and realised capital gain as well as the associated tax rates are listed below:

| Tax profile | Annual distribution rate | Tax rate |
|---|---|---|
| Interest (i) | 20% | 15% |
| Dividends (d) | 30% | 5% |
| Capital gain (cg) | 40% | 5% |

Assume that the portfolio's cost basis equals market value.

**Required:**

Calculate the expected future accumulation in15 years assuming these parameters hold for that time period. (5 marks)

(d) The composition of the Fin Group Fund portfolio is as follows:

| Stock | Number of shares | Price (Sh.) |
|---|---|---|
| A | 200,000 | 35 |
| B | 300,000 | 40 |
| C | 400,000 | 20 |
| D | 600,000 | 25 |

The fund has not borrowed any funds, but its accrued management fee with the portfolio manager, currently totals Sh.3,000,000. There are 4,000,000 shares outstanding.

**Required:**

The net asset value (NAV) of the fund. (3 marks)

**(Total: 20 marks)**

**QUESTION FIVE**

(a) Explain the following terms as used in behavioural finance:

(i) Decision theory. (2 marks)

(ii) Bounded rationality. (2 marks)

(iii) Prospect theory. (2 marks)

(iv) Aversion to ambiguity bias. (2 marks)

(v) Innumeracy bias. (2 marks)

(b) Caroline Wekesa is a financial analyst at Wema Financial Services. She has been requested by her investment manager to develop an Investment Policy Statement (IPS) for a client.

Advise Caroline Wekesa on three roles of IPS in the portfolio management process. (6 marks)

(c) Describe four reasons why it is important for portfolio managers to document information. (4 marks)

**(Total: 20 marks)**

.....

Present Value Interest factor of 1 Received at the End of *n* Periods at r Percent:

$$PVIF_{r,n} = 1 / (1+r)^n = (1+r)^{-n}$$

| Period | 1% | 2% | 3% | 4% | 5% | 6% | 7% | 8% | 9% | 10% | 11% | 12% | 13% | 14% | 15% | 16% | 20% | 24% | 25% | 30% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.9901 | 0.9804 | 0.9709 | 0.9615 | 0.9524 | 0.9434 | 0.9346 | 0.9259 | 0.9174 | 0.9091 | 0.9009 | 0.8929 | 0.8850 | 0.8772 | 0.8696 | 0.8621 | 0.8333 | 0.8065 | 0.8000 | 0.7692 |
| 2 | 0.9803 | 0.9612 | 0.9426 | 0.9246 | 0.9070 | 0.8900 | 0.8734 | 0.8573 | 0.8417 | 0.8264 | 0.8116 | 0.7972 | 0.7831 | 0.7695 | 0.7561 | 0.7432 | 0.6944 | 0.6504 | 0.6400 | 0.5917 |
| 3 | 0.9706 | 0.9423 | 0.9151 | 0.8890 | 0.8638 | 0.8396 | 0.8163 | 0.7938 | 0.7722 | 0.7513 | 0.7312 | 0.7118 | 0.6931 | 0.6750 | 0.6575 | 0.6407 | 0.5787 | 0.5245 | 0.5120 | 0.4552 |
| 4 | 0.9610 | 0.9238 | 0.8885 | 0.8548 | 0.8227 | 0.7921 | 0.7629 | 0.7350 | 0.7084 | 0.6830 | 0.6587 | 0.6355 | 0.6133 | 0.5921 | 0.5718 | 0.5523 | 0.4823 | 0.4230 | 0.4096 | 0.3501 |
| 5 | 0.9515 | 0.9057 | 0.8626 | 0.8219 | 0.7835 | 0.7473 | 0.7130 | 0.6806 | 0.6499 | 0.6209 | 0.5935 | 0.5674 | 0.5428 | 0.5194 | 0.4972 | 0.4761 | 0.4019 | 0.3411 | 0.3277 | 0.2693 |
| | | | | | | | | | | | | | | | | | | | | |
| 6 | 0.9420 | 0.8880 | 0.8375 | 0.7903 | 0.7462 | 0.7050 | 0.6663 | 0.6302 | 0.5963 | 0.5645 | 0.5346 | 0.5066 | 0.4803 | 0.4556 | 0.4323 | 0.4104 | 0.3349 | 0.2751 | 0.2621 | 0.2072 |
| 7 | 0.9327 | 0.8706 | 0.8131 | 0.7599 | 0.7107 | 0.6651 | 0.6227 | 0.5835 | 0.5470 | 0.5132 | 0.4817 | 0.4523 | 0.4251 | 0.3996 | 0.3759 | 0.3538 | 0.2791 | 0.2218 | 0.2097 | 0.1594 |
| 8 | 0.9235 | 0.8535 | 0.7894 | 0.7307 | 0.6768 | 0.6274 | 0.5820 | 0.5403 | 0.5019 | 0.4665 | 0.4339 | 0.4039 | 0.3762 | 0.3506 | 0.3269 | 0.3050 | 0.2326 | 0.1789 | 0.1678 | 0.1226 |
| 9 | 0.9143 | 0.8368 | 0.7664 | 0.7026 | 0.6446 | 0.5919 | 0.5439 | 0.5002 | 0.4604 | 0.4241 | 0.3909 | 0.3606 | 0.3329 | 0.3075 | 0.2843 | 0.2630 | 0.1938 | 0.1443 | 0.1342 | 0.0943 |
| 10 | 0.9053 | 0.8203 | 0.7441 | 0.6756 | 0.6139 | 0.5584 | 0.5083 | 0.4632 | 0.4224 | 0.3855 | 0.3522 | 0.3220 | 0.2946 | 0.2697 | 0.2472 | 0.2267 | 0.1615 | 0.1164 | 0.1074 | 0.0725 |
| | | | | | | | | | | | | | | | | | | | | |
| 11 | 0.8963 | 0.8043 | 0.7224 | 0.6496 | 0.5847 | 0.5268 | 0.4751 | 0.4289 | 0.3875 | 0.3505 | 0.3173 | 0.2875 | 0.2607 | 0.2366 | 0.2149 | 0.1954 | 0.1346 | 0.0938 | 0.0859 | 0.0558 |
| 12 | 0.8874 | 0.7885 | 0.7014 | 0.6246 | 0.5568 | 0.4970 | 0.4440 | 0.3971 | 0.3555 | 0.3186 | 0.2858 | 0.2567 | 0.2307 | 0.2076 | 0.1869 | 0.1685 | 0.1122 | 0.0757 | 0.0687 | 0.0429 |
| 13 | 0.8787 | 0.7730 | 0.6810 | 0.6006 | 0.5303 | 0.4688 | 0.4150 | 0.3677 | 0.3262 | 0.2897 | 0.2575 | 0.2292 | 0.2042 | 0.1821 | 0.1625 | 0.1452 | 0.0935 | 0.0610 | 0.0550 | 0.0330 |
| 14 | 0.8700 | 0.7579 | 0.6611 | 0.5775 | 0.5051 | 0.4423 | 0.3878 | 0.3405 | 0.2992 | 0.2633 | 0.2320 | 0.2046 | 0.1807 | 0.1597 | 0.1413 | 0.1252 | 0.0779 | 0.0492 | 0.0440 | 0.0254 |
| 15 | 0.8613 | 0.7430 | 0.6419 | 0.5553 | 0.4810 | 0.4173 | 0.3624 | 0.3152 | 0.2745 | 0.2394 | 0.2090 | 0.1827 | 0.1599 | 0.1401 | 0.1229 | 0.1079 | 0.0649 | 0.0397 | 0.0352 | 0.0195 |
| | | | | | | | | | | | | | | | | | | | | |
| 16 | 0.8528 | 0.7284 | 0.6232 | 0.5339 | 0.4581 | 0.3936 | 0.3387 | 0.2919 | 0.2519 | 0.2176 | 0.1883 | 0.1631 | 0.1415 | 0.1229 | 0.1069 | 0.0930 | 0.0541 | 0.0320 | 0.0281 | 0.0150 |
| 17 | 0.8444 | 0.7142 | 0.6050 | 0.5134 | 0.4363 | 0.3714 | 0.3166 | 0.2703 | 0.2311 | 0.1978 | 0.1696 | 0.1456 | 0.1252 | 0.1078 | 0.0929 | 0.0802 | 0.0451 | 0.0258 | 0.0225 | 0.0116 |
| 18 | 0.8360 | 0.7002 | 0.5874 | 0.4936 | 0.4155 | 0.3503 | 0.2959 | 0.2502 | 0.2120 | 0.1799 | 0.1528 | 0.1300 | 0.1108 | 0.0946 | 0.0808 | 0.0691 | 0.0376 | 0.0208 | 0.0180 | 0.0089 |
| 19 | 0.8277 | 0.6864 | 0.5703 | 0.4746 | 0.3957 | 0.3305 | 0.2765 | 0.2317 | 0.1945 | 0.1635 | 0.1377 | 0.1161 | 0.0981 | 0.0829 | 0.0703 | 0.0596 | 0.0313 | 0.0168 | 0.0144 | 0.0068 |
| 20 | 0.8195 | 0.6730 | 0.5537 | 0.4564 | 0.3769 | 0.3118 | 0.2584 | 0.2145 | 0.1784 | 0.1486 | 0.1240 | 0.1037 | 0.0868 | 0.0728 | 0.0611 | 0.0514 | 0.0261 | 0.0135 | 0.0115 | 0.0053 |
| | | | | | | | | | | | | | | | | | | | | |
| 21 | 0.8114 | 0.6598 | 0.5375 | 0.4388 | 0.3589 | 0.2942 | 0.2415 | 0.1987 | 0.1637 | 0.1351 | 0.1117 | 0.0926 | 0.0768 | 0.0638 | 0.0531 | 0.0443 | 0.0217 | 0.0109 | 0.0092 | 0.0040 |
| 22 | 0.8034 | 0.6468 | 0.5219 | 0.4220 | 0.3418 | 0.2775 | 0.2257 | 0.1839 | 0.1502 | 0.1228 | 0.1007 | 0.0826 | 0.0680 | 0.0560 | 0.0462 | 0.0382 | 0.0181 | 0.0088 | 0.0074 | 0.0031 |
| 23 | 0.7954 | 0.6342 | 0.5067 | 0.4057 | 0.3256 | 0.2618 | 0.2109 | 0.1703 | 0.1378 | 0.1117 | 0.0907 | 0.0738 | 0.0601 | 0.0491 | 0.0402 | 0.0329 | 0.0151 | 0.0071 | 0.0059 | 0.0024 |
| 24 | 0.7876 | 0.6217 | 0.4919 | 0.3901 | 0.3101 | 0.2470 | 0.1971 | 0.1577 | 0.1264 | 0.1015 | 0.0817 | 0.0659 | 0.0532 | 0.0431 | 0.0349 | 0.0284 | 0.0126 | 0.0057 | 0.0047 | 0.0018 |
| 25 | 0.7798 | 0.6095 | 0.4776 | 0.3751 | 0.2953 | 0.2330 | 0.1842 | 0.1460 | 0.1160 | 0.0923 | 0.0736 | 0.0588 | 0.0471 | 0.0378 | 0.0304 | 0.0245 | 0.0105 | 0.0046 | 0.0038 | 0.0014 |
| | | | | | | | | | | | | | | | | | | | | |
| 30 | 0.7419 | 0.5521 | 0.4120 | 0.3083 | 0.2314 | 0.1741 | 0.1314 | 0.0994 | 0.0754 | 0.0573 | 0.0437 | 0.0334 | 0.0256 | 0.0196 | 0.0151 | 0.0116 | 0.0042 | 0.0016 | 0.0012 | |
| 35 | 0.7059 | 0.5000 | 0.3554 | 0.2534 | 0.1813 | 0.1301 | 0.0937 | 0.0676 | 0.0490 | 0.0356 | 0.0259 | 0.0189 | 0.0139 | 0.0102 | 0.0075 | 0.0055 | 0.0017 | 0.0005 | | |
| 36 | 0.6989 | 0.4902 | 0.3450 | 0.2437 | 0.1727 | 0.1227 | 0.0875 | 0.0626 | 0.0449 | 0.0323 | 0.0234 | 0.0169 | 0.0123 | 0.0089 | 0.0065 | 0.0048 | 0.0014 | | | |
| 40 | 0.6717 | 0.4529 | 0.3066 | 0.2083 | 0.1420 | 0.0972 | 0.0668 | 0.0460 | 0.0318 | 0.0221 | 0.0154 | 0.0107 | 0.0075 | 0.0053 | 0.0037 | 0.0026 | 0.0007 | | | |
| 50 | 0.6080 | 0.3715 | 0.2281 | 0.1407 | 0.0872 | 0.0543 | 0.0339 | 0.0213 | 0.0134 | 0.0085 | 0.0054 | 0.0035 | 0.0022 | 0.0014 | 0.0009 | 0.0006 | | | | |

Present Value Interest factors for Annuity of 1 Discounted at r Percent for *n* Periods:

$$PVIFA_{r,n} = [1 - 1/(1+r)^n] / r$$

| Period | 1% | 2% | 3% | 4% | 5% | 6% | 7% | 8% | 9% | 10% | 11% | 12% | 13% | 14% | 15% | 16% | 20% | 24% | 25% | 30% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.9901 | 0.9804 | 0.9709 | 0.9615 | 0.9524 | 0.9434 | 0.9346 | 0.9259 | 0.9174 | 0.9091 | 0.9009 | 0.8929 | 0.8850 | 0.8772 | 0.8696 | 0.8621 | 0.8333 | 0.8065 | 0.8000 | 0.7692 |
| 2 | 1.9704 | 1.9416 | 1.9135 | 1.8861 | 1.8594 | 1.8334 | 1.8080 | 1.7833 | 1.7591 | 1.7355 | 1.7125 | 1.6901 | 1.6681 | 1.6467 | 1.6257 | 1.6052 | 1.5278 | 1.4568 | 1.4400 | 1.3609 |
| 3 | 2.9410 | 2.8839 | 2.8286 | 2.7751 | 2.7232 | 2.6730 | 2.6243 | 2.5771 | 2.5313 | 2.4869 | 2.4437 | 2.4018 | 2.3612 | 2.3216 | 2.2832 | 2.2459 | 2.1065 | 1.9813 | 1.9520 | 1.8161 |
| 4 | 3.9020 | 3.8077 | 3.7171 | 3.6299 | 3.5460 | 3.4651 | 3.3872 | 3.3121 | 3.2397 | 3.1699 | 3.1024 | 3.0373 | 2.9745 | 2.9137 | 2.8550 | 2.7982 | 2.5887 | 2.4043 | 2.3616 | 2.1662 |
| 5 | 4.8534 | 4.7135 | 4.5797 | 4.4518 | 4.3295 | 4.2124 | 4.1002 | 3.9927 | 3.8897 | 3.7908 | 3.6959 | 3.6048 | 3.5172 | 3.4331 | 3.3522 | 3.2743 | 2.9906 | 2.7454 | 2.6893 | 2.4356 |
| | | | | | | | | | | | | | | | | | | | | |
| 6 | 5.7955 | 5.6014 | 5.4172 | 5.2421 | 5.0757 | 4.9173 | 4.7665 | 4.6229 | 4.4859 | 4.3553 | 4.2305 | 4.1114 | 3.9975 | 3.8887 | 3.7845 | 3.6847 | 3.3255 | 3.0205 | 2.9514 | 2.6427 |
| 7 | 6.7282 | 6.4720 | 6.2303 | 6.0021 | 5.7864 | 5.5824 | 5.3893 | 5.2064 | 5.0330 | 4.8684 | 4.7122 | 4.5638 | 4.4226 | 4.2883 | 4.1604 | 4.0386 | 3.6046 | 3.2423 | 3.1611 | 2.8021 |
| 8 | 7.6517 | 7.3255 | 7.0197 | 6.7327 | 6.4632 | 6.2098 | 5.9713 | 5.7466 | 5.5348 | 5.3349 | 5.1461 | 4.9676 | 4.7988 | 4.6389 | 4.4873 | 4.3436 | 3.8372 | 3.4212 | 3.3289 | 2.9247 |
| 9 | 8.5660 | 8.1622 | 7.7861 | 7.4353 | 7.1078 | 6.8017 | 6.5152 | 6.2469 | 5.9952 | 5.7590 | 5.5370 | 5.3282 | 5.1317 | 4.9464 | 4.7716 | 4.6065 | 4.0310 | 3.5655 | 3.4631 | 3.0190 |
| 10 | 9.4713 | 8.9826 | 8.5302 | 8.1109 | 7.7217 | 7.3601 | 7.0236 | 6.7101 | 6.4177 | 6.1446 | 5.8892 | 5.6502 | 5.4262 | 5.2161 | 5.0188 | 4.8332 | 4.1925 | 3.6819 | 3.5705 | 3.0915 |
| | | | | | | | | | | | | | | | | | | | | |
| 11 | 10.368 | 9.7868 | 9.2526 | 8.7605 | 8.3064 | 7.8869 | 7.4987 | 7.1390 | 6.8052 | 6.4951 | 6.2065 | 5.9377 | 5.6869 | 5.4527 | 5.2332 | 5.0286 | 4.3271 | 3.7757 | 3.6564 | 3.1473 |
| 12 | 11.255 | 10.575 | 9.9540 | 9.3851 | 8.8633 | 8.3838 | 7.9427 | 7.5361 | 7.1607 | 6.8137 | 6.4924 | 6.1944 | 5.9176 | 5.6603 | 5.4206 | 5.1971 | 4.4392 | 3.8514 | 3.7251 | 3.1903 |
| 13 | 12.134 | 11.348 | 10.635 | 9.9856 | 9.3936 | 8.8527 | 8.3577 | 7.9038 | 7.4869 | 7.1034 | 6.7499 | 6.4235 | 6.1218 | 5.8424 | 5.5831 | 5.3423 | 4.5327 | 3.9124 | 3.7801 | 3.2233 |
| 14 | 13.004 | 12.106 | 11.296 | 10.563 | 9.8986 | 9.2950 | 8.7455 | 8.2442 | 7.7862 | 7.3667 | 6.9819 | 6.6282 | 6.3025 | 6.0021 | 5.7245 | 5.4675 | 4.6106 | 3.9616 | 3.8241 | 3.2487 |
| 15 | 13.865 | 12.849 | 11.938 | 11.118 | 10.380 | 9.7122 | 9.1079 | 8.5595 | 8.0607 | 7.6061 | 7.1909 | 6.8109 | 6.4624 | 6.1422 | 5.8474 | 5.5755 | 4.6755 | 4.0013 | 3.8593 | 3.2682 |
| | | | | | | | | | | | | | | | | | | | | |
| 16 | 14.718 | 13.578 | 12.561 | 11.652 | 10.838 | 10.106 | 9.4466 | 8.8514 | 8.3126 | 7.8237 | 7.3792 | 6.9740 | 6.6039 | 6.2651 | 5.9542 | 5.6685 | 4.7296 | 4.0333 | 3.8874 | 3.2832 |
| 17 | 15.562 | 14.292 | 13.166 | 12.166 | 11.274 | 10.477 | 9.7632 | 9.1216 | 8.5436 | 8.0216 | 7.5488 | 7.1196 | 6.7291 | 6.3729 | 6.0472 | 5.7487 | 4.7746 | 4.0591 | 3.9099 | 3.2948 |
| 18 | 16.398 | 14.992 | 13.754 | 12.659 | 11.690 | 10.828 | 10.059 | 9.3719 | 8.7556 | 8.2014 | 7.7016 | 7.2497 | 6.8399 | 6.4674 | 6.1280 | 5.8178 | 4.8122 | 4.0799 | 3.9279 | 3.3037 |
| 19 | 17.226 | 15.678 | 14.324 | 13.134 | 12.085 | 11.158 | 10.336 | 9.6036 | 8.9501 | 8.3649 | 7.8393 | 7.3658 | 6.9380 | 6.5504 | 6.1982 | 5.8775 | 4.8435 | 4.0967 | 3.9424 | 3.3105 |
| 20 | 18.046 | 16.351 | 14.877 | 13.590 | 12.462 | 11.470 | 10.594 | 9.8181 | 9.1285 | 8.5136 | 7.9633 | 7.4694 | 7.0248 | 6.6231 | 6.2593 | 5.9288 | 4.8696 | 4.1103 | 3.9539 | 3.3158 |
| | | | | | | | | | | | | | | | | | | | | |
| 21 | 18.857 | 17.011 | 15.415 | 14.029 | 12.821 | 11.764 | 10.836 | 10.017 | 9.2922 | 8.6487 | 8.0751 | 7.5620 | 7.1016 | 6.6870 | 6.3125 | 5.9731 | 4.8913 | 4.1212 | 3.9631 | 3.3198 |
| 22 | 19.660 | 17.659 | 15.937 | 14.451 | 13.163 | 12.042 | 11.061 | 10.201 | 9.4424 | 8.7715 | 8.1757 | 7.6446 | 7.1695 | 6.7429 | 6.3587 | 6.0113 | 4.9094 | 4.1300 | 3.9705 | 3.3230 |
| 23 | 20.456 | 18.292 | 16.444 | 14.857 | 13.489 | 12.303 | 11.272 | 10.371 | 9.5802 | 8.8832 | 8.2664 | 7.7184 | 7.2297 | 6.7921 | 6.3988 | 6.0442 | 4.9245 | 4.1371 | 3.9764 | 3.3254 |
| 24 | 21.243 | 18.914 | 16.936 | 15.247 | 13.799 | 12.550 | 11.469 | 10.529 | 9.7066 | 8.9847 | 8.3481 | 7.7843 | 7.2829 | 6.8351 | 6.4338 | 6.0726 | 4.9371 | 4.1428 | 3.9811 | 3.3272 |
| 25 | 22.023 | 19.523 | 17.413 | 15.622 | 14.094 | 12.783 | 11.654 | 10.675 | 9.8226 | 9.0770 | 8.4217 | 7.8431 | 7.3300 | 6.8729 | 6.4641 | 6.0971 | 4.9476 | 4.1474 | 3.9849 | 3.3286 |
| | | | | | | | | | | | | | | | | | | | | |
| 30 | 25.808 | 22.396 | 19.600 | 17.292 | 15.372 | 13.765 | 12.409 | 11.258 | 10.274 | 9.4269 | 8.6938 | 8.0552 | 7.4957 | 7.0027 | 6.5660 | 6.1772 | 4.9789 | 4.1601 | 3.9950 | 3.3321 |
| 35 | 29.409 | 24.999 | 21.487 | 18.665 | 16.374 | 14.498 | 12.948 | 11.655 | 10.567 | 9.6442 | 8.8552 | 8.1755 | 7.5856 | 7.0700 | 6.6166 | 6.2153 | 4.9915 | 4.1644 | 3.9984 | 3.3330 |
| 36 | 30.108 | 25.489 | 21.832 | 18.908 | 16.547 | 14.621 | 13.035 | 11.717 | 10.612 | 9.6765 | 8.8786 | 8.1924 | 7.5979 | 7.0790 | 6.6231 | 6.2201 | 4.9929 | 4.1649 | 3.9987 | 3.3331 |
| 40 | 32.835 | 27.355 | 23.115 | 19.793 | 17.159 | 15.046 | 13.332 | 11.925 | 10.757 | 9.7791 | 8.9511 | 8.2438 | 7.6344 | 7.1050 | 6.6418 | 6.2335 | 4.9966 | 4.1659 | 3.9995 | 3.3332 |
| 50 | 39.196 | 31.424 | 25.730 | 21.482 | 18.256 | 15.762 | 13.801 | 12.233 | 10.962 | 9.9148 | 9.0417 | 8.3045 | 7.6752 | 7.1327 | 6.6605 | 6.2463 | 4.9995 | 4.1666 | 3.9999 | 3.3333 |

# KASNEB

## CIFA PART II SECTION 4

## PORTFOLIO MANAGEMENT

**FRIDAY: 27 November 2015.** **Time Allowed: 3 hours.**

**Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings.**

**QUESTION ONE**

(a) Evaluate the three major steps involved in the portfolio management process. (6 marks)

(b) Outline four criteria which could assist a portfolio manager in specifying an asset class. (4 marks)

(c) The Joel Hospital has an operating budget of Sh.1.5 billion and has been operating at a budget surplus for the last two years. The hospital has a Sh.2 billion endowment whose sole purpose is to provide capital equipment for the hospital. The endowment's long term expected total return is 8.6% which includes a 3.3% income component. The hospital has no minimum payout requirement and expects no future contributions. Traditionally, the hospital board of directors has determined the annual payout based on current needs. Payouts have been rising steadily to Sh.137.5 million two years ago and to Sh.140 million last year.

The chief finance officer of Joel Hospital has requested for the hospital board's guidance in establishing a long term spending for the hospital. He has requested Sh.160 million to buy medical equipment. The inflation rate for the medical equipment price is 4% while the general consumer price index is 2.5%.

**Required:**

(i) Discuss the implication of the current pressure on the hospital to increase spending. (3 marks)

(ii) Explain how Joel Hospital's time horizon would affect its risk tolerance. (2 marks)

(iii) Determine a long-term spending policy for Joel Hospital, including a spending rate as a percentage of assets. Justify the policy. (5 marks)

**(Total: 20 marks)**



**QUESTION TWO**

(a) Analyse three tools that could be used by a financial analyst when formulating capital market expectations. (6 marks)

(b) Highlight four factors that could be used in predicting the beta of a company. (4 marks)

(c) The following financial data provides an analyst's expected return on two stocks listed at PASDAQ securities exchange:

| Market Return | Aggressive Stock | Defensive Stock |
|---|---|---|
| 6% | 2% | 8% |
| 20% | 30% | 16% |

**Required:**

(i) The betas (β) of the two stocks. (2 marks)

(ii) Expected return on each stock if the market return is equally likely to be 6% or 20%. (2 marks)

(iii) Determine the Security Market Line (SML) if the risk free rate is 7% and market return is equally likely to be 6% or 20%. (2 marks)

(iv) Calculate the Alphas (α) of the two stocks. (4 marks)

**(Total: 20 marks)**

**QUESTION THREE**

(a) Propose four common errors that might occur in investment management. (4 marks)

(b) Esther Simiyu, aged 40 years has a steady job as a manager at a non-governmental organisation. She plans to retire at the age of 55 years. She is a mother of two teenage children and she intends to fund a dedicated trust so as to provide for her children's needs until they reach the age of 25 years. She will need Sh.250,000 within the next few months to fund the trust. Her investment assets are currently valued at Sh.1,600,000. Esther saves Sh.300,000 of her after-tax income every year and plans to continue doing so until retirement. The next contribution will be made in one year. As part of her normal expenses, she annually provides approximately Sh.100,000 of support to a local children charity foundation.

When she retires in 15 years time, she plans to purchase a 25 year annuity that would pay Sh.400,000 after-tax annually. She will need Sh.8,500,000 at retirement to fund the annuity. She expects the annual payout to be sufficient to meet all her needs on an inflation adjusted basis. She does not plan to leave any estate at her death.

**Required:**

(i) The required annual return that would enable Esther Simiyu to purchase the desired retirement annuity at the age of 55 years. (4 marks)

(ii) "Esther's ability to take risk could be considered above average". Giving three reasons justify this statement. (6 marks)

(c) Discuss three merits and three demerits of the application of arbitrage pricing theory (APT) in investment management analysis. (6 marks)

**(Total: 20 marks)**

**QUESTION FOUR**

(a) (i) Define the term "value of risk". (2 marks)

(ii) Summarise four limitations of value of risk (VaR). (4 marks)

(b) An analyst would like to know the VaR for a portfolio consisting of two asset classes; long term government bonds issued in Kenya and long term government bonds issued in Tanzania. The expected monthly return on Kenyan bonds is 0.85% and the standard deviation is 3.20%. The expected monthly return on Tanzanian bonds (in Kenya Shilling) is 0.95% and the standard deviation is 5.26%. The correlation between the Kenya Shilling return of Tanzania and the Kenyan bond is 0.35.

The portfolio market value is Sh.100 million and is equally weighted between the two asset classes.
Assume a year has 52 weeks.

**Required:**

The 5% weekly VaR using the analytical method. (5 marks)

(c) Discuss the following investor psychology theories:

(i) Prospect theory. (3 marks)

(ii) Regret theory. (3 marks)

(d) Outline three inputs necessary to aid in deciding whether to add an investment to an existing portfolio. (3 marks)

**(Total: 20 marks)**

**QUESTION FIVE**

(a) Distinguish between the terms "Sharpe ratio" and "information ratio" as used in active portfolio management. (4 marks)

(b) (i) Explain the term "Fundamental Law of Active Management". (2 marks)

(ii) Patrick Waiharo is evaluating two investment managers:

- Manager X - He follows 500 shares index with annual forecasts, and the information coefficient for each of the forecasts is 0.03.

Manager Y - He follows 100 shares index with annual forecasts, and the information coefficient for each of the forecasts is twice that of Manager X's security forecasts.

**Required:**
Advise Patrick Waiharo on which manager to select using the Fundamental Law of Active Management.
(4 marks)

(c) An analyst obtains the following annual rates of returns for a mutual fund:

| Year | Return (%) |
|---|---|
| 2012 | 14 |
| 2013 | -10 |
| 2014 | -2 |

**Required:**
(i) The fund's holding period return (HPR) over the three-year period. (2 marks)

(ii) The fund's annual geometric mean return. (2 marks)

(d) A financial analyst has created the following data to illustrate the application of utility theory to portfolio selection:

| Investment | Expected Return % | Expected Standard Deviation % |
|---|---|---|
| A | 18 | 2 |
| B | 19 | 8 |
| C | 20 | 15 |
| D | 18 | 30 |

He uses the following utility function: $U = E(r) - {}^{1}/_{2} A \sigma^2$

Where: U = Expected utility.
E (r) = Expected return.
A = Measure for risk aversion.
$\sigma^2$ = Variance of expected return.



**Required:**
(i) Advise on which investment a risk-neutral investor should choose. (2 marks)

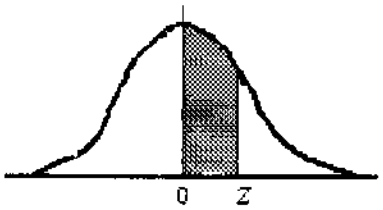
(ii) The investment that the risk-seeking investor should choose if a measure for risk aversion has a value of -2.
(2 marks)

(iii) The investment that the risk-averse investor should choose if a measure for risk aversion has a value of 2.
(2 marks)
**(Total: 20 marks)**

.....

# NORMAL CURVE

AREAS
under the
STANDARD
NORMAL CURVE
from 0 to z




| z | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | .0000 | .0040 | .0080 | .0120 | .0160 | .0199 | .0239 | .0279 | .0319 | .0359 |
| 0.1 | .0398 | .0438 | .0478 | .0517 | .0557 | .0596 | .0636 | .0675 | .0714 | .0754 |
| 0.2 | .0793 | .0832 | .0871 | .0910 | .0948 | .0987 | .1026 | .1064 | .1103 | .1141 |
| 0.3 | .1179 | .1217 | .1255 | .1293 | .1331 | .1368 | .1406 | .1443 | .1480 | .1517 |
| 0.4 | .1554 | .1591 | .1628 | .1664 | .1700 | .1736 | .1772 | .1808 | .1844 | .1879 |
| 0.5 | .1915 | .1950 | .1985 | .201. | .2051 | .2088 | .2123 | .2157 | .2190 | .2224 |
| 0.6 | .2258 | .2291 | .2324 | .2357 | .2389 | .2422 | .2454 | .2486 | .2518 | .2549 |
| 0.7 | .2580 | .2612 | .2642 | .2673 | .2704 | .2734 | .2764 | .2794 | .2823 | .2852 |
| 0.8 | .2881 | .2910 | .2939 | .2967 | .2996 | .3023 | .3051 | .3078 | .3106 | 3133 |
| 0.9 | .3159 | .3186 | .3212 | .3238 | .3264 | .3289 | .3315 | .3340 | .3365 | .3389 |
| 1.0 | .3413 | .3438 | .3461 | .3485 | .3508 | .3531 | .3554 | .3577 | .3599 | .3621 |
| 1.1 | .3643 | .3665 | .3686 | .3708 | .3729 | .3749 | .3770 | .3790 | .3810 | .3830 |
| 1.2 | .3849 | .3869 | .3888 | .3907 | .3925 | .3944 | .3962 | .3980 | .3997 | .4015 |
| 1.3 | .4032 | .4049 | .4066 | .4082 | .4099 | .4115 | .4131 | .4147 | .4162 | .4177 |
| 1.4 | .4192 | .4207 | .4222 | .4236 | .4251 | .4265 | .4279 | .4292 | .4306 | .4319 |
| 1.5 | .4332 | .4345 | .4357 | .4370 | .4382 | .4394 | .4406 | .4418 | .4429 | .4441 |
| 1.6 | .4452 | .4463 | .4474 | .4484 | .4495 | .4505 | .4515 | .4525 | .4535 | .4545 |
| 1.7 | .4554 | .4564 | .4573 | .4582 | .4591 | .4599 | .4608 | .4616 | .4625 | .4633 |
| 1.8 | .4641 | .4649 | .4656 | .4664 | .4671 | .4678 | .4686 | .4693 | .4699 | .4706 |
| 1.9 | .4713 | .4719 | .4726 | .4732 | .4738 | .4744 | .4750 | .4756 | .4761 | .4767 |
| 2.0 | .4772 | .4778 | .4783 | .4788 | .4793 | .4798 | .4803 | .4808 | .4812 | .4817 |
| 2.1 | .4821 | .4826 | .4830 | .4834 | .4838 | .4842 | .4846 | .4850 | .4854 | .4857 |
| 2.2 | .4861 | .4864 | .4868 | .4871 | .4875 | .4878 | .4881 | .4884 | .4887 | .4890 |
| 2.3 | .4893 | .4896 | .4898 | .4901 | .4904 | .4906 | .4909 | .4911 | .4913 | .4916 |
| 2.4 | .4918 | .4920 | .4922 | .4925 | .4927 | .4929 | .4931 | .4932 | .4934 | .4936 |
| 2.5 | .4938 | .4940 | .4941 | .4943 | .4945 | .4946 | .4948 | .4949 | .4951 | .4952 |
| 2.6 | .4953 | .4955 | .4956 | .4957 | .4959 | .4960 | .4961 | .4962 | .4963 | .4964 |
| 2.7 | .4965 | .4966 | .4967 | .4968 | .4969 | .4970 | .4971 | .4972 | .4973 | .4974 |
| 2.8 | .4974 | .4975 | .4976 | .4977 | .4977 | .4978 | .4979 | .4979 | .4980 | .4981 |
| 2.9 | .4981 | .4982 | .4982 | .4983 | .4984 | .4984 | .4985 | .4985 | .4986 | .4986 |
| 3.0 | .4987 | .4987 | .4987 | .4988 | .4988 | .4989 | .4989 | .4989 | .4990 | .4990 |
| 3.1 | .4990 | .4991 | .4991 | .4991 | .4992 | .4992 | .4992 | .4992 | .4993 | .4993 |
| 3.2 | .4993 | .4993 | .4994 | .4994 | .4994 | .4994 | .4994 | .4995 | .4995 | .4995 |
| 3.3 | .4995 | .4995 | .4995 | .4996 | .4996 | .4996 | .4996 | .4996 | .4996 | .4997 |
| 3.4 | .4997 | .4997 | .4997 | .4997 | .4997 | .4997 | .4997 | .4997 | .4997 | .4998 |
| 3.5 | .4998 | .4998 | .4998 | .4998 | .4998 | .4998 | .4998 | .4998 | .4998 | .4998 |
| 3.6 | .4998 | .4998 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 |
| 3.7 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 |
| 3.8 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 |
| 3.9 | .5000 | .5000 | .5000 | .5000 | .5000 | .5000 | .5000 | .5000 | .5000 | .5000 |

## Present Value of 1 Received at the End of $n$ Periods:

$$PVIF_{r,n} = 1/(1+r)^n = (1+r)^{-n}$$

| Period | 1% | 2% | 3% | 4% | 5% | 6% | 7% | 8% | 9% | 10% | 12% | 14% | 15% | 16% | 18% | 20% | 24% | 28% | 32% | 36% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .9901 | .9804 | .9709 | .9615 | .9524 | .9434 | .9346 | .9259 | .9174 | .9091 | .8929 | .8772 | .8696 | .8621 | .8475 | .8333 | .8065 | .7813 | .7576 | .7353 |
| 2 | .9803 | .9612 | .9426 | .9246 | .9070 | .8900 | .8734 | .8573 | .8417 | .8264 | .7972 | .7695 | .7561 | .7432 | .7182 | .6944 | .6504 | .6104 | .5739 | .5407 |
| 3 | .9706 | .9423 | .9151 | .8890 | .8638 | .8396 | .8163 | .7938 | .7722 | .7513 | .7118 | .6750 | .6575 | .6407 | .6086 | .5787 | .5245 | .4768 | .4348 | .3975 |
| 4 | .9610 | .9238 | .8885 | .8548 | .8227 | .7921 | .7629 | .7350 | .7084 | .6830 | .6355 | .5921 | .5718 | .5523 | .5158 | .4823 | .4230 | .3725 | .3294 | .2923 |
| 5 | .9515 | .9057 | .8626 | .8219 | .7835 | .7473 | .7130 | .6806 | .6499 | .6209 | .5674 | .5194 | .4972 | .4761 | .4371 | .4019 | .3411 | .2910 | .2495 | .2149 |
| 6 | .9420 | .8880 | .8375 | .7903 | .7462 | .7050 | .6663 | .6302 | .5963 | .5645 | .5066 | .4556 | .4323 | .4104 | .3704 | .3349 | .2751 | .2274 | .1890 | .1580 |
| 7 | .9327 | .8706 | .8131 | .7599 | .7107 | .6651 | .6227 | .5835 | .5470 | .5132 | .4523 | .3996 | .3759 | .3538 | .3139 | .2791 | .2218 | .1776 | .1432 | .1162 |
| 8 | .9235 | .8535 | .7894 | .7307 | .6768 | .6274 | .5820 | .5403 | .5019 | .4665 | .4039 | .3506 | .3269 | .3050 | .2660 | .2326 | .1789 | .1388 | .1085 | .0854 |
| 9 | .9143 | .8368 | .7664 | .7026 | .6446 | .5919 | .5439 | .5002 | .4604 | .4241 | .3606 | .3075 | .2843 | .2630 | .2255 | .1938 | .1443 | .1084 | .0822 | .0628 |
| 10 | .9053 | .8203 | .7441 | .6756 | .6139 | .5584 | .5083 | .4632 | .4224 | .3855 | .3220 | .2697 | .2472 | .2267 | .1911 | .1615 | .1164 | .0847 | .0623 | .0462 |
| 11 | .8963 | .8043 | .7224 | .6496 | .5847 | .5268 | .4751 | .4289 | .3875 | .3505 | .2875 | .2366 | .2149 | .1954 | .1619 | .1346 | .0938 | .0662 | .0472 | .0340 |
| 12 | .8874 | .7885 | .7014 | .6246 | .5568 | .4970 | .4440 | .3971 | .3555 | .3186 | .2567 | .2076 | .1869 | .1685 | .1372 | .1122 | .0757 | .0517 | .0357 | .0250 |
| 13 | .8787 | .7730 | .6810 | .6006 | .5303 | .4688 | .4150 | .3677 | .3262 | .2897 | .2292 | .1821 | .1625 | .1452 | .1163 | .0935 | .0610 | .0404 | .0271 | .0184 |
| 14 | .8700 | .7579 | .6611 | .5775 | .5051 | .4423 | .3878 | .3405 | .2992 | .2633 | .2046 | .1597 | .1413 | .1252 | .0985 | .0779 | .0492 | .0316 | .0205 | .0135 |
| 15 | .8613 | .7430 | .6419 | .5553 | .4810 | .4173 | .3624 | .3152 | .2745 | .2394 | .1827 | .1401 | .1229 | .1079 | .0835 | .0649 | .0397 | .0247 | .0155 | .0099 |
| 16 | .8528 | .7284 | .6232 | .5339 | .4581 | .3936 | .3387 | .2919 | .2519 | .2176 | .1631 | .1229 | .1069 | .0930 | .0708 | .0541 | .0320 | .0193 | .0118 | .0073 |
| 17 | .8444 | .7142 | .6050 | .5134 | .4363 | .3714 | .3166 | .2703 | .2311 | .1978 | .1456 | .1078 | .0929 | .0802 | .0600 | .0451 | .0258 | .0150 | .0089 | .0054 |
| 18 | .8360 | .7002 | .5874 | .4936 | .4155 | .3503 | .2959 | .2502 | .2120 | .1799 | .1300 | .0946 | .0808 | .0691 | .0508 | .0376 | .0208 | .0118 | .0068 | .0039 |
| 19 | .8277 | .6864 | .5703 | .4746 | .3957 | .3305 | .2765 | .2317 | .1945 | .1635 | .1161 | .0829 | .0703 | .0596 | .0431 | .0313 | .0168 | .0092 | .0051 | .0029 |
| 20 | .8195 | .6730 | .5537 | .4564 | .3769 | .3118 | .2584 | .2145 | .1784 | .1486 | .1037 | .0728 | .0611 | .0514 | .0365 | .0261 | .0135 | .0072 | .0039 | .0021 |
| 25 | .7798 | .6095 | .4776 | .3751 | .2953 | .2330 | .1842 | .1460 | .1160 | .0923 | .0588 | .0378 | .0304 | .0245 | .0160 | .0105 | .0046 | .0021 | .0010 | .0005 |
| 30 | .7419 | .5521 | .4120 | .3083 | .2314 | .1741 | .1314 | .0994 | .0754 | .0573 | .0334 | .0196 | .0151 | .0116 | .0070 | .0042 | .0016 | .0006 | .0002 | .0001 |
| 40 | .6717 | .4529 | .3066 | .2083 | .1420 | .0972 | .0668 | .0460 | .0318 | .0221 | .0107 | .0053 | .0037 | .0026 | .0013 | .0007 | .0002 | .0001 | * | * |
| 50 | .6080 | .3715 | .2281 | .1407 | .0872 | .0543 | .0339 | .0213 | .0134 | .0085 | .0035 | .0014 | .0009 | .0006 | .0003 | .0001 | * | * | * | * |
| 60 | .5504 | .3048 | .1697 | .0951 | .0535 | .0303 | .0173 | .0099 | .0057 | .0033 | .0011 | .0004 | .0002 | .0001 | * | * | * | * | * | * |

* The factor is zero to four decimal places



## Present Value of an Annuity of 1 Per Period for n Periods:

$$PVIF_{r,t} = \sum_{i=1}^{n} \frac{1}{(1+r)^i} = \frac{1 - \frac{1}{(1+r)^n}}{r}$$

| Number of payments | 1% | 2% | 3% | 4% | 5% | 6% | 7% | 8% | 9% | 10% | 12% | 14% | 15% | 16% | 18% | 20% | 24% | 28% | 32% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.9901 | 0.9804 | 0.9709 | 0.9615 | 0.9524 | 0.9434 | 0.9346 | 0.9259 | 0.9174 | 0.9091 | 0.8929 | 0.8772 | 0.8696 | 0.8621 | 0.8475 | 0.8333 | 0.8065 | 0.7813 | 0.7576 |
| 2 | 1.9704 | 1.9416 | 1.9135 | 1.8861 | 1.8594 | 1.8334 | 1.8080 | 1.7833 | 1.7591 | 1.7355 | 1.6901 | 1.6467 | 1.6257 | 1.6052 | 1.5656 | 1.5278 | 1.4568 | 1.3916 | 1.3315 |
| 3 | 2.9410 | 2.8839 | 2.8286 | 2.7751 | 2.7232 | 2.6730 | 2.6243 | 2.5771 | 2.5313 | 2.4869 | 2.4018 | 2.3216 | 2.2832 | 2.2459 | 2.1743 | 2.1065 | 1.9813 | 1.8684 | 1.7663 |
| 4 | 3.9020 | 3.8077 | 3.7171 | 3.6299 | 3.5460 | 3.4651 | 3.3872 | 3.3121 | 3.2397 | 3.1699 | 3.0373 | 2.9137 | 2.8550 | 2.7982 | 2.6901 | 2.5887 | 2.4043 | 2.2410 | 2.0957 |
| 5 | 4.8534 | 4.7135 | 4.5797 | 4.4518 | 4.3295 | 4.2124 | 4.1002 | 3.9927 | 3.8897 | 3.7908 | 3.6048 | 3.4331 | 3.3522 | 3.2743 | 3.1272 | 2.9906 | 2.7454 | 2.5320 | 2.3452 |
| 6 | 5.7955 | 5.6014 | 5.4172 | 5.2421 | 5.0757 | 4.9173 | 4.7665 | 4.6229 | 4.4859 | 4.3553 | 4.1114 | 3.8887 | 3.7845 | 3.6847 | 3.4976 | 3.3255 | 3.0205 | 2.7594 | 2.5342 |
| 7 | 6.7282 | 6.4720 | 6.2303 | 6.0021 | 5.7864 | 5.5824 | 5.3893 | 5.2064 | 5.0330 | 4.8684 | 4.5638 | 4.2883 | 4.1604 | 4.0386 | 3.8115 | 3.6046 | 3.2423 | 2.9370 | 2.6775 |
| 8 | 7.6517 | 7.3255 | 7.0197 | 6.7327 | 6.4632 | 6.2098 | 5.9713 | 5.7466 | 5.5348 | 5.3349 | 4.9676 | 4.6389 | 4.4873 | 4.3436 | 4.0776 | 3.8372 | 3.4212 | 3.0758 | 2.7860 |
| 9 | 8.5660 | 8.1622 | 7.7861 | 7.4353 | 7.1078 | 6.8017 | 6.5152 | 6.2469 | 5.9952 | 5.7590 | 5.3282 | 4.9464 | 4.7716 | 4.6065 | 4.3030 | 4.0310 | 3.5655 | 3.1842 | 2.8681 |
| 10 | 9.4713 | 8.9826 | 8.5302 | 8.1109 | 7.7217 | 7.3601 | 7.0236 | 6.7101 | 6.4177 | 6.1446 | 5.6502 | 5.2161 | 5.0188 | 4.8332 | 4.4941 | 4.1925 | 3.6819 | 3.2689 | 2.9304 |
| 11 | 10.3676 | 9.7868 | 9.2526 | 8.7605 | 8.3064 | 7.8869 | 7.4987 | 7.1390 | 6.8052 | 6.4951 | 5.9377 | 5.4527 | 5.2337 | 5.0286 | 4.6560 | 4.3271 | 3.7757 | 3.3351 | 2.9776 |
| 12 | 11.2551 | 10.5753 | 9.9540 | 9.3851 | 8.8633 | 8.3838 | 7.9427 | 7.5361 | 7.1607 | 6.8137 | 6.1944 | 5.6603 | 5.4206 | 5.1971 | 4.7932 | 4.4392 | 3.8514 | 3.3868 | 3.0133 |
| 13 | 12.1337 | 11.3484 | 10.6350 | 9.9856 | 9.3936 | 8.8527 | 8.3577 | 7.9038 | 7.4869 | 7.1034 | 6.4235 | 5.8424 | 5.5831 | 5.3423 | 4.9095 | 4.5327 | 3.9124 | 3.4272 | 3.0404 |
| 14 | 13.0037 | 12.1062 | 11.2961 | 10.5631 | 9.8986 | 9.2950 | 8.7455 | 8.2442 | 7.7862 | 7.3667 | 6.6282 | 6.0021 | 5.7245 | 5.4675 | 5.0081 | 4.6106 | 3.9616 | 3.4587 | 3.0609 |
| 15 | 13.8651 | 12.8493 | 11.9379 | 11.1184 | 10.3797 | 9.7122 | 9.1079 | 8.5595 | 8.0607 | 7.6061 | 6.8109 | 6.1422 | 5.8474 | 5.5755 | 5.0916 | 4.6755 | 4.0013 | 3.4834 | 3.0764 |
| 16 | 14.7179 | 13.5777 | 12.5611 | 11.6523 | 10.8378 | 10.1059 | 9.4466 | 8.8514 | 8.3126 | 7.8237 | 6.9740 | 6.2651 | 5.9542 | 5.6685 | 5.1624 | 4.7296 | 4.0333 | 3.5026 | 3.0882 |
| 17 | 15.5623 | 14.2919 | 13.1661 | 12.1657 | 11.2741 | 10.4773 | 9.7632 | 9.1216 | 8.5436 | 8.0216 | 7.1196 | 6.3729 | 6.0472 | 5.7487 | 5.2223 | 4.7746 | 4.0591 | 3.5177 | 3.0971 |
| 18 | 16.3983 | 14.9920 | 13.7535 | 12.6593 | 11.6896 | 10.8276 | 10.0591 | 9.3719 | 8.7556 | 8.2014 | 7.2497 | 6.4674 | 6.1280 | 5.8178 | 5.2732 | 4.8122 | 4.0799 | 3.5294 | 3.1039 |
| 19 | 17.2260 | 15.6785 | 14.3238 | 13.1339 | 12.0853 | 11.1581 | 10.3356 | 9.6036 | 8.9501 | 8.3649 | 7.3658 | 6.5504 | 6.1982 | 5.8775 | 5.3162 | 4.8435 | 4.0967 | 3.5386 | 3.1090 |
| 20 | 18.0456 | 16.3514 | 14.8775 | 13.5903 | 12.4622 | 11.4699 | 10.5940 | 9.8181 | 9.1285 | 8.5136 | 7.4694 | 6.6231 | 6.2593 | 5.9288 | 5.3527 | 4.8696 | 4.1103 | 3.5458 | 3.1129 |
| 25 | 22.0232 | 19.5235 | 17.4131 | 15.6221 | 14.0939 | 12.7834 | 11.6536 | 10.6748 | 9.8226 | 9.0770 | 7.8431 | 6.8729 | 6.4641 | 6.0971 | 5.4669 | 4.9476 | 4.1474 | 3.5640 | 3.1220 |
| 30 | 25.8077 | 22.3965 | 19.6004 | 17.2920 | 15.3725 | 13.7648 | 12.4090 | 11.2578 | 10.2737 | 9.4269 | 8.0552 | 7.0027 | 6.5660 | 6.1772 | 5.5168 | 4.9789 | 4.1601 | 3.5693 | 3.1242 |
| 40 | 32.8347 | 27.3555 | 23.1148 | 19.7928 | 17.1591 | 15.0463 | 13.3317 | 11.9246 | 10.7574 | 9.7791 | 8.2438 | 7.1050 | 6.6418 | 6.2335 | 5.5482 | 4.9966 | 4.1659 | 3.5712 | 3.1250 |
| 50 | 39.1961 | 31.4236 | 25.7298 | 21.4822 | 18.2559 | 15.7619 | 13.8007 | 12.2335 | 10.9617 | 9.9148 | 8.3045 | 7.1327 | 6.6605 | 6.2463 | 5.5541 | 4.9995 | 4.1666 | 3.5714 | 3.1250 |
| 60 | 44.9550 | 34.7609 | 27.6756 | 22.6235 | 18.9293 | 16.1614 | 14.0392 | 12.3766 | 11.0480 | 9.9672 | 8.3240 | 7.1401 | 6.6651 | 6.2402 | 5.5553 | 4.9999 | 4.1667 | 3.5714 | 3.1250 |

kasneb

**CIFA PART II SECTION 4**

**PORTFOLIO MANAGEMENT**

**FRIDAY: 3 September 2021.** **Time Allowed: 3 hours.**

**Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings.**

**QUESTION ONE**

(a) In relation to pooled investment products:

(i) Explain the meaning of the term "mutual funds". (2 marks)

(ii) Summarise six advantages of investing in mutual funds. (6 marks)

(b) The following information relates to the value of a unit fund held by an investor as at 31 December 2020:

1. The account was valued at Sh.50 million at the month of January 2020 and Sh.57 million as at 31 December 2020.
2. During the next four quarters of the year 2020, the cash flows were as follows:

| Date | Cash flows (Sh."000") | Valuation (Sh."000") |
|---|---|---|
| 31 March 2020 | (2,580) | 53,000 |
| 30 June 2020 | (1,970) | 54,000 |
| 30 September 2020 | (1,125) | 55,000 |
| 31 December 2020 | 900 | 57,000 |

**Required:**

The time weighted rate of return (TWRR) for the fund as at 31 December 2020. (4 marks)

(c) Hydrax Ltd. is an all equity financed company with a cost of capital of 17.75%. The company is evaluating five annual capital investment projects with the following expected returns and risks:

| Project | Initial outlay Sh. "million" | Annual cash flow Sh. "million" | Beta |
|---|---|---|---|
| P | 150 | 165 | 0.3 |
| W | 150 | 170 | 0.5 |
| X | 200 | 240 | 1.0 |
| Y | 250 | 295 | 1.5 |
| Z | 250 | 300 | 2.0 |

**Additional information:**

1. The risk free rate of return is 7.5%.
2. The market rate of return is 16%.

**Required:**

(i) The beta factor of the company. (1 mark)

(ii) Using suitable computations, advise the management of Hydrax Ltd. on the project to undertake. (5 marks)

(iii) Compute the beta factor of the accepted project(s) based on your results in (c) (ii) above. (2 marks)

**(Total: 20 marks)**

**QUESTION TWO**

(a) Evaluate four ethical responsibilities of a portfolio manager. (4 marks)

(b) As the new investment analyst of Matrix Capital Ltd., you have been provided with the following information relating to a fund manager's return for the past four years:

| Year | Fund manager returns (%) | Market index returns (%) |
|---|---|---|
| 2020 | 9.385 | 9.676 |
| 2019 | 11.715 | 12.505 |
| 2018 | 14.211 | 13.125 |
| 2017 | 12.501 | 11.918 |

**Required:**

(i) The fund manager's tracking error. (4 marks)

(ii) Highlight three causes of tracking error in (b) (i) above. (3 marks)

(c) The following data describes a three-stock financial market that satisfies the single-index model:

| Stock | Capitalisation Sh. "million" | Beta | Mean excess return (%) | Standard deviation (%) |
|---|---|---|---|---|
| A | 3,000 | 1.0 | 10 | 40 |
| B | 1,940 | 0.2 | 2 | 30 |
| C | 1,360 | 1.7 | 17 | 50 |

The standard deviation of the market-index portfolio is 25%.

**Required:**

(i) The mean excess return of the index portfolio. (2 marks)

(ii) The covariance between stock A and stock B. (2 marks)

(iii) The covariance between stock B and the index. (2 marks)



(d) As a Certified Investment and Financial Analyst trainee, you recently landed a job in an investment firm and were posted in the private wealth management department. One of your clients, Mr. Richmond Mapesa, is a high net worth investor (HNI) with an estimated net worth of Sh.500 million. He would like to invest some of his money in tax efficient, low risk and high returns products. Further analysis into his investment profile indicates that he is risk averse and has low liquidity needs. He is also open to offshore investing.

**Required:**

Recommend three investment products available to Richmond Mapesa based on the information provided above.
(3 marks)
**(Total: 20 marks)**

**QUESTION THREE**

(a) Describe two consequences faced by financial market participants suffering from each of the following behavioural biases:

(i) Mental accounting. (2 marks)

(ii) Loss aversion bias. (2 marks)

(iii) Overconfidence bias. (2 marks)

(iv) Endowment bias. (2 marks)

(b) Teresia Nyaboke is assessing the performance of the actively managed diversified asset portfolio. The diversified asset portfolio is invested in equities, bonds and real estate and allocations to these asset classes and to the holdings within them are unconstrained. Selected return, financial, risk and statistical data are presented below:

| Asset Sub portfolio | Breadth (BR) | Sub portfolio return (%) | Benchmark return (%) | Portfolio Allocation (%) | Strategic asset allocation %) | Transfer coefficient (TC) | Information coefficient (IC) |
|---|---|---|---|---|---|---|---|
| Equities | 21 | 36.9 | 31.6 | 63 | 60 | 0.90 | 0.091 |
| Bonds | 23 | –2.4 | –2.6 | 28 | 35 | 0.79 | 0.087 |
| Real estate | 19 | 33.4 | 28.3 | 9 | 5 | 0.86 | 0.093 |

**Required:**
Calculate the following:

(i) The value added (VA) to the diversified asset portfolio attributable to security selection decision. (3 marks)

(ii) The value added to the diversified asset portfolio attributable to asset allocation decision. (3 marks)

(iii) The information ratio of each sub portfolio. (3 marks)

(c) Susan Atieno has compiled the following data for three active managers:

| Manager | Residual return (%) | Residual risk (%) | Level of risk aversion |
|---|---|---|---|
| 1 | 5.0 | 5.5 | 0.12 |
| 2 | 4.0 | 5.0 | 0.10 |
| 3 | 5.0 | 7.5 | 0.08 |

**Required**
Determine the manager that has the highest optimal level of residual risk. (3 marks)
**(Total: 20 marks)**

**QUESTION FOUR**

(a) Propose five applications of fintech in portfolio management. (5 marks)

(b) (i) Differentiate between "core capital" and "excess capital" in relation to private wealth management. (4 marks)

(i) Fredrick Onyango and Assumpta Akinyi are 74 and 71 years old respectively. They would like to maintain annual spending of Sh.500,000 on an inflation adjusted basis. Inflation is expected to be 3% and the nominal risk free rate is 5%. Their survival probabilities based on their current age are provided below:

| Year | Fredrick Onyango | Assumpta Akinyi | Probability survival (Fredrick Onyango) | Probability survival (Assumpta Akinyi) |
|---|---|---|---|---|
| 1 | 74 | 71 | 0.9355 | 0.9831 |
| 2 | 75 | 72 | 0.8702 | 0.9649 |
| 3 | 76 | 73 | 0.8038 | 0.9457 |

**Required:**
Calculate the couple's capitalised value of their core capital spending needs over the next three years. (4 marks)

(c) An analyst has estimated that the returns for an asset, conditional on the performance of the overall economy, are as follows:

| Return | Probability | Economic growth |
|---|---|---|
| 5% | 20% | Poor |
| 10% | 40% | Average |
| 14% | 40% | Good |

The conditional expected returns on the market portfolio are:

| Return | Probability | Economic growth |
|---|---|---|
| 2% | 20% | Poor |
| 10% | 40% | Average |
| 15% | 40% | Good |

The risk free rate is 5% and the risky asset has a beta of 1.1 with respect to the market portfolio.

**Required:**

(i) Using the capital asset pricing model (CAPM), determine whether the asset is correctly priced. (4 marks)

(ii) Examine three limitations of the capital asset pricing model (CAPM). (3 marks)

**(Total: 20 marks)**

**QUESTION FIVE**

(a) William Munyi, aged 69, has had bad luck with his investments in recent years and decides to consult you for advice. Munyi's portfolio is composed of 90% stocks and 10% bonds with a total value of Sh.2.6 million. Classifying himself as conservative, Munyi blamed the aggressive allocation on a previous money manager, and says he wants to substantially increase the fixed income weighting of his portfolio.

From his portfolio, Munyi hopes to fund his retirement at the rate of Sh.7,000 per month adjusted for inflation. He has also promised a local charity at least Sh.2 million upon his death. Munyi is in good health and most of the men in his family have lived into their late 80s.

**Required:**

Based solely on the information presented above, analyse the risk tolerance of the investor. (4 marks)

(b) A portfolio has the following returns:

| Month | Returns (%) |
|---|---|
| 1 | 0.99 |
| 2 | 0.22 |
| 3 | –0.30 |
| 4 | 1.10 |
| 5 | –0.04 |
| 6 | 1.50 |
| 7 | 2.50 |
| 8 | 1.50 |
| 9 | –0.50 |
| 10 | 1.20 |
| 11 | 1.09 |
| 12 | –1.20 |



The minimum acceptable return is 0.50% for each month.

**Required:**

The Sortino ratio of the portfolio. (6 marks)

(c) Consider a portfolio consisting of two securities as shown below:

| Stock | Weighting (Wo) | Standard deviation |
|---|---|---|
| AB | 0.40 | 4% |
| XY | 0.60 | 7% |

**Additional information:**

1. The portfolio value is Sh.50 million.
2. The correlation between the two stocks is 25% and the Z-score is –1.645.

**Required:**

(i) The value at risk (VaR) over 1 day period with a 95% confidence level. (4 marks)

(ii) Examine three applications of value at risk (VaR). (3 marks)

(iii) Highlight three weaknesses of VaR. (3 marks)

**(Total: 20 marks)**

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**CIFA PART II SECTION 4**

**PORTFOLIO MANAGEMENT**

**FRIDAY: 21 May 2021.** **Time Allowed: 3 hours.**

**Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings.**

**QUESTION ONE**

(a) Highlight four benefits of investing in an index fund. (4 marks)

(b) You have been appointed as a fund manager for a pension development fund for civil servants in your country.

**Required:**
Draft an investment policy statement (IPS) for the fund, clearly indicating the key sections. (10 marks)

(c) Examine three key differences between "traditional finance" and "behavioural finance". (6 marks)
**(Total: 20 marks)**

**QUESTION TWO**

(a) Felix Otieno, an analyst at Diamond Investment Fund has outlined the factor exposures of two stocks using macroeconomic factors as shown below:

| **Factor** | **Stock A** | **Stock B** |
|---|---|---|
| Confidence | 0.2 | 0.6 |
| Time horizon | 0.6 | 0.8 |
| Inflation | – 0.1 | – 0.5 |
| Business cycle | 4.0 | 2.0 |
| Market timing | 1.0 | 0.7 |

**Required:**

(i) Compute the factor exposures of a portfolio invested 50% in Stock A and remainder in Stock B. (3 marks)

(ii) Contrary to general forecasts, you expect strong economic growth with a slight increase in inflation. Recommend the stock that you should overweigh in your portfolio. (2 marks)

(b) An investment advisor is counselling Susan Nkatha, a client who recently inherited Sh.1.2 billion and has above average risk tolerance ($R_A = 2$) and wants returns that will outpace inflation in the long-term.

Susan expects to liquidate Sh.60 million of the portfolio in 12 months ideally without invading the initial capital.

The alternative strategic asset allocation choices for Susan are as follows:

| | **Investor's forecasts** | |
|---|---|---|
| **Asset allocation** | **Expected Return** | **Standard deviation of return** |
| A | 10% | 20% |
| B | 7% | 10% |
| C | 5.25% | 5% |

**Required:**

(i) Determine the preferred asset allocation based on risk adjusted expected returns for the asset allocation. (5 marks)

(ii) Determine the shortfall level, $R_L$, assuming that Susan's desire is not to invade the Sh.1.2 billion principal. (2 marks)

(iii) Select the best asset allocation using Roy's safety first criterion. (3 marks)

(c) The following information relates to price movements of some selected shares:

| Share | Start of year 2020 | End of year 2020 |
|---|---|---|
| X | 110 | 130 |
| Y | 76 | 72 |
| Z | 95 | 100 |

**Required:**

Calculate the following types of means based on the holding period return:

(i) Arithmetic mean. (2 marks)

(ii) Geometric mean. (2 marks)

(iii) Explain why a financial analyst is more likely to apply geometric mean as opposed to arithmetic mean. (1 mark)

**(Total: 20 marks)**

**QUESTION THREE**

(a) Summarise six assumptions of the capital asset pricing model (CAPM). (6 marks)

(b) An investor has decided to invest Sh.1 million in the shares of two companies namely Edulink (E) and Bookstore (B).

The projections of returns from the shares of the two companies along with their probabilities are as follows:

| Probability | Edulink (%) | Bookstore (%) |
|---|---|---|
| 0.20 | 12 | 16 |
| 0.25 | 14 | 10 |
| 0.25 | –7 | 28 |
| 0.30 | 28 | –2 |

**Required:**

Determine the proportion of each of the above shares required to formulate a minimum risk portfolio. (8 marks)

(c) Jeremiah Kiragu owns a portfolio with the following characteristics:

| | Security A | Security B | Risk free security |
|---|---|---|---|
| Factor 1 sensitivity | 0.80 | 1.50 | 0 |
| Factor 2 sensitivity | 0.60 | 1.20 | 0 |
| Expected return | 15% | 20% | 10% |

It is assumed that security returns are generated by a two factor model.

**Required:**

(i) Determine the sensitivity of Kiragu's portfolio to the two factors assuming that he has Sh.1 million to invest and sell short Sh.500,000 of security B and purchases Sh. 1,500,000 of security A. (2 marks)

(ii) Determine the sensitivity of the portfolio to the two factors assuming that Kiragu borrows Sh.1 million at the risk free rate and invest the amount he borrows along with the original amount of Sh.1 million in security A and security B in the same proportion as described in (c) (i) above. (2 marks)

(iii) Calculate the expected return premium of factor 2. (2 marks)

**(Total: 20 marks)**

**QUESTION FOUR**

(a) Explain the meaning of the following types of risks that could affect a portfolio:

(i) Compliance risk. (1 mark)

(ii) Operational risk (1 mark)

(iii) Counterparty risk. (1 mark)

(b) Summarise three ways that could be used by a portfolio manager to manage credit risks. (3 marks)

(c) Propose two applications of trusts as an estate planning tool. (4 marks)

(d) A consultant is analysing three investment managers for a new mandate.

The table below provides the managers' ex-ante active return expectations and portfolio weights.

The last two columns include the risk and the ex-post, realised active returns for the four securities:

| | Manager 1 | | Manager 2 | | Manager 3 | | | |
|---|---|---|---|---|---|---|---|---|
| | ΔW | E(RA) | ΔW | E(RA) | ΔW | E(RA) | Risk | Realised RA |
| Security 1 | −0.125 | 0.03 | 0.2 | 0.04 | −0.05 | 0.025 | 0.17 | 0.06 |
| Security 2 | 0.025 | 0.04 | 0 | 0.01 | 0.05 | 0.015 | 0.10 | 0.07 |
| Security 3 | 0.075 | 0.05 | −0.1 | 0 | 0.05 | 0.005 | 0.12 | 0.04 |
| Security 4 | 0.025 | 0.06 | −0.1 | 0.02 | −0.05 | 0.015 | 0.25 | 0.02 |

Where:

ΔW = Portfolio weight
E(RA) = Expected active return
RA = Active return

All the three managers claim to be good at forecasting returns and also claim to be efficient in portfolio construction.

**Required:**
Determine, using the full fundamental law of active management the following:

(i) The manager that is best at efficiently building portfolios by anticipating future returns. (5 marks)

(ii) The manager that is best at building portfolios to make full use of their ability to correctly anticipate returns. (5 marks)

**(Total: 20 marks)**

**QUESTION FIVE**

(a) Analyse three standardised methods for estimating value at risk (VaR). (6 marks)

(b) Evaluate four factors that could hinder a portfolio manager from investing internationally. (4 marks)

(c) The following information relates to a fund manager's annual return and the share index's return for the last five years:

| Year | Fund Manager's Returns (%) | Share index's Returns (%) |
|---|---|---|
| 2020 | 11.9 | 12.1 |
| 2019 | −6.8 | −5.9 |
| 2018 | 9.5 | 9.7 |
| 2017 | 13 | 12.8 |
| 2016 | 9.5 | 10.0 |

**Required:**

(i) The fund manager's tracking error. (3 marks)

(ii) State whether the fund manager is making progress on his portfolio management strategy. Justify your answer. (1 mark)

(d) As the Chief Investment Officer (CIO) of Uwezo Ltd., which is an all-equity financed company, you have over the years been investing in short-term projects that do not exceed one year to complete.

The company is considering investing in the following one year projects:

| Project | Initial Outlay Sh."000" | Expected cash flow Sh."000" | Beta factor |
|---|---|---|---|
| A | 13,300 | 14,600 | 0.3 |
| B | 13,300 | 15,100 | 0.5 |
| C | 20,000 | 23,700 | 1.0 |
| D | 26,700 | 31,800 | 1.5 |
| E | 26,700 | 32,000 | 2.0 |

**Additional information:**

1. The risk free rate is 8% and the expected return on the market portfolio is 15%.
2. The market-equilibrium cost of capital is 18.5%.
3. Neither of the projects is divisible.

**Required:**

(i) The company's beta factor. (1 mark)

(ii) Required rate of returns for each project using the capital asset pricing model (CAPM). (2 marks)

(iii) Expected returns for each project using undiscounted cash flows. (3 marks)

**(Total: 20 marks)**

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**CIFA PART II SECTION 4**

**PORTFOLIO MANAGEMENT**

**MONDAY: 30 November 2020.** **Time Allowed: 3 hours.**

**Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings.**

**QUESTION ONE**

(a) In the context of pooled investment products, examine four differences between "conventional mutual funds" and "exchange traded funds (ETFs)". (4 marks)

(b) Joel Mundia, an investment products analyst, has gathered the following information about three stocks:

| State of economy | Probability of State of economy | Rate of return if state of economy occurs | | |
|---|---|---|---|---|
| | | Stock A | Stock B | Stock C |
| Boom | 0.35 | 0.20 | 0.35 | 0.60 |
| Normal | 0.40 | 0.15 | 0.12 | 0.05 |
| Bust | 0.25 | 0.01 | – 0.25 | – 0.50 |

**Additional information:**

1. Joel Mundia has invested 40% each in stock A and B and 20% in stock C.
2. The expected Treasury bill rate is 3.80% and expected inflation rate is 3.50%.

**Required:**

Calculate the following:

(i) Portfolio expected return. (4 marks)

(ii) Portfolio standard deviation. (2 marks)

(iii) Expected risk premium on the portfolio. (2 marks)

(iv) Expected real risk premium on the portfolio. (2 marks)

(c) Benson Mwahima is a risk manager for a large multinational agribusiness firm. The firm grows its own maize, wheat and soya beans but pays large sums of money to third parties for pesticides, fertilizer and other supplies. For these payments, the company borrows heavily to finance its purchases. Customers typically purchases from them on credit. Moreover, the company buys and sells its products and raw materials worldwide, often transacting the domestic currency of its customers and suppliers. This year, the firm intends to finance its expansion through issue of equity.

**Required:**

Recommend and justify six risk exposures that should be reported as part of an enterprise risk management (ERP) system for this firm. (6 marks)

**(Total: 20 marks)**

**QUESTION TWO**

(a) In the context of behavioural finance, discuss four information processing biases. (8 marks)

(b) Susan Opiyo, an investor estimates that her annual living expenses will average Sh.132,500 before taking into account her daughter's educational costs. Susan believes that if necessary, she can reduce her spending by Sh.32,500. She plans to meet her living expenses with the proceeds from her motivational speaking amounting to Sh.50,000 annually and her investment portfolio amounting to sh.82,500. Because of the uncertainty of her motivational speaking fees, Susan plans to establish an emergency reserve equal to one year's living expenses.

She has recently received an inheritance of Sh.1,020,000. She also holds Sh.75,000 in a balanced mutual fund and Sh.25,000 in a money market fund.

Susan intends to re-evaluate her investment policy statement and asset allocation guidelines every three years.

**Required:**

(i) Discuss the investor's liquidity requirements. (4 marks)

(ii) Determine the investor's return requirement. (3 marks)

(iii) Evaluate whether the investor's portfolio can be expected to satisfy that requirement assuming inflation averages 3% annually and she reduces her annual living expenses to Sh.100,000. (2 marks)

(iv) Explain why an analysis of the investor's investment policy statement might become necessary before the next three-year review. (3 marks)

**(Total: 20 marks)**

**QUESTION THREE**

(a) Explain three functions of a private wealth manager. (6 marks)

(b) Grace Wanjohi and Colnerius Korir both have Sh.100,000 each split equally between a tax deferred account and a taxable account. Grace chooses to put stock with an expected return of 7% in the tax deferred account and bonds yielding 4% in the taxable account. Colnerius chooses to put stock with an expected return of 7% in the taxable account and bonds yielding 4% in the tax deferred account. When held in taxable account, equity returns will be taxed entirely as capital gains at a 5% rate, while interest income is taxed annually at a rate of 15%. The tax rate applicable to withdrawals from the tax deferred account will be 30%.

**Required:**

Calculate for Grace Wanjohi and Colnerius Korir, the after tax accumulation after 20 years. (4 marks)

(c) The investment committee of Matrix investment Ltd. used reports from various security analysts to develop inputs for the single-index model.



The output derived from the single model consisted of the following efficient portfolios:

| Portfolio | Expected return (%) | Standard deviation (%) |
|---|---|---|
| A | 8 | 3 |
| B | 10 | 6 |
| C | 13 | 8 |
| D | 17 | 13 |
| E | 20 | 18 |

**Required:**

(i) Assuming that the prevailing risk free rate is 6%, determine the optimal portfolio. (5 marks)

(ii) Assuming that the standard deviation of 12% were acceptable, determine the expected portfolio return and demonstrate how Matrix Investment Ltd. would finance it. (3 marks)

(iii) The investment committee would like to earn an expected return of 10% with a standard deviation of 4%.

Using suitable computation, explain whether this is possible. (2 marks)

**(Total: 20 marks)**

**QUESTION FOUR**

(a) Explain the following terms as used in investment management:

(i) Fintech. (2 marks)

(ii) Robo-Advisory services. (2 marks)

(iii) Distributed ledger technology (DLT). (2 marks)

(b) John Omurundo has gathered the following information about four individual securities whose active returns are uncorrelated with each other and forecasts are independent from year to year.

The active return forecasts, active risks and the active weights for each security are shown below:

| Security | Expected active Return (%) | Active return Volatility (%) | Active weight (%) |
|---|---|---|---|
| 1 | 5 | 25 | 18 |
| 2 | 10 | 50 | 9 |
| 3 | – 5 | 25 | – 18 |
| 4 | 10 | 50 | – 9 |

**Required:**

(i) The portfolio weights and the total expected returns for each of the four securities given that the benchmark portfolio for these four securities is equally weighted and that the forecasted return on the benchmark is 10%. (3 marks)

(ii) The forecasted total return and active return of the managed portfolio. (2 marks)

(iii) The active risk of the managed portfolio. (2 marks)

(iv) Verify the basic fundamental law of active management using the expected active return and active risk of the managed portfolio. The individual security active return forecasts and active weights were sized using an information coefficient of 0.20, breadth of 4 and active risk. (3 marks)

(c) With an aid of a well labelled diagram, differentiate between an "efficient portfolio" and an "optimal portfolio". (4 marks)

**(Total: 20 marks)**

**QUESTION FIVE**

(a) (i) Explain the term "ethical investor". (2 marks)

(ii) Propose two challenges that could be encountered by ethical investors while undertaking their portfolio management assignments. (2 marks)

(b) As a young Certified Investment and Financial Analyst (CIFA) graduate, you recently landed a job as a financial analyst trainee with Boma Capital.

You have been presented with the following information relating to portfolio of your company's shares trading at the Securities Exchange:

| Equity stock | 1 January 2019 (Sh.) | 31 December 2019 (Sh.) |
|---|---|---|
| P | 225,000 | 248,000 |
| Q | 86,000 | 75,000 |
| R | 152,500 | 167,500 |
| S | 105,000 | 90,000 |

**Required:**

Based on the holding period return (HPR), calculate the following:

(i) Arithmetic mean. (2 marks)

(ii) Geometric mean. (2 marks)

(iii) The value of the new index using the results obtained in (b) (i) and (b) (ii) above. Assume an initial index of 102. (2 marks)

(c) You recently got a job as a financial analyst with Aspen Consultants.

The following information have been availed to you relating to a client's portfolio return and the bond index return:

| Period | Portfolio return (%) | Bond index return (%) |
|---|---|---|
| 1 | – 0.62 | – 0.93 |
| 2 | 2.47 | 1.89 |
| 3 | 1.12 | 0.63 |
| 4 | 0.74 | – 0.15 |
| 5 | 1.19 | 0.67 |
| 6 | 2.05 | 1.37 |

**Required:**

(i) The annualised tracking error in basis points. (5 marks)

(ii) Comment on whether the portfolio return is succeeding or not based on your answer in (c) (i) above. (2 marks)

(d) Describe three major challenges in application of risk-adjusted performance measures in portfolio management. (3 marks)

**(Total: 20 marks)**

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**CIFA PART II SECTION 4**

**PORTFOLIO MANAGEMENT**

**THURSDAY: 28 November 2019.** **Time Allowed: 3 hours.**

**Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings.**

**QUESTION ONE**

(a) Highlight five steps involved in the portfolio management process. (5 marks)

(b) Explain three forms of investment strategies that could be adopted by a portfolio manager in the management of a client portfolio. (6 marks)

(c) The following financial data relates to the performance of company's X shares against the market share index over the last three year period:

| Year | Market index return (%) | Returns on company's shares (%) |
|---|---|---|
| 1 | 8 | 10 |
| 2 | 10 | 11 |
| 3 | 12 | 12 |

The Treasury bill rate has been stable at 6% per annum over the last three years.

**Required:**

(i) Using the capital asset pricing model (CAPM), determine the expected return for year 4 assuming that the market index return for the fourth year is forecasted at 14%. (6 marks)

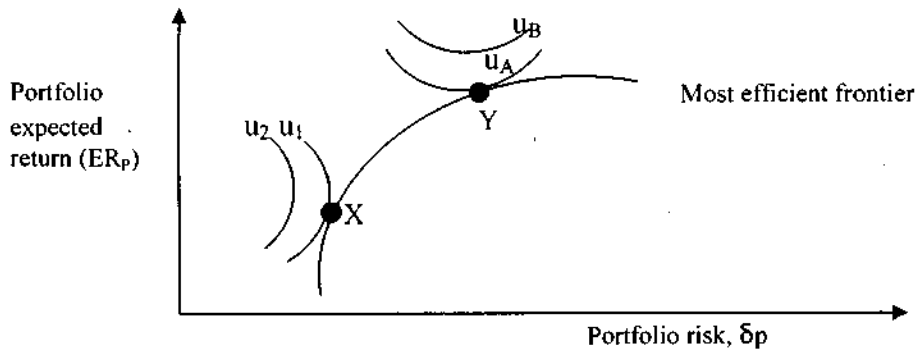
(ii) Advise a Kenyan fund manager who is planning to use CAPM on its practicability both in Kenya and in other African countries. (3 marks)

**(Total: 20 marks)**

**QUESTION TWO**

(a) Propose four investments constrains considered by a portfolio manager while developing an investment policy statement (IPS) for a client. (4 marks)

(b) Lewis Mulwa, a financial analyst at Kiwa Capital is analysing two investors, X and Y, whose portfolio performance is illustrated in the diagram below:




Where: $u_1$, $u_2$ and $u_A$, $u_B$ are the utility curves for investor X and Y respectively.

**Required:**

Describe investor X and investor Y in terms of their utility and investment decisions. (4 marks)

(c) An investment manager has time-weighted returns for the first six months of the year as follows:

| Month | Monthly returns (%) |
|---|---|
| January | 1.25 |
| February | 3.47 |
| March | -2.36 |
| April | 1.89 |
| May | -2.67 |
| June | 2.57 |

**Required:**

(i) A time-weighted rate of return for the investment manager by chain-linking the monthly time-weighted returns. (2 marks)

(ii) Compare and contrast the time-weighted rate of return with a calculation involving adding the monthly rates of return. (4 marks)

(d) The table below provides information on two securities assumed to constitute the market portfolio:

| Security | Expected return | Standard deviation | Proportion |
|---|---|---|---|
| A | 10% | 20% | 0.40 |
| B | 15% | 28% | 0.60 |

The correlation between the two securities is 0.3 and the risk-free rate is 5%.

**Required:**

Predict the capital market line (CML) equation for the portfolio. (6 marks)

**(Total: 20 marks)**



**QUESTION THREE**

(a) Examine three major risks associated with managing a portfolio against a liability structure. (6 marks)

(b) Phan Limited wishes to buy Sh.1,000,000 worth of shares in each of two companies from a choice of three companies; X Ltd., Y Ltd. and Z Ltd. that it might wish to acquire at some future date. The three companies are in different industries. Historical data for 5 years on the risk and return of the three companies are provided below:

| Company | Annual average returns (%) | Standard deviation of returns (%) |
|---|---|---|
| X | 11 | 17 |
| Y | 20 | 29 |
| Z | 14 | 21 |

**Correlation coefficient between returns**

| Company | |
|---|---|
| X and Y | 0.00 |
| X and Z | 0.62 |
| Y and Z | 0.40 |

**Required:**

(i) Using suitable computations, advise Phan Limited on the most efficient portfolio to select for investment. (7 marks)

(ii) Explain whether the company's strategy should be to purchase the most efficient portfolio identified in (b) (i) above. (3 marks)

(c) The following table shows the portfolio estimated factor sensitivity of Nella Limited to the Fama-French three-factor model and the risk premiums associated with each factor:

| | Factor sensitivity | Risk premium (%) |
|---|---|---|
| Market factor | 1.25 | 9.0 |
| Size factor | -0.60 | 5.4 |
| Value factor | -0.25 | 8.6 |

The risk-free rate is 9.4%.

**Required:**

(i) The required rate of return for the company using the Fama-French three factor model. (2 marks)

(ii) Comment on the expected style characteristics of the company based on its factor sensitivities. (2 marks)

**(Total: 20 marks)**

**QUESTION FOUR**

(a) In relation to behavioural finance, discuss four challenges that portfolio managers could face while classifying and understanding individual investor behaviour. (8 marks)

(b) During the annual evaluation of fund managers, an asset management firm collected the following data on the performance of its two fund managers, A and B:

| | Fund manager A | | Fund manager B | | Market index | |
|---|---|---|---|---|---|---|
| Asset | Weight (%) | Return (%) | Weight (%) | Return (%) | Weight (%) | Return (%) |
| 1 | 60 | 18 | 40 | 12 | 33.3 | 12 |
| 2 | 20 | 15 | 30 | 10.5 | 33.3 | 9 |
| 3 | 20 | 5 | 30 | 8.4 | 33.3 | 6 |

**Required:**

Determine the best performing manager in terms of the following criterion:

(i) Value added (VA). (4 marks)

(ii) Asset selection skills. (4 marks)

(iii) Asset allocation skills. (4 marks)

**(Total: 20 marks)**

**QUESTION FIVE**

(a) (i) Explain the term "estate planning" as used in portfolio management. (2 marks)

(ii) Assess three estate planning tools that could be used to manage private wealth. (6 marks)

(b) An analyst develops the assumptions below which will be used for estimating the portfolio value at risk (VaR) for a Sh.260 million portfolio:

| Method | Average return assumption (%) | Standard deviation assumption (%) |
|---|---|---|
| Monte Carlo simulation | 0.026 | 0.501 |
| Parametric approach | 0.026 | 0.501 |
| Historical simulation | 0.023 | 0.490 |

The analyst decides to apply annual 1% VaR limit of Sh.260 million in his portfolio. The number of standard deviations to attain 1% VaR is 2.33.

Assume the year has 250 days.

**Required:**

The portfolio's annual 1% parametric VaR. (4 marks)

(c) A financial advisory firm is considering subscribing to the investment newsletters of two independent equity analysts; Jack and Elizabeth. Their alphas, residual risk and correlation between forecasted and realised alpha are provided in the table below:

| | Jack | Elizabeth |
|---|---|---|
| Alpha | 4% | 7% |
| Residual risk ($\sigma^2$) | 0.30 | 0.40 |
| Correlation between forecasted and realised alpha | 0.85 | 0.60 |

A regression of forecast alpha on realised alphas $\alpha^f = a_0 + a_1\alpha^r + \varepsilon$ indicated that Jack and Elizabeth's forecast were not biased. There are two stocks in the active portfolio, one recommended by Jack and the other by Elizabeth.

**Required:**

Using the Treynor-Black Model and alphas adjusted for each analyst's forecast accuracy, determine the optimal allocation of the stock recommended by Jack to the active portfolio. (4 marks)

(d) Titus Makanda, an active portfolio manager, has on an annual basis a 5% portfolio return with a standard deviation of 10% and a tracking error of 5%.

Assume that the benchmark return is 2.5% per annum and a risk-free rate is 0.1% per annum.

**Required:**

(i) The Sharpe ratio of the portfolio manager. (2 marks)

(ii) The information ratio of the portfolio manager. (2 marks)

**(Total: 20 marks)**

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## Present Value of 1 Received at the End of $n$ Periods:

$$PVIF_{r,n} = 1/(1+r)^n = (1+r)^{-n}$$

| Period | 1% | 2% | 3% | 4% | 5% | 6% | 7% | 8% | 9% | 10% | 12% | 14% | 15% | 16% | 18% | 20% | 24% | 28% | 32% | 36% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .9901 | .9804 | .9709 | .9615 | .9524 | .9434 | .9346 | .9259 | .9174 | .9091 | .8929 | .8772 | .8696 | .8621 | .8475 | .8333 | .8065 | .7813 | .7576 | .7353 |
| 2 | .9803 | .9612 | .9426 | .9246 | .9070 | .8900 | .8734 | .8573 | .8417 | .8264 | .7972 | .7695 | .7561 | .7432 | .7182 | .6944 | .6504 | .6104 | .5739 | .5407 |
| 3 | .9706 | .9423 | .9151 | .8890 | .8638 | .8396 | .8163 | .7938 | .7722 | .7513 | .7118 | .6750 | .6575 | .6407 | .6086 | .5787 | .5245 | .4768 | .4348 | .3975 |
| 4 | .9610 | .9238 | .8885 | .8548 | .8227 | .7921 | .7629 | .7350 | .7084 | .6830 | .6355 | .5921 | .5718 | .5523 | .5158 | .4823 | .4230 | .3725 | .3294 | .2923 |
| 5 | .9515 | .9057 | .8626 | .8219 | .7835 | .7473 | .7130 | .6806 | .6499 | .6209 | .5674 | .5194 | .4972 | .4761 | .4371 | .4019 | .3411 | .2910 | .2495 | .2149 |
| 6 | .9420 | .8880 | .8375 | .7903 | .7462 | .7050 | .6663 | .6302 | .5963 | .5645 | .5066 | .4556 | .4323 | .4104 | .3704 | .3349 | .2751 | .2274 | .1890 | .1580 |
| 7 | .9327 | .8706 | .8131 | .7599 | .7107 | .6651 | .6227 | .5835 | .5470 | .5132 | .4523 | .3996 | .3759 | .3538 | .3139 | .2791 | .2218 | .1776 | .1432 | .1162 |
| 8 | .9235 | .8535 | .7894 | .7307 | .6768 | .6274 | .5820 | .5403 | .5019 | .4665 | .4039 | .3506 | .3269 | .3050 | .2660 | .2326 | .1789 | .1388 | .1085 | .0854 |
| 9 | .9143 | .8368 | .7664 | .7026 | .6446 | .5919 | .5439 | .5002 | .4604 | .4241 | .3606 | .3075 | .2843 | .2630 | .2255 | .1938 | .1443 | .1084 | .0822 | .0628 |
| 10 | .9053 | .8203 | .7441 | .6756 | .6139 | .5584 | .5083 | .4632 | .4224 | .3855 | .3220 | .2697 | .2472 | .2267 | .1911 | .1615 | .1164 | .0847 | .0623 | .0462 |
| 11 | .8963 | .8043 | .7224 | .6496 | .5847 | .5268 | .4751 | .4289 | .3875 | .3505 | .2875 | .2366 | .2149 | .1954 | .1619 | .1346 | .0938 | .0662 | .0472 | .0340 |
| 12 | .8874 | .7885 | .7014 | .6246 | .5568 | .4970 | .4440 | .3971 | .3555 | .3186 | .2567 | .2076 | .1869 | .1685 | .1372 | .1122 | .0757 | .0517 | .0357 | .0250 |
| 13 | .8787 | .7730 | .6810 | .6006 | .5303 | .4688 | .4150 | .3677 | .3262 | .2897 | .2292 | .1821 | .1625 | .1452 | .1163 | .0935 | .0610 | .0404 | .0271 | .0184 |
| 14 | .8700 | .7579 | .6611 | .5775 | .5051 | .4423 | .3878 | .3405 | .2992 | .2633 | .2046 | .1597 | .1413 | .1252 | .0985 | .0779 | .0492 | .0316 | .0205 | .0135 |
| 15 | .8613 | .7430 | .6419 | .5553 | .4810 | .4173 | .3624 | .3152 | .2745 | .2394 | .1827 | .1401 | .1229 | .1079 | .0835 | .0649 | .0397 | .0247 | .0155 | .0099 |
| 16 | .8528 | .7284 | .6232 | .5339 | .4581 | .3936 | .3387 | .2919 | .2519 | .2176 | .1631 | .1229 | .1069 | .0930 | .0708 | .0541 | .0320 | .0193 | .0118 | .0073 |
| 17 | .8444 | .7142 | .6050 | .5134 | .4363 | .3714 | .3166 | .2703 | .2311 | .1978 | .1456 | .1078 | .0929 | .0802 | .0600 | .0451 | .0258 | .0150 | .0089 | .0054 |
| 18 | .8360 | .7002 | .5874 | .4936 | .4155 | .3503 | .2959 | .2502 | .2120 | .1799 | .1300 | .0946 | .0808 | .0691 | .0508 | .0376 | .0208 | .0118 | .0068 | .0039 |
| 19 | .8277 | .6864 | .5703 | .4746 | .3957 | .3305 | .2765 | .2317 | .1945 | .1635 | .1161 | .0829 | .0703 | .0596 | .0431 | .0313 | .0168 | .0092 | .0051 | .0029 |
| 20 | .8195 | .6730 | .5537 | .4564 | .3769 | .3118 | .2584 | .2145 | .1784 | .1486 | .1037 | .0728 | .0611 | .0514 | .0365 | .0261 | .0135 | .0072 | .0039 | .0021 |
| 25 | .7798 | .6095 | .4776 | .3751 | .2953 | .2330 | .1842 | .1460 | .1160 | .0923 | .0588 | .0378 | .0304 | .0245 | .0160 | .0105 | .0046 | .0021 | .0010 | .0005 |
| 30 | .7419 | .5521 | .4120 | .3083 | .2314 | .1741 | .1314 | .0994 | .0754 | .0573 | .0334 | .0196 | .0151 | .0116 | .0070 | .0042 | .0016 | .0006 | .0002 | .0001 |
| 40 | .6717 | .4529 | .3066 | .2083 | .1420 | .0972 | .0668 | .0460 | .0318 | .0221 | .0107 | .0053 | .0037 | .0026 | .0013 | .0007 | .0002 | .0001 | * | * |
| 50 | .6080 | .3715 | .2281 | .1407 | .0872 | .0543 | .0339 | .0213 | .0134 | .0085 | .0035 | .0014 | .0009 | .0006 | .0003 | .0001 | * | * | * | * |
| 60 | .5504 | .3048 | .1697 | .0951 | .0535 | .0303 | .0173 | .0099 | .0057 | .0033 | .0011 | .0004 | .0002 | .0001 | * | * | * | * | * | * |

* The factor is zero to four decimal places

## Present Value of an Annuity of 1 Per Period for n Periods:

$$PVIF_{r,n} = \sum_{t=1}^{n} \frac{1}{(1+r)^t} = \frac{1 - \frac{1}{(1+r)^n}}{r}$$

| Number of payments | 1% | 2% | 3% | 4% | 5% | 6% | 7% | 8% | 9% | 10% | 12% | 14% | 15% | 16% | 18% | 20% | 24% | 28% | 32% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.9901 | 0.9804 | 0.9709 | 0.9615 | 0.9524 | 0.9434 | 0.9346 | 0.9259 | 0.9174 | 0.9091 | 0.8929 | 0.8772 | 0.8696 | 0.8621 | 0.8475 | 0.8333 | 0.8065 | 0.7813 | 0.7576 |
| 2 | 1.9704 | 1.9416 | 1.9135 | 1.8861 | 1.8594 | 1.8334 | 1.8080 | 1.7833 | 1.7591 | 1.7355 | 1.6901 | 1.6467 | 1.6257 | 1.6052 | 1.5656 | 1.5278 | 1.4568 | 1.3916 | 1.3315 |
| 3 | 2.9410 | 2.8839 | 2.8286 | 2.7751 | 2.7232 | 2.6730 | 2.6243 | 2.5771 | 2.5313 | 2.4869 | 2.4018 | 2.3216 | 2.2832 | 2.2459 | 2.1743 | 2.1065 | 1.9813 | 1.8684 | 1.7663 |
| 4 | 3.9020 | 3.8077 | 3.7171 | 3.6299 | 3.5460 | 3.4651 | 3.3872 | 3.3121 | 3.2397 | 3.1699 | 3.0373 | 2.9137 | 2.8550 | 2.7982 | 2.6901 | 2.5887 | 2.4043 | 2.2410 | 2.0957 |
| 5 | 4.8534 | 4.7135 | 4.5797 | 4.4518 | 4.3295 | 4.2124 | 4.1002 | 3.9927 | 3.8897 | 3.7908 | 3.6048 | 3.4331 | 3.3522 | 3.2743 | 3.1272 | 2.9906 | 2.7454 | 2.5320 | 2.3452 |
| 6 | 5.7955 | 5.6014 | 5.4172 | 5.2421 | 5.0757 | 4.9173 | 4.7665 | 4.6229 | 4.4859 | 4.3553 | 4.1114 | 3.8887 | 3.7845 | 3.6847 | 3.4976 | 3.3255 | 3.0205 | 2.7594 | 2.5342 |
| 7 | 6.7282 | 6.4720 | 6.2303 | 6.0021 | 5.7864 | 5.5824 | 5.3893 | 5.2064 | 5.0330 | 4.8684 | 4.5638 | 4.2883 | 4.1604 | 4.0386 | 3.8115 | 3.6046 | 3.2423 | 2.9370 | 2.6775 |
| 8 | 7.6517 | 7.3255 | 7.0197 | 6.7327 | 6.4632 | 6.2098 | 5.9713 | 5.7466 | 5.5348 | 5.3349 | 4.9676 | 4.6389 | 4.4873 | 4.3436 | 4.0776 | 3.8372 | 3.4212 | 3.0758 | 2.7860 |
| 9 | 8.5660 | 8.1622 | 7.7861 | 7.4353 | 7.1078 | 6.8017 | 6.5152 | 6.2469 | 5.9952 | 5.7590 | 5.3282 | 4.9464 | 4.7716 | 4.6065 | 4.3030 | 4.0310 | 3.5655 | 3.1842 | 2.8681 |
| 10 | 9.4713 | 8.9826 | 8.5302 | 8.1109 | 7.7217 | 7.3601 | 7.0236 | 6.7101 | 6.4177 | 6.1446 | 5.6502 | 5.2161 | 5.0188 | 4.8332 | 4.4941 | 4.1925 | 3.6819 | 3.2689 | 2.9304 |
| 11 | 10.3676 | 9.7868 | 9.2526 | 8.7605 | 8.3064 | 7.8869 | 7.4987 | 7.1390 | 6.8052 | 6.4951 | 5.9377 | 5.4527 | 5.2337 | 5.0286 | 4.6560 | 4.3271 | 3.7757 | 3.3351 | 2.9776 |
| 12 | 11.2551 | 10.5753 | 9.9540 | 9.3851 | 8.8633 | 8.3838 | 7.9427 | 7.5361 | 7.1607 | 6.8137 | 6.1944 | 5.6603 | 5.4206 | 5.1971 | 4.7932 | 4.4392 | 3.8514 | 3.3868 | 3.0133 |
| 13 | 12.1337 | 11.3484 | 10.6350 | 9.9856 | 9.3936 | 8.8527 | 8.3577 | 7.9038 | 7.4869 | 7.1034 | 6.4235 | 5.8424 | 5.5831 | 5.3423 | 4.9095 | 4.5327 | 3.9124 | 3.4272 | 3.0404 |
| 14 | 13.0037 | 12.1062 | 11.2961 | 10.5631 | 9.8986 | 9.2950 | 8.7455 | 8.2442 | 7.7862 | 7.3667 | 6.6282 | 6.0021 | 5.7245 | 5.4675 | 5.0081 | 4.6106 | 3.9616 | 3.4587 | 3.0609 |
| 15 | 13.8651 | 12.8493 | 11.9379 | 11.1184 | 10.3797 | 9.7122 | 9.1079 | 8.5595 | 8.0607 | 7.6061 | 6.8109 | 6.1422 | 5.8474 | 5.5755 | 5.0916 | 4.6755 | 4.0013 | 3.4834 | 3.0764 |
| 16 | 14.7179 | 13.5777 | 12.5611 | 11.6523 | 10.8378 | 10.1059 | 9.4466 | 8.8514 | 8.3126 | 7.8237 | 6.9740 | 6.2651 | 5.9542 | 5.6685 | 5.1624 | 4.7296 | 4.0333 | 3.5026 | 3.0882 |
| 17 | 15.5623 | 14.2919 | 13.1661 | 12.1657 | 11.2741 | 10.4773 | 9.7632 | 9.1216 | 8.5436 | 8.0216 | 7.1196 | 6.3729 | 6.0472 | 5.7487 | 5.2223 | 4.7746 | 4.0591 | 3.5177 | 3.0971 |
| 18 | 16.3983 | 14.9920 | 13.7535 | 12.6593 | 11.6896 | 10.8276 | 10.0591 | 9.3719 | 8.7556 | 8.2014 | 7.2497 | 6.4674 | 6.1280 | 5.8178 | 5.2732 | 4.8122 | 4.0799 | 3.5294 | 3.1039 |
| 19 | 17.2260 | 15.6785 | 14.3238 | 13.1339 | 12.0853 | 11.1581 | 10.3356 | 9.6036 | 8.9501 | 8.3649 | 7.3658 | 6.5504 | 6.1982 | 5.8775 | 5.3162 | 4.8435 | 4.0967 | 3.5386 | 3.1090 |
| 20 | 18.0456 | 16.3514 | 14.8775 | 13.5903 | 12.4622 | 11.4699 | 10.5940 | 9.8181 | 9.1285 | 8.5136 | 7.4694 | 6.6231 | 6.2593 | 5.9288 | 5.3527 | 4.8696 | 4.1103 | 3.5458 | 3.1129 |
| 25 | 22.0232 | 19.5235 | 17.4131 | 15.6221 | 14.0939 | 12.7834 | 11.6536 | 10.6748 | 9.8226 | 9.0770 | 7.8431 | 6.8729 | 6.4641 | 6.0971 | 5.4669 | 4.9476 | 4.1474 | 3.5640 | 3.1220 |
| 30 | 25.8077 | 22.3965 | 19.6004 | 17.2920 | 15.3725 | 13.7648 | 12.4090 | 11.2578 | 10.2737 | 9.4269 | 8.0552 | 7.0027 | 6.5660 | 6.1772 | 5.5168 | 4.9789 | 4.1601 | 3.5693 | 3.1242 |
| 40 | 32.8347 | 27.3555 | 23.1148 | 19.7928 | 17.1591 | 15.0463 | 13.3317 | 11.9246 | 10.7574 | 9.7791 | 8.2438 | 7.1050 | 6.6418 | 6.2335 | 5.5482 | 4.9966 | 4.1659 | 3.5712 | 3.1250 |
| 50 | 39.1961 | 31.4236 | 25.7298 | 21.4822 | 18.2559 | 15.7619 | 13.8007 | 12.2335 | 10.9617 | 9.9148 | 8.3045 | 7.1327 | 6.6605 | 6.2463 | 5.5541 | 4.9995 | 4.1666 | 3.5714 | 3.1250 |
| 60 | 44.9550 | 34.7609 | 27.6756 | 22.6235 | 18.9293 | 16.1614 | 14.0392 | 12.3766 | 11.0480 | 9.9672 | 8.3240 | 7.1401 | 6.6651 | 6.2402 | 5.5553 | 4.9999 | 4.1667 | 3.5714 | 3.1250 |

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**CIFA PART II SECTION 4**

**PORTFOLIO MANAGEMENT**

**FRIDAY: 24 May 2019.** **Time Allowed: 3 hours.**

**Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings.**

**QUESTION ONE**

(a) Describe three investment processes in relation to the investment policy statement (IPS). (6 marks)

(b) A study by Celtic mutual fund has revealed the following data in respect of three securities:

| Security | Standard deviation, σ (%) | Correlation with market index, ρ |
|---|---|---|
| A | 20 | 0.60 |
| B | 18 | 0.95 |
| C | 12 | 0.75 |

The standard deviation of market portfolio is observed to be 15%.



**Required:**
Calculate the following:

(i) Beta of the portfolio consisting of equal investment in each security. (3 marks)

(ii) The systematic risk of the portfolio. (2 marks)

(iii) The unsystematic risk of the portfolio. (4 marks)

(c) The following information relates to five portfolios managed by Saraya Mutual Fund Ltd.:

| Portfolio | Expected return (ER) (%) | Variance ($\sigma^2$) |
|---|---|---|
| 1 | 10.0 | 0.0256 |
| 2 | 14.0 | 0.0484 |
| 3 | 11.20 | 0.0169 |
| 4 | 16.80 | 0.0625 |
| 5 | 19.30 | 0.0289 |

**Additional information:**
1. The expected return of the market is 13%.
2. The standard deviation of the market return is 16%.
3. The risk-free rate of return is 6%.

**Required:**
(i) Using the capital asset pricing model (CAPM), determine which of the above portfolios are over-valued or under-valued. (4 marks)

(ii) Based on the result in (c) (i) above, advise an investor who is considering buying or selling a security. (1 mark)

**(Total: 20 marks)**

**QUESTION TWO**

(a) (i) Examine three ways in which value at risk (VaR) and stress-testing techniques could be applied in assessing capital adequancy in growth firms. (3 marks)

(ii) Elizabeth Mutesi works in the risk management department of a mutual fund and uses the variance-covariance method to estimate the weekly value at risk (VaR) for a fund. She assumes returns are normally distributed and uses a Z-value of 1.65 for a 5% probability.

Summary statistics and capital market expectations are provided below:

| | Developed market bonds | Developed market equities |
|---|---|---|
| | (%) | (%) |
| Target portfolio weight | 60 | 40 |
| Expected annual return | 8 | 14 |
| Expected annual standard deviation | 10 | 16 |
| Expected correlation between the developed market bonds and developed market equities | 0.50 | |
| Portfolio beta | 0.78 | |
| Portfolio size | Sh.100 million | |
| Assume one year has 52 weeks | | |

**Required:**
The 5% weekly VaR in shillings using the variance-covariance method. (6 marks)

(b) The universe of available risky securities consists of a large number of shares, identically distributed with expected return of 15%, standard deviation of 60% and a common correlation coefficient of 0.5. The Treasury bill yield is at 10%.

**Hint:**

$$\sigma p = \left( \sigma^2/n + p \times \sigma^2 (n-1)/n \right)^{1/2}$$

Where: n is number of shares
p is correlation coefficient
σ is standard deviation

**Required:**
(i) Determine the smallest number of shares necessary to generate an efficient portfolio with a standard deviation equal to or smaller than 43%. (2 marks)

(ii) The slope of the capital market line (CML). (3 marks)

(c) A financial analyst gathered the following data relating to Zeldic fund:

| | |
|---|---|
| Information ratio (IR) | 0.25 |
| Benchmark Sharpe ratio | 0.30 |
| Benchmark total risk | 20% |

**Required:**
(i) The optimal level of active risk for an investor in Zeldic fund. (3 marks)

(ii) The total excess return for the investor in Zeldic fund. (3 marks)

**(Total: 20 marks)**

**QUESTION THREE**

(a) Explain how the following biases could affect investors in the context of behavioural finance:

(i) The narrative fallacy. (2 marks)

(ii) Framing bias. (2 marks)

(iii) Self-serving bias. (2 marks)

(b) (i) Explain the term "tax alpha" as used in private wealth management. (2 marks)

(ii) Johnson Masinde is advising two clients on matters relating to tax on their portfolios.

**Client 1:** The client lives in a tax jurisdiction with a flat tax rate of 30% which applies to all types of income and is taxed annually. The client expects to earn 10% per year on his investment over a 20 year time horizon and has an initial portfolio of Sh.1 million.

**Client 2:** The client expects to earn 10% per year on his investment over a 20 year time horizon and has an initial portfolio of Sh.1 million. The returns come in the form of deferred capital gain that are not taxed until the end of the 20 years. The capital gain tax is 5%.

**Required:**
For each client:

(i) Calculate the expected wealth at the end of 20 years. (4 marks)

(ii) Determine the proportion of potential investment gains consumed by taxes. (4 marks)

(c) The following information relates to Bidii College Endowment fund:

| | | |
|---|---|---|
| **Type of investor** | : | Institutional endowment |
| **Purpose** | : | Provide annual scholarship totalling Sh.39.5 million. |
| **Asset base** | : | Sh.1 billion. |
| **Stated return desire** | : | 6% calculated as a spending rate of 4% plus previously expected college tuition inflation of 2%. |
| **Other return factors** | : | Revised expectation of college tuition inflation is 3%. |
| **Tax concerns** | : | Tax exempt. |

**Required:**
Discuss the following appropriate client objectives for the endowment fund:

(i) Risk. (2 marks)

(ii) Return. (2 marks)

**(Total: 20 marks)**



**QUESTION FOUR**

(a) In relation to active portfolio management, analyse three factors that could determine the information ratio (IR). (3 marks)

(b) Smoothline Fund invests in three asset classes namely; domestic equities, domestic bonds and international equities.

The asset allocation weights of Smoothline Fund and the expected performance of each asset class and the benchmark are shown below:

| **Asset class** | **Portfolio weight ($wp_i$) (%)** | **Benchmark weight ($WB_i$) (%)** | **Portfolio return E(RR) (%)** | **Benchmark return ($ERB_i$) (%)** |
|---|---|---|---|---|
| Domestic equities | 45 | 40 | 11 | 12 |
| Domestic bonds | 30 | 30 | 6 | 5 |
| International equities | 25 | 30 | 14 | 12 |

**Required:**
The expected active return for the portfolio. (4 marks)

(c) Rosaline Awuor is a young ICIFA graduate who finalised her studies three years ago and started a small practice as an independent financial advisor. However, her firm does not handle client's money but only offers consultancy advisory services to her clients. Upon successful sourcing of a client, she proceeds to recommend and place the client with a fund manager or investment firm on which she earns structured agency commission on that account.

One of Roseline's client, Douglas Kogi, is evaluating two investment managers who have the following characteristics:

**Manager X:** Follows 100 stock index with annual forecast and information co-efficient (IC) of 0.076.

**Manager Y:** Follows 500 stock index with an annual forecast and IC of each forecast is half as much of Manager X's security forecast.

**Required:**

(i) The information ratio (IR) for Manager X and Manager Y. (2 marks)

(ii) Advise Roseline on the manager to recommend based on your answer in (c) (i) above. (1 mark)

(iii) Evaluate four ethical issues that Roseline is likely to encounter in the course of her duties as an independent financial adviser. (4 marks)

(d) An investor purchased Sh.10,000 of a mutual fund's shares.

The fund had the following total returns over a three year period; +5%, -8%, +12%.

**Required:**

(i) The fund's holding period return (HPR). (1 mark)

(ii) The fund's geometric mean. (1 mark)

(e) Alex Kubasu intends to buy 1,000 shares of Vini Limited at a purchase price of Sh.100 each. The annual dividend per share (DPS) is Sh.2.00. The share price after one year is projected to be Sh.110 per share. The initial margin requirement is 40%, the call money rate is 4% and the commission per share is Sh.0.05.

**Required:**

The investor's return on the margin transaction. (4 marks)

**(Total: 20 marks)**

**QUESTION FIVE**

(a) Evaluate four ways in which behavioural biases could affect portfolio construction. (8 marks)

(b) In relation to mutual funds:

(i) Distinguish between an "open-end mutual fund" and a "closed-end mutual fund". (2 marks)

(ii) Describe two types of fees charged by mutual funds. (2 marks)

(c) Philip Mwea, an investment analyst at Pritz Fund Management (PFM) is valuing two equity markets. Market A is a developed market while Market B is an emerging market.

**Additional information:**

| | | |
|---|---|---|
| 1. | Sharpe ratio of the global investable portfolio | 0.29 |
| 2. | Standard deviation of the global investable portfolio | 9% |
| 3. | Risk-free rate of return | 5% |
| 4. | Degree of market integration for Market A | 80% |
| 5. | Degree of market integration for Market B | 65% |
| 6. | Standard deviation of Market A | 17% |
| 7. | Standard deviation of Market B | 28% |
| 8. | Correlation of Market A with global investable portfolio | 0.82 |
| 9. | Correlation of Market B with global investable portfolio | 0.63 |
| 10. | Estimated illiquidity premium for Market A | 0.0% |
| 11. | Estimated illiquidity premium for Market B | 2.3% |

The investor's time horizon is five years.

**Required:**

(i) Assets expected returns. (4 marks)

(ii) Asset beta for each market. (2 marks)

(iii) Covariance of the two equity markets. (2 marks)

**(Total: 20 marks)**

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**CIFA PART II SECTION 4**

**PORTFOLIO MANAGEMENT**

**FRIDAY: 30 November 2018** **Time Allowed: 3 hours.**

**Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings.**

**QUESTION ONE**

(a) Portfolio managers are employed or contracted by a wide variety of investment clients.

In relation to the above statement, explain five categories of investment clients outlining their distinctive characteristics and needs in each case. (5 marks)

(b) Susan Maritim has been investing in Zawadi Limited's shares for the past two years. On 1 January 2016, she purchased a share of the company at Sh.50 and on 31 January 2016, she purchased another share of the company at Sh.65. Zawadi Limited paid a dividend of Sh.2 per share in each of the years 2016 and 2017. At the end of year 2017, Susan sold both shares for Sh.70 each.

**Required:**

(i) The time-weighted rate of return on the investment. (3 marks)

(ii) The money-weighted rate of return on the investment. (3 marks)



(c) Joyce Kanini, a CIFA graduate working at Ramara Capital, is reviewing the performance of a client portfolio and has compiled the following information:

| | |
|---|---|
| Average return over the last year | 13.75% |
| Benchmark average return over the last year | 12.36% |
| Standard deviation | 16.90% |
| Beta | 1.23 |
| Tracking error | 7.21% |
| Semi-standard deviation | 13.72% |
| Risk-free rate | 5.35% |

**Required:**

(i) The information ratio for the portfolio. (2 marks)

(ii) The Sharpe ratio. (2 marks)

(iii) The Sortino ratio. (2 marks)

(d) Fiona Chedzuga, an investor, believes there are three important factors that could determine the expected rate of return for Wema Limited's shares.

Fiona uses the following factor betas and factor risk premiums to analyse the shares' returns:

| Factor | Factor Beta | Factor risk premium (%) |
|---|---|---|
| 1 | 0.70 | 1.5 |
| 2 | 1.20 | 4.0 |
| 3 | -0.10 | 5.0 |

The risk-free rate is 4%.

**Required:**

The expected return for Wema Limited's shares using the arbitrage pricing theory (APT) model. (3 marks)

**(Total: 20 marks)**

**QUESTION TWO**

(a) Describe the following biases which financial analysts might face while conducting research:

(i) Escalation bias. (1 mark)

(ii) Confirmation bias. (1 mark)

(iii) Illusion of knowledge bias. (1 mark)

(iv) Disposition effect. (1 mark)

(v) Availability bias. (1 mark)

(b) Suggest four remedial actions that a research analyst should take to overcome the biases identified in (a) (i) to (v) above. (4 marks)

(c) Examine four factors that could influence the extent of risk diversification in a portfolio. (4 marks)

(d) An investor gathers the following data relating to portfolios A, B and C:

| Portfolio | Expected return (%) | Standard deviation of return (%) |
|---|---|---|
| A | 11.5 | 18 |
| B | 8 | 14 |
| C | 6 | 10 |

The investor's level of risk aversion is 5.

**Required:**
Using the risk adjusted approach, recommend the portfolio that the investor should choose. (3 marks)

(e) A review of historical data and empirical studies provides strong support for the contention that asset allocation is a critical component of the portfolio management process.

In view of the above statement, describe the four decisions involved in constructing an investment strategy. (4 marks)
**(Total: 20 marks)**

**QUESTION THREE**

(a) Explain three assumptions of the fundamental law of active management. (6 marks)

(b) Explain the following terms as used in active portfolio management:

(i) Information coefficient. (2 marks)

(ii) Breadth. (2 marks)

(c) A portfolio manager gathers the following data and decides to calculate the alpha of a theoretical fund that has active holdings twice the size of those of the all the return (ALR) fund for each of the four sectors.

| Stocks | Alpha (%) | Benchmark fund weighting (%) | ALR fund weighting (%) |
|---|---|---|---|
| Technology | 1.8 | 25 | 35 |
| Health care | -2.4 | 25 | 20 |
| Retail | 2.1 | 25 | 30 |
| Mining | -1.5 | 25 | 15 |

**Required:**
The alpha of the theoretical fund. (4 marks)

(d) A financial analyst gathers the data below for portfolio managers A and B:

| Portfolio manager | Residual return | Residual risk | Level of risk aversion |
|---|---|---|---|
| A | 5.0% | 5.5% | 0.12 |
| B | 5.0% | 7.5% | 0.08 |

**Required:**

(i) The optimal level of residual risk for portfolio manager B. (3 marks)

(ii) The value added by portfolio manager A. (3 marks)

**(Total: 20 marks)**

**QUESTION FOUR**

(a) A financial analyst has obtained the following information regarding two companies in different sectors namely, agriculture and manufacturing:

| State of economy | Probability | Return of company in the agriculture sector (%) | Return of company in the manufacturing sector (%) |
|---|---|---|---|
| High economic growth | 0.50 | 20 | 22 |
| Average economic growth | 0.30 | 14 | 16 |
| Recession | 0.20 | 10 | 12 |

**Additional information:**

1. The risk-free rate of return is 10%.
2. The market risk premium is 5%.
3. The market rate of return is 11%.

**Required:**

(i) The expected return and standard deviation for each company. (6 marks)

(ii) The correlation coefficient of the portfolio. (2 marks)

(iii) The portfolio risk and return. (2 marks)

(iv) The minimum return that should be considered acceptable for the portfolio. (2 marks)

(v) Determine whether the portfolio is efficient. (2 marks)



(b) Johnson Mulwa is aged 54 and is anticipating retirement. Approximately 60% of his total investments are currently held in a tax exempt account and 40% in a taxable account. Contributions to both accounts are made with after tax income. In the tax exempt account, withdrawals are entirely tax free and without penalty.

In the taxable account, Johnson incurs a 5% tax on both income and realised capital gains. Realised losses can be used to offset current or future income and capital gains. He has experienced substantial losses in both of his investment accounts over the past year. He estimates that he will need to postpone retirement and questions whether his investments were optimally structured.

Johnson meets with his advisor to discuss the effect of the tax regime on his portfolios. The advisor suggests that over the last year, both Johnson's after tax return and investment risk would have been higher if a large proportion of assets had been held in the taxable account.

**Required:**

By justifying each response with one reason, determine, based only on tax consideration whether the advisor is correct or incorrect with respect to Johnson's:

(i) After tax return. (3 marks)

(ii) Investment risk. (3 marks)

**(Total: 20 marks)**

**QUESTION FIVE**

(a) Assess three challenges of forecasting in relation to capital market expectations. (6 marks)

(b) A portfolio manager gathers the following information relating to a bank's holding of government bonds:

| | | |
|---|---|---|
| 1. | Portfolio value | Sh.1,400 million. |
| 2. | Expected annualised return | 6% |
| 3. | Standard deviation of annualised return | 7% |
| 4. | Standard normal Z - values for the 0.05 and 0.01 probability levels are 1.65 and 2.33 respectively. | |

**Required:**

Calculate the 1% monthly value at risk (VaR) for the portfolio. (4 marks)

(c) Kevin Opati recently inherited Sh.7.5 million in cash from his father's estate and has approached you for investment advice. Both Kevin and his wife are 30 years old. Kevin is employed as a factory worker and has an annual salary of Sh.500,000. Although he receives total health care coverage for himself and his family, he makes no contributions to his firm's defined benefit pension plan and is not yet vested in any of the company's other retirement benefits. Kevin's wife is a teacher with an annual salary of Sh.380,000. She has only recently opened a retirement savings account. Their four children are aged six, five, four and three years. They have a small savings account, no investments other than the wife's meagre retirement account and credit card debt of Sh.200,000.

**Required:**

(i) Evaluate Kevin's situational profile according to the source of wealth and stage of life. (2 marks)

(ii) Formulate the investment constraint for Kevin's family. (8 marks)

**(Total: 20 marks)**

.....

## Present Value of 1 Received at the End of $n$ Periods:

$$PVIF_{r,n} = 1/(1+r)^n = (1+r)^{-n}$$

| Period | 1% | 2% | 3% | 4% | 5% | 6% | 7% | 8% | 9% | 10% | 12% | 14% | 15% | 16% | 18% | 20% | 24% | 28% | 32% | 36% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .9901 | .9804 | .9709 | .9615 | .9524 | .9434 | .9346 | .9259 | .9174 | .9091 | .8929 | .8772 | .8696 | .8621 | .8475 | .8333 | .8065 | .7813 | .7576 | .7353 |
| 2 | .9803 | .9612 | .9426 | .9246 | .9070 | .8900 | .8734 | .8573 | .8417 | .8264 | .7972 | .7695 | .7561 | .7432 | .7182 | .6944 | .6504 | .6104 | .5739 | .5407 |
| 3 | .9706 | .9423 | .9151 | .8890 | .8638 | .8396 | .8163 | .7938 | .7722 | .7513 | .7118 | .6750 | .6575 | .6407 | .6086 | .5787 | .5245 | .4768 | .4348 | .3975 |
| 4 | .9610 | .9238 | .8885 | .8548 | .8227 | .7921 | .7629 | .7350 | .7084 | .6830 | .6355 | .5921 | .5718 | .5523 | .5158 | .4823 | .4230 | .3725 | .3294 | .2923 |
| 5 | .9515 | .9057 | .8626 | .8219 | .7835 | .7473 | .7130 | .6806 | .6499 | .6209 | .5674 | .5194 | .4972 | .4761 | .4371 | .4019 | .3411 | .2910 | .2495 | .2149 |
| 6 | .9420 | .8880 | .8375 | .7903 | .7462 | .7050 | .6663 | .6302 | .5963 | .5645 | .5066 | .4556 | .4323 | .4104 | .3704 | .3349 | .2751 | .2274 | .1890 | .1580 |
| 7 | .9327 | .8706 | .8131 | .7599 | .7107 | .6651 | .6227 | .5835 | .5470 | .5132 | .4523 | .3996 | .3759 | .3538 | .3139 | .2791 | .2218 | .1776 | .1432 | .1162 |
| 8 | .9235 | .8535 | .7894 | .7307 | .6768 | .6274 | .5820 | .5403 | .5019 | .4665 | .4039 | .3506 | .3269 | .3050 | .2660 | .2326 | .1789 | .1388 | .1085 | .0854 |
| 9 | .9143 | .8368 | .7664 | .7026 | .6446 | .5919 | .5439 | .5002 | .4604 | .4241 | .3606 | .3075 | .2843 | .2630 | .2255 | .1938 | .1443 | .1084 | .0822 | .0628 |
| 10 | .9053 | .8203 | .7441 | .6756 | .6139 | .5584 | .5083 | .4632 | .4224 | .3855 | .3220 | .2697 | .2472 | .2267 | .1911 | .1615 | .1164 | .0847 | .0623 | .0462 |
| 11 | .8963 | .8043 | .7224 | .6496 | .5847 | .5268 | .4751 | .4289 | .3875 | .3505 | .2875 | .2366 | .2149 | .1954 | .1619 | .1346 | .0938 | .0662 | .0472 | .0340 |
| 12 | .8874 | .7885 | .7014 | .6246 | .5568 | .4970 | .4440 | .3971 | .3555 | .3186 | .2567 | .2076 | .1869 | .1685 | .1372 | .1122 | .0757 | .0517 | .0357 | .0250 |
| 13 | .8787 | .7730 | .6810 | .6006 | .5303 | .4688 | .4150 | .3677 | .3262 | .2897 | .2292 | .1821 | .1625 | .1452 | .1163 | .0935 | .0610 | .0404 | .0271 | .0184 |
| 14 | .8700 | .7579 | .6611 | .5775 | .5051 | .4423 | .3878 | .3405 | .2992 | .2633 | .2046 | .1597 | .1413 | .1252 | .0985 | .0779 | .0492 | .0316 | .0205 | .0135 |
| 15 | .8613 | .7430 | .6419 | .5553 | .4810 | .4173 | .3624 | .3152 | .2745 | .2394 | .1827 | .1401 | .1229 | .1079 | .0835 | .0649 | .0397 | .0247 | .0155 | .0099 |
| 16 | .8528 | .7284 | .6232 | .5339 | .4581 | .3936 | .3387 | .2919 | .2519 | .2176 | .1631 | .1229 | .1069 | .0930 | .0708 | .0541 | .0320 | .0193 | .0118 | .0073 |
| 17 | .8444 | .7142 | .6050 | .5134 | .4363 | .3714 | .3166 | .2703 | .2311 | .1978 | .1456 | .1078 | .0929 | .0802 | .0600 | .0451 | .0258 | .0150 | .0089 | .0054 |
| 18 | .8360 | .7002 | .5874 | .4936 | .4155 | .3503 | .2959 | .2502 | .2120 | .1799 | .1300 | .0946 | .0808 | .0691 | .0508 | .0376 | .0208 | .0118 | .0068 | .0039 |
| 19 | .8277 | .6864 | .5703 | .4746 | .3957 | .3305 | .2765 | .2317 | .1945 | .1635 | .1161 | .0829 | .0703 | .0596 | .0431 | .0313 | .0168 | .0092 | .0051 | .0029 |
| 20 | .8195 | .6730 | .5537 | .4564 | .3769 | .3118 | .2584 | .2145 | .1784 | .1486 | .1037 | .0728 | .0611 | .0514 | .0365 | .0261 | .0135 | .0072 | .0039 | .0021 |
| 25 | .7798 | .6095 | .4776 | .3751 | .2953 | .2330 | .1842 | .1460 | .1160 | .0923 | .0588 | .0378 | .0304 | .0245 | .0160 | .0105 | .0046 | .0021 | .0010 | .0005 |
| 30 | .7419 | .5521 | .4120 | .3083 | .2314 | .1741 | .1314 | .0994 | .0754 | .0573 | .0334 | .0196 | .0151 | .0116 | .0070 | .0042 | .0016 | .0006 | .0002 | .0001 |
| 40 | .6717 | .4529 | .3066 | .2083 | .1420 | .0972 | .0668 | .0460 | .0318 | .0221 | .0107 | .0053 | .0037 | .0026 | .0013 | .0007 | .0002 | .0001 | | |
| 50 | .6080 | .3715 | .2281 | .1407 | .0872 | .0543 | .0339 | .0213 | .0134 | .0085 | .0035 | .0014 | .0009 | .0006 | .0003 | .0001 | | | | |
| 60 | .5504 | .3048 | .1697 | .0951 | .0535 | .0303 | .0173 | .0099 | .0057 | .0033 | .0011 | .0004 | .0002 | .0001 | | | | | | |

* The factor is zero to four decimal places



## Present Value of an Annuity of 1 Per Period for n Periods:

$$PVIF_{r,n} = \sum_{t=1}^{n} \frac{1}{(1+r)^t} = \frac{1 - \frac{1}{(1+r)^n}}{r}$$

| Number of payments | 1% | 2% | 3% | 4% | 5% | 6% | 7% | 8% | 9% | 10% | 12% | 14% | 15% | 16% | 18% | 20% | 24% | 28% | 32% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.9901 | 0.9804 | 0.9709 | 0.9615 | 0.9524 | 0.9434 | 0.9346 | 0.9259 | 0.9174 | 0.9091 | 0.8929 | 0.8772 | 0.8696 | 0.8621 | 0.8475 | 0.8333 | 0.8065 | 0.7813 | 0.7576 |
| 2 | 1.9704 | 1.9416 | 1.9135 | 1.8861 | 1.8594 | 1.8334 | 1.8080 | 1.7833 | 1.7591 | 1.7355 | 1.6901 | 1.6467 | 1.6257 | 1.6052 | 1.5656 | 1.5278 | 1.4568 | 1.3916 | 1.3315 |
| 3 | 2.9410 | 2.8839 | 2.8286 | 2.7751 | 2.7232 | 2.6730 | 2.6243 | 2.5771 | 2.5313 | 2.4869 | 2.4018 | 2.3216 | 2.2832 | 2.2459 | 2.1743 | 2.1065 | 1.9813 | 1.8684 | 1.7663 |
| 4 | 3.9020 | 3.8077 | 3.7171 | 3.6299 | 3.5460 | 3.4651 | 3.3872 | 3.3121 | 3.2397 | 3.1699 | 3.0373 | 2.9137 | 2.8550 | 2.7982 | 2.6901 | 2.5887 | 2.4043 | 2.2410 | 2.0957 |
| 5 | 4.8534 | 4.7135 | 4.5797 | 4.4518 | 4.3295 | 4.2124 | 4.1002 | 3.9927 | 3.8897 | 3.7908 | 3.6048 | 3.4331 | 3.3522 | 3.2743 | 3.1272 | 2.9906 | 2.7454 | 2.5320 | 2.3452 |
| 6 | 5.7955 | 5.6014 | 5.4172 | 5.2421 | 5.0757 | 4.9173 | 4.7665 | 4.6229 | 4.4859 | 4.3553 | 4.1114 | 3.8887 | 3.7845 | 3.6847 | 3.4976 | 3.3255 | 3.0205 | 2.7594 | 2.5342 |
| 7 | 6.7282 | 6.4720 | 6.2303 | 6.0021 | 5.7864 | 5.5824 | 5.3893 | 5.2064 | 5.0330 | 4.8684 | 4.5638 | 4.2883 | 4.1604 | 4.0386 | 3.8115 | 3.6046 | 3.2423 | 2.9370 | 2.6775 |
| 8 | 7.6517 | 7.3255 | 7.0197 | 6.7327 | 6.4632 | 6.2098 | 5.9713 | 5.7466 | 5.5348 | 5.3349 | 4.9676 | 4.6389 | 4.4873 | 4.3436 | 4.0776 | 3.8372 | 3.4212 | 3.0758 | 2.7860 |
| 9 | 8.5660 | 8.1622 | 7.7861 | 7.4353 | 7.1078 | 6.8017 | 6.5152 | 6.2469 | 5.9952 | 5.7590 | 5.3282 | 4.9464 | 4.7716 | 4.6065 | 4.3030 | 4.0310 | 3.5655 | 3.1842 | 2.8681 |
| 10 | 9.4713 | 8.9826 | 8.5302 | 8.1109 | 7.7217 | 7.3601 | 7.0236 | 6.7101 | 6.4177 | 6.1446 | 5.6502 | 5.2161 | 5.0188 | 4.8332 | 4.4941 | 4.1925 | 3.6819 | 3.2689 | 2.9304 |
| 11 | 10.3676 | 9.7868 | 9.2526 | 8.7605 | 8.3064 | 7.8869 | 7.4987 | 7.1390 | 6.8052 | 6.4951 | 5.9377 | 5.4527 | 5.2337 | 5.0286 | 4.6560 | 4.3271 | 3.7757 | 3.3351 | 2.9776 |
| 12 | 11.2551 | 10.5753 | 9.9540 | 9.3851 | 8.8633 | 8.3838 | 7.9427 | 7.5361 | 7.1607 | 6.8137 | 6.1944 | 5.6603 | 5.4206 | 5.1971 | 4.7932 | 4.4392 | 3.8514 | 3.3868 | 3.0133 |
| 13 | 12.1337 | 11.3484 | 10.6350 | 9.9856 | 9.3936 | 8.8527 | 8.3577 | 7.9038 | 7.4869 | 7.1034 | 6.4235 | 5.8424 | 5.5831 | 5.3423 | 4.9095 | 4.5327 | 3.9124 | 3.4272 | 3.0404 |
| 14 | 13.0037 | 12.1062 | 11.2961 | 10.5631 | 9.8986 | 9.2950 | 8.7455 | 8.2442 | 7.7862 | 7.3667 | 6.6282 | 6.0021 | 5.7245 | 5.4675 | 5.0081 | 4.6106 | 3.9616 | 3.4587 | 3.0609 |
| 15 | 13.8651 | 12.8493 | 11.9379 | 11.1184 | 10.3797 | 9.7122 | 9.1079 | 8.5595 | 8.0607 | 7.6061 | 6.8109 | 6.1422 | 5.8474 | 5.5755 | 5.0916 | 4.6755 | 4.0013 | 3.4834 | 3.0764 |
| 16 | 14.7179 | 13.5777 | 12.5611 | 11.6523 | 10.8378 | 10.1059 | 9.4466 | 8.8514 | 8.3126 | 7.8237 | 6.9740 | 6.2651 | 5.9542 | 5.6685 | 5.1624 | 4.7296 | 4.0333 | 3.5026 | 3.0882 |
| 17 | 15.5623 | 14.2919 | 13.1661 | 12.1657 | 11.2741 | 10.4773 | 9.7632 | 9.1216 | 8.5436 | 8.0216 | 7.1196 | 6.3729 | 6.0472 | 5.7487 | 5.2223 | 4.7746 | 4.0591 | 3.5177 | 3.0971 |
| 18 | 16.3983 | 14.9920 | 13.7535 | 12.6593 | 11.6896 | 10.8276 | 10.0591 | 9.3719 | 8.7556 | 8.2014 | 7.2497 | 6.4674 | 6.1280 | 5.8178 | 5.2732 | 4.8122 | 4.0799 | 3.5294 | 3.1039 |
| 19 | 17.2260 | 15.6785 | 14.3238 | 13.1339 | 12.0853 | 11.1581 | 10.3356 | 9.6036 | 8.9501 | 8.3649 | 7.3658 | 6.5504 | 6.1982 | 5.8775 | 5.3162 | 4.8435 | 4.0967 | 3.5386 | 3.1090 |
| 20 | 18.0456 | 16.3514 | 14.8775 | 13.5903 | 12.4622 | 11.4699 | 10.5940 | 9.8181 | 9.1285 | 8.5136 | 7.4694 | 6.6231 | 6.2593 | 5.9288 | 5.3527 | 4.8696 | 4.1103 | 3.5458 | 3.1129 |
| 25 | 22.0232 | 19.5235 | 17.4131 | 15.6221 | 14.0939 | 12.7834 | 11.6536 | 10.6748 | 9.8226 | 9.0770 | 7.8431 | 6.8729 | 6.4641 | 6.0971 | 5.4669 | 4.9476 | 4.1474 | 3.5640 | 3.1220 |
| 30 | 25.8077 | 22.3965 | 19.6004 | 17.2920 | 15.3725 | 13.7648 | 12.4090 | 11.2578 | 10.2737 | 9.4269 | 8.0552 | 7.0027 | 6.5660 | 6.1772 | 5.5168 | 4.9789 | 4.1601 | 3.5693 | 3.1242 |
| 40 | 32.8347 | 27.3555 | 23.1148 | 19.7928 | 17.1591 | 15.0463 | 13.3317 | 11.9246 | 10.7574 | 9.7791 | 8.2438 | 7.1050 | 6.6418 | 6.2335 | 5.5482 | 4.9966 | 4.1659 | 3.5712 | 3.1250 |
| 50 | 39.1961 | 31.4236 | 25.7298 | 21.4822 | 18.2559 | 15.7619 | 13.8007 | 12.2335 | 10.9617 | 9.9148 | 8.3045 | 7.1327 | 6.6605 | 6.2463 | 5.5541 | 4.9995 | 4.1666 | 3.5714 | 3.1250 |
| 60 | 44.9550 | 34.7609 | 27.6756 | 22.6235 | 18.9293 | 16.1614 | 14.0392 | 12.3766 | 11.0480 | 9.9672 | 8.3240 | 7.1401 | 6.6651 | 6.2402 | 5.5553 | 4.9999 | 4.1667 | 3.5714 | 3.1250 |

kasneb

**CIFA PART II SECTION 4**

**PORTFOLIO MANAGEMENT**

**FRIDAY: 25 May 2018.** **Time Allowed: 3 hours.**

**Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings.**

**QUESTION ONE**

(a) Your national government has recently embraced devolution and established county governments. As an experienced Certified Investment and Financial Analyst (CIFA), you have received an invitation to address an investment conference that will be taking place in your home county.

**Required:**

(i) In your presentation, enumerate four emerging investment products that you would recommend to the county government to enable it to be more independent from the central government funding. (4 marks)

(ii) Propose three constraints that the county government is likely to encounter while executing the recommendations identified in (a)(i) above. (3 marks)

(b) The following information relates to the expected returns of shares of two companies held by Jemima Sheri in the securities exchange:

| Market return (%) | Aggressive company shares (%) | Defensive company shares (%) |
|---|---|---|
| 6 | 2 | 8 |
| 20 | 30 | 16 |

**Additional information:**

1. The risk-free rate is 7%.
2. The 6% and 20% market returns have an equal chance of occurrence.

**Required:**

(i) Beta for each company's shares. (2 marks)

(ii) Expected return on each company's shares. (2 marks)

(iii) The security market line (SML). (3 marks)

(iv) Alpha for each company's shares. (4 marks)

(c) With respect to Harry Markowitz's modern portfolio theory (MPT), explain the following terms:

(i) Tangent line. (1 mark)

(ii) Efficient frontier. (1 mark)

**(Total: 20 marks)**

**QUESTION TWO**

(a) Summarise three benefits of a well written investment policy statement (IPS). (3 marks)

(b) Explain two applications of the capital asset pricing model (CAPM). (4 marks)

(c) Zuhura Limited is a small company operating in a highly cyclical industry and all of its revenues are generated from its domestic country. The company has rising earnings and a strong (low debt) balance sheet. Zuhura Limited's defined benefit (DB) pension plan is divided into two parts; the active-lives portion (current employees) and the retired-lives portion (retired employees). The active-lives portion of Zuhura Limited's plan is Sh.100 million in assets and a Sh.5 million surplus. The portion of the plan is structured as shown below:

**Original asset allocation for the active-lives portfolio:**

| **Asset Class:** | **Allocation (%)** |
|---|---|
| Large-capitalisation domestic shares | 50 |
| Small-capitalisation domestic shares | 10 |
| 30-day treasury bills | 10 |
| Intermediate-term bonds | 20 |
| Long-term bonds | 10 |

**Notes:**

| | |
|---|---|
| Risk-free rate | 5.0% |
| Expected return of total portfolio | 9.0% |
| Standard deviation | 13.0% |
| Sharpe ratio | 0.31 |

**Additional information:**

1. The duration of the active-lives portion of the plan's liabilities is 20 years.
2. The discount rate applied to these liabilities is 7.5%.
3. The workforce with an average age of 39, is relatively young.
4. The return objective for the active-lives portion of the pension plan is 9%.

**Required:**

Create and justify, using the above information, the following three elements of the investment policy statement (IPS) for the active-lives portion of Zuhura Limited pension plan.

(i) Return objective. (3 marks)

(ii) Risk tolerance. (3 marks)

(iii) Time horizon. (3 marks)



(d) Philomena Mwaboza intends to invest in Blue Star Limited shares. The value of the company's shares depends on various parameters as illustrated below:

| **Factor** | **Beta** | **Expected value (%)** | **Actual value (%)** |
|---|---|---|---|
| Gross National Product (GNP) | 1.20 | 7.70 | 7.70 |
| Inflation | 1.75 | 5.50 | 7.00 |
| Interest rate | 1.30 | 7.75 | 9.00 |
| Share market index | 1.70 | 10.00 | 12.00 |
| Industrial production | 1.00 | 7.00 | 7.50 |

The risk-free rate of interest is 9.25%.

**Required:**

Determine the return of the company's share using the Arbitrage Pricing Theory (APT). (4 marks)

**(Total: 20 marks)**

**QUESTION THREE**

(a) In the context of portfolio management, describe the following terms:

(i) Risk tolerance. (2 marks)

(ii) Indifference curve. (2 marks)

(iii) The two fund separation theorem. (2 marks)

(iv) Risk parity strategy. (2 marks)

(b) Discuss two limitations of the fundamental law of active management. (2 marks)

(c) Joyce Cheptoo makes monthly allocation decisions between agricultural sector and industrial sector based on proprietary model. The historical correlation between the returns of the two sectors is 0.30. Cheptoo's bets have been 60% correct. Further information is provided below:

| Sector | Expected return E(R) (%) | Standard deviation (σ) (%) | Benchmark weights (%) |
|---|---|---|---|
| Agricultural | 10.8 | 3.0 | 65 |
| Industrial | 13.2 | 5.0 | 35 |

**Required:**

(i) The annualised active risk of Joyce Cheptoo's sector rotation strategy. (2 marks)

(ii) The expected annualised active return of Joyce Cheptoo's sector rotation strategy. (2 marks)

(iii) The allocation to the agricultural sector assuming that Joyce Cheptoo feels that industrial sector will outperform the agricultural sector over the next month and assuming that the active risk is limited to 5.20%. (2 marks)

(d) Omega fund has information ratio of 0.2 and active risk of 9%. The benchmark portfolio has a sharpe ratio of 0.4 and a total risk of 12%. A portfolio (P) with an optimal level of active risk, can be constructed by combining Omega fund and the benchmark portfolio.

**Required:**

(i) Calculate portfolio P's Sharpe ratio. (2 marks)

(ii) Determine the proportion of benchmark and Omega fund in portfolio (P). (2 marks)

**(Total: 20 marks)**

**QUESTION FOUR**

(a) You are the chief financial analyst for investments at Peakcock Pension Plan, and you have been trying to invest efficiently on the asset-side so that the pension fund achieves its expected rate of return. However, having seen a convincing argument that pension fund management should consider not only the asset-side but also the liability-side, you decide to incorporate the liability of the pension plan into your analysis. The table below contains current information about asset and liability-sides:

| | Initial value Sh. "million" | Expected Return (%) | Risk Standard deviation (%) | Correlation against bonds | Correlation against equity |
|---|---|---|---|---|---|
| **Equity** | 60 | 8 | 15 | 0.3 | 1 |
| **Bonds** | 90 | 3 | 4 | 1 | 0.3 |
| **Liability** | 100 | 3.5 | 6 | 0.8 | 0.2 |

**Required:**

(i) Peakcock Pension Plan's funding ratio. (1 mark)

(ii) Identify three actions that could be taken by the pension plan in the light of the funding ratio obtained in (a)(i) above. (3 marks)

(iii) Peakcock Pension Plan's overall expected return and risk (standard deviation). (4 marks)

(iv) The correlation between asset and liability for the Pension Plan. (2 marks)

(b) Explain six types of risks that could affect a portfolio. (6 marks)

(c) Evaluate two advantages and two limitations of value at risk (VaR) as a risk management technique. (4 marks)

**(Total: 20 marks)**

**QUESTION FIVE**

(a) Describe three systematic trading biases that could impact investment decisions. (6 marks)

(b) Ndonye and his wife Lilian are planning for retirement and want to compare the past performance of a few mutual funds they are considering for investment. They believe that a comparison over a five-year period would be appropriate. They are provided with the following information about the LowBridge fund that they are considering:

| Year | Asset under management at the beginning of the year (Sh. "million") | Net Return (%) |
|---|---|---|
| 1 | 30 | 15 |
| 2 | 45 | - 5 |
| 3 | 20 | 10 |
| 4 | 25 | 15 |
| 5 | 35 | 3 |

The couple is concerned that the effect of both tax and inflation might reduce their return. Based on the current tax code, they expect to pay 30% tax on the return they earn from investment, inflation has been around 2% and they expect the same rate of inflation to be maintained.

**Required:**

(i) The holding period return for the five-year period. (2 marks)

(ii) The geometric mean annual return. (2 marks)

(iii) The anticipated after tax real return that an investor would have earned in the fifth year. (2 marks)

(c) Cynthia Nyamai has estimated the covariance between Ugandan equities and Kenyan equities as 230 using historical data. Using a factor model approach based on proxy for the world market portfolio, she estimates the covariance as 190. Cynthia takes a shrinkage estimator approach when estimating covariances and determines that the optimal weight on the historical estimate is 0.30.



**Required:**

(i) Calculate the shrinkage estimate of the covariance between Kenyan equities and Ugandan equities. (2 marks)

(ii) Describe the theoretical advantage of a shrinkage estimate of covariance compared to a raw historical estimate. (2 marks)

(d) An equity financial manager has created the following data to illustrate the application of utility theory to portfolio selection:

| Investment | Expected return [E(r)] (%) | Expected standard deviation ($\sigma$) (%) |
|---|---|---|
| P | 18 | 2 |
| Q | 19 | 8 |
| R | 20 | 15 |
| S | 18 | 30 |

The utility function is expressed as: $U = E(r) - \frac{1}{2} A\sigma^2$

**Required:**

Using suitable computations:

(i) Identify the investment suitable for a risk-neutral investor. (1 mark)

(ii) Identify suitable investment for a risk-seeking investor assuming that the measure for risk aversion (A) has a value of -2. (1 mark)

(iii) Identify the suitable investment for a risk-averse investor assuming that the measure for risk aversion has a value of 2. (1 mark)

(iv) Assuming that the measure for risk aversion has a value of 4, identify the suitable investment for a risk-averse investor. (1 mark)

**(Total: 20 marks)**

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**CIFA PART II SECTION 4**

**PORTFOLIO MANAGEMENT**

**FRIDAY: 1 December 2017.** **Time Allowed: 3 hours.**

**Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings.**

**QUESTION ONE**

(a) You have recently been appointed as the Chief Investment Officer (CIO) of a major investment advisory firm in your country. Martin Kibet, a high net worth client has approached your firm seeking to invest Sh.100 million.

**Required:**
Evaluate the four steps in the portfolio management process that you are expected to follow while investing the client's money. (4 marks)

(b) The investment policy statement (IPS) serves as a governing document for most investment decisions. It should identify the objectives and operational constraints on the investment portfolio.

In light of the above statement, discuss five categories of portfolio constraints. (5 marks)

(c) Amos Mambo has invested 30% of his funds in risk-free assets and the remaining 70% in an index fund that represents the market. The risk-free rate is 8%. The index fund is expected to generate a return of 21% with a standard deviation of 9.8%. Amos Mambo is considering the following three options:

**Option 1** – Maintain the portfolio as it is.

**Option 2** – Withdraw his investment from the risk-free security and invest the same in the index fund.

**Option 3** – Apart from investing his entire funds in the index fund, Amos Mambo intends to borrow a sum equal to 20% of his available funds at risk-free rate and invest the same in the index fund.

**Required:**

(i) The expected portfolio return under each of the three options. (3 marks)

(ii) The portfolio risk under each of the three options. (3 marks)

(iii) Comment on your answer in (c) (i) and (c) (ii) above based on the borrowing option. (1 mark)

(d) The table below shows the portfolio return and the benchmark return for a bond portfolio over a six-year period.

| Period | Portfolio return (%) | Benchmark return (%) |
|---|---|---|
| 2011 | 14.10 | 13.70 |
| 2012 | 8.20 | 8.00 |
| 2013 | 7.80 | 8.00 |
| 2014 | 3.20 | 3.50 |
| 2015 | 2.60 | 2.40 |
| 2016 | 3.30 | 3.00 |

**Required:**
Portfolio tracking risk. (4 marks)

**(Total: 20 marks)**

## QUESTION TWO

(a) Explain five steps of the risk management process. (5 marks)

(b) The estimated rate of return of six securities and their respective Beta coefficients are as shown below:

| Security | Estimated rate of return (%) | Beta Coefficients |
|---|---|---|
| A | 15 | 1.15 |
| B | 17 | 1.19 |
| C | 23 | 1.22 |
| D | 30 | 1.75 |
| E | 20 | 1.14 |
| F | 18 | 1.13 |
| G | 25 | 1.21 |

**Additional information:**

1. The risk-free rate of return is 9%.
2. The expected market rate of return is 21%.

**Required:**

(i) Using capital asset pricing model (CAPM), identify the securities that are correctly valued, overvalued or undervalued. (8 marks)

(ii) Illustrate, using a well labelled diagram, the results obtained in (b) (i) above. (2 marks)

(c) Modern portfolio theory (MPT) might not be directly applicable to "real world" portfolios since some of the underlying assumptions of MPT do not hold.

**Required:**

Discuss the impact of the following on the capital market line (CML):

(i) Taxes. (2 marks)

(ii) Different borrowing and lending rates. (3 marks)

**(Total: 20 marks)**



## QUESTION THREE

(a) In relation to behavioural finance, explain five emotional biases that could affect financial decisions. (5 marks)

(b) Evaluate two factors that could affect portfolio diversification. (4 marks)

(c) The rates of return on company X's security and the market portfolios for 10 periods are given below:

| Period | Return on company X's security (%) | Return on market portfolio (%) |
|---|---|---|
| 1 | 20 | 22 |
| 2 | 22 | 20 |
| 3 | 25 | 18 |
| 4 | 21 | 16 |
| 5 | 18 | 20 |
| 6 | –5 | 8 |
| 7 | 17 | –6 |
| 8 | 19 | 5 |
| 9 | –7 | 6 |
| 10 | 20 | 11 |

**Required:**

The security characteristic line (SCL) for company X's security. (8 marks)

(d) Melissa Onyango, a financial advisor interviewed a client so as to prepare a written investment policy statement (IPS). After the interview, Onyango established the following:

1. The client's earnings have exceeded pre-tax income of Sh.12 million each year for the past five years.
2. The client has no dependants.
3. The client's subsistence needs are approximately Sh.4.5 million per year.
4. The client feels uncomfortable with the lack of security markets knowledge.

5. All of the client's current savings are invested in money market securities guaranteed by an agency of her national government.
6. The client's response to a standard risk assessment questionnaire suggests that she has low risk tolerance.

**Required:**
Assess the client's ability to bear risk and willingness to take risk. (3 marks)
**(Total: 20 marks)**

**QUESTION FOUR**

(a) A medical foundation (MF) based in a developed country was established to provide grants in perpetuity. The foundation is expecting to receive Sh.450 million cash gift three months from now. The gift will greatly increase the size of the foundation's endowment from its current Sh.100 million. The foundation's grant making policy has been to pay out virtually all of its annual net investment income. Since its investment approach has been conservative, the endowment portfolio now consists of entirely fixed income securities. The foundation's annual grants must be at least equal to 5% of its assets' market value to maintain MF's tax exempt status, a requirement that is expected to continue indefinitely. The foundation expects to have no additional gifts or fundraising activities in the foreseeable future.

Given the changes in circumstances that the cash gift will make, the finance committee wishes to develop new grant making and investment policies. Annual spending must at least meet the 5% of the market value requirements, but the committee is unsure of how much higher spending can or should be. The committee intends to pay out as much as possible, however, it understands that preserving the real value of the foundation's assets is equally important in order to preserve its future grant making capabilities.

You have been tasked to assist the committee in developing appropriate policies:

**Required:**
Formulate and justify an investment policy statement for the foundation. (12 marks)

(b) Johnson Mwau is an investment consultant. One of the portfolios he consults for is ABC portfolio which is managed for a pension fund with a high risk aversion of 0.15. The portfolio manager for the ABC fund anticipates that the portfolio will generate a quarterly residual return of 0.5% with a residual risk of 1%.

XYZ is also a fund for which Mwau consults for and which is an actively managed, large capitalised portfolio. Mwau decides to use a market timing strategy. The portfolio manager for XYZ makes weekly bets on the direction of the large capitalised market. The portfolio manager is right 53% of the time. During a recent meeting, the manager said that he could increase his coverage by including small capitalised stocks but he was expecting to be correct only 52% of the time for the small capitalised sector. He would make the same number of bets in the small capitalised sector as the large capitalised sector. The manager states that the information sources for the large capitalised bets and small capitalised bets are uncorrelated.

**Required:**

(i) The annualised value added for portfolio ABC based on the portfolio manager's estimates of residual risk and residual return. (2 marks)

(ii) The optimal level of annualised residual risk for portfolio ABC. (3 marks)

(iii) The combined information ratio if the portfolio manager for XYZ includes small capitalised stocks along with large capitalised stocks in his strategy. (3 marks)

**(Total: 20 marks)**

**QUESTION FIVE**

(a) Sospeter Muhongo is the Chief Finance Officer (CFO) of Next Tech Limited (NTL), a computer manufacturing company that develops computer software. NTL operates a defined benefit (DB) pension scheme that is open to new participants. The DB scheme is entirely funded by NTL staff retirement contributions.

The company's risk committee has requested Muhongo to assess how NTL's DB scheme compares to two competitor schemes; XYZ and ABC. He summarises selected financial data in Exhibit 1 and the scheme characteristics in Exhibit 2 for each of the three firms:

**Exhibit 1**
**Selected financial data**
**For the year ended 31 December 2016**

| | NTL | XYZ | ABC |
|---|---|---|---|
| Sales (Sh."million") | 500 | 300 | 800 |
| Net income (Sh."million") | 135 | 90 | 120 |
| Projected benefit obligation (Sh."million") | 520 | 409 | 201 |
| Debt-to-equity ratio | 1.30 | 1.10 | 1.40 |

**Exhibit 2**
**Defined Benefit (DB) plan characteristics**

| | NTL | XYZ | ABC |
|---|---|---|---|
| Provision allowing lump-sum distributions | Yes | No | No |
| Provision allowing early retirement | No | No | Yes |
| Proportion of active lives (%) | 62 | 57 | ·69 |
| Plan funded status | Surplus | Deficit | Surplus |

**Required:**
Citing one reason, determine the company's pension scheme with the lowest risk tolerance under the following categories:

(i) Sponsor financial status. (3 marks)

(ii) Workforce characteristics. (3 marks)

(b) Doreen Nyamai, a financial analyst at Truepack Capital employs the Grinold - Kroner model in forecasting long-term developed market equity returns. Doreen makes the following forecasts:

1. A 3.5% dividend yield on Kenyan equities, based on Nairobi Securities Exchange composite index.
2. A repurchase yield of 1.5% for Kenyan equities.
3. A long-term inflation rate of 4% per annum.
4. Long-term corporate real earnings growth at 6% per annum, based on a 1.5% premium for corporate growth over her expected Kenyan gross domestic product (GDP) growth rate of 3%.
5. An expansion rate for price-to-earnings (P/E) multiple of 0.25% per year.



**Required:**
Determine the expected rate of return on Kenyan equities using Grinold-Kroner model. (3 marks)

(c) Jonathan Rotich, a financial analyst has been presented with the following information relating to a portfolio of three companies' shares trading at the securities exchange.

| Company's share | Opening price Sh. | Closing price Sh. |
|---|---|---|
| A | 12 | 15 |
| B | 52 | 48 |
| C | 38 | 45 |

**Required:**
Based on holding period return (HPR), compute the following:

(i) Arithmetic mean. (2 marks)

(ii) Geometric mean. (2 marks)

(iii) The value of the new index using the results obtained in (c) (i) and (c) (ii) above. Assume an initial index value of 131. (2 marks)

(d) The Metro Fund is a portfolio consisting of 42% fixed-income investments and 58% equity investments. The manager of Metro Fund recently estimated that the annual value at risk (VaR) as 5% assuming a 250-day trading year. The portfolio is worth Sh.1,367,000 based on the portfolio's market value of Sh.12,428,000. The correlation between shares and bonds is zero.

**Required:**
The daily expected loss in bond position that will be exceeded 5% of the time assuming the annual loss in the equity position is only expected to exceed Sh.1,153,000. (5 marks)
**(Total: 20 marks)**

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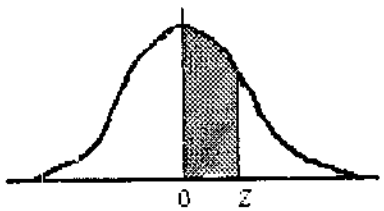
# NORMAL CURVE

AREAS
under the
STANDARD
NORMAL CURVE
from 0 to $z$




| z | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.0 | .0000 | .0040 | .0080 | .0120 | .0160 | .0199 | .0239 | .0279 | .0319 | .0359 |
| 0.1 | .0398 | .0438 | .0478 | .0517 | .0557 | .0596 | .0636 | .0675 | .0714 | .0754 |
| 0.2 | .0793 | .0832 | .0871 | .0910 | .0948 | .0987 | .1026 | .1064 | .1103 | .1141 |
| 0.3 | .1179 | .1217 | .1255 | .1293 | .1331 | .1368 | .1406 | .1443 | .1480 | .1517 |
| 0.4 | .1554 | .1591 | .1628 | .1664 | .1700 | .1736 | .1772 | .1808 | .1844 | .1879 |
| 0.5 | .1915 | .1950 | .1985 | .201 | .2051 | .2088 | .2123 | .2157 | .2190 | .2224 |
| 0.6 | .2258 | .2291 | .2324 | .2357 | .2389 | .2422 | .2454 | .2486 | .2518 | .2549 |
| 0.7 | .2580 | .2612 | .2642 | .2673 | .2704 | .2734 | .2764 | .2794 | .2823 | .2852 |
| 0.8 | .2881 | .2910 | .2939 | .2967 | .2996 | .3023 | .3051 | .3078 | .3106 | 3133 |
| 0.9 | .3159 | .3186 | .3212 | .3238 | .3264 | .3289 | .3315 | .3340 | .3365 | .3389 |
| 1.0 | .3413 | .3438 | .3461 | .3485 | .3508 | .3531 | .3554 | .3577 | .3599 | .3621 |
| 1.1 | .3643 | .3665 | .3686 | .3708 | .3729 | .3749 | .3770 | .3790 | .3810 | .3830 |
| 1.2 | .3849 | .3869 | .3888 | .3907 | .3925 | .3944 | .3962 | .3980 | .3997 | .4015 |
| 1.3 | .4032 | .4049 | .4066 | .4082 | .4099 | .4115 | .4131 | .4147 | .4162 | .4177 |
| 1.4 | .4192 | .4207 | .4222 | .4236 | .4251 | .4265 | .4279 | .4292 | .4306 | .4319 |
| 1.5 | .4332 | .4345 | .4357 | .4370 | .4382 | .4394 | .4406 | .4418 | .4429 | .4441 |
| 1.6 | .4452 | .4463 | .4474 | .4484 | .4495 | .4505 | .4515 | .4525 | .4535 | .4545 |
| 1.7 | .4554 | .4564 | .4573 | .4582 | .4591 | .4599 | .4608 | .4616 | .4625 | .4633 |
| 1.8 | .4641 | .4649 | .4656 | .4664 | .4671 | .4678 | .4686 | .4693 | .4699 | .4706 |
| 1.9 | .4713 | .4719 | .4726 | .4732 | .4738 | .4744 | .4750 | .4756 | .4761 | .4767 |
| 2.0 | .4772 | .4778 | .4783 | .4788 | .4793 | .4798 | .4803 | .4808 | .4812 | .4817 |
| 2.1 | .4821 | .4826 | .4830 | .4834 | .4838 | .4842 | .4846 | .4850 | .4854 | .4857 |
| 2.2 | .4861 | .4864 | .4868 | .4871 | .4875 | .4878 | .4881 | .4884 | .4887 | .4890 |
| 2.3 | .4893 | .4896 | .4898 | .4901 | .4904 | .4906 | .4909 | .4911 | .4913 | .4916 |
| 2.4 | .4918 | .4920 | .4922 | .4925 | .4927 | .4929 | .4931 | .4932 | .4934 | .4936 |
| 2.5 | .4938 | .4940 | .4941 | .4943 | .4945 | .4946 | .4948 | .4949 | .4951 | .4952 |
| 2.6 | .4953 | .4955 | .4956 | .4957 | .4959 | .4960 | .4961 | .4962 | .4963 | .4964 |
| 2.7 | .4965 | .4966 | .4967 | .4968 | .4969 | .4970 | .4971 | .4972 | .4973 | .4974 |
| 2.8 | .4974 | .4975 | .4976 | .4977 | .4977 | .4978 | .4979 | .4979 | .4980 | .4981 |
| 2.9 | .4981 | .4982 | .4982 | .4983 | .4984 | .4984 | .4985 | .4985 | .4986 | .4986 |
| 3.0 | .4987 | .4987 | .4987 | .4988 | .4988 | .4989 | .4989 | .4989 | .4990 | .4990 |
| 3.1 | .4990 | .4991 | .4991 | .4991 | .4992 | .4992 | .4992 | .4992 | .4993 | .4993 |
| 3.2 | .4993 | .4993 | .4994 | .4994 | .4994 | .4994 | .4994 | .4995 | .4995 | .4995 |
| 3.3 | .4995 | .4995 | .4995 | .4996 | .4996 | .4996 | .4996 | .4996 | .4996 | .4997 |
| 3.4 | .4997 | .4997 | .4997 | .4997 | .4997 | .4997 | .4997 | .4997 | .4997 | .4998 |
| 3.5 | .4998 | .4998 | .4998 | .4998 | .4998 | .4998 | .4998 | .4998 | .4998 | .4998 |
| 3.6 | .4998 | .4998 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 |
| 3.7 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 |
| 3.8 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 | .4999 |
| 3.9 | .5000 | .5000 | .5000 | .5000 | .5000 | .5000 | .5000 | .5000 | .5000 | .5000 |

# KASNEB

## CIFA PART II SECTION 4

## PORTFOLIO MANAGEMENT

**FRIDAY: 26 May 2017.** **Time Allowed: 3 hours.**

**Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings.**

**QUESTION ONE**

(a) The basic objective of portfolio management is to maximise investors' return and minimise risk. However, there are other auxiliary objectives as per the needs of each individual investor.

**Required:**
In relation to the above statement, highlight four auxiliary needs of an individual investor. (4 marks)

(b) Propose six measures that a portfolio management firm could establish to ensure that its portfolio managers remain independent and objective while undertaking their duties. (6 marks)

(c) The following information relates to the returns of security X and security Y over a five-year period:

| | Returns (%) | |
|---|---|---|
| **Year** | **Security X** | **Security Y** |
| 2012 | 10 | 20 |
| 2013 | 20 | 30 |
| 2014 | 30 | 50 |
| 2015 | 40 | 40 |
| 2016 | 50 | 60 |



**Required:**

(i) The securities beta. (3 marks)

(ii) The securities alpha. (2 marks)

(iii) The residual variance. (2 marks)

(iv) Interpret the results obtained in (c)(i), (c)(ii) and (c)(iii) above. (3 marks)

**(Total: 20 marks)**

**QUESTION TWO**

(a) Assess the following investor personality types that could offer an insight to a portfolio manager when predicting investors risk-taking appetite and their decision making styles:

(i) Cautious investors. (2 marks)

(ii) Methodical investors. (2 marks)

(iii) Spontaneous investors. (2 marks)

(iv) Individualist investors. (2 marks)

(b) Summarise four assumptions underlying capital asset pricing model (CAPM). (4 marks)

(c) An actively managed portfolio has a transfer coefficient (TC) of 0.50 and an unconstrained information ratio of 0.30. The benchmark portfolio has a sharpe ratio of 0.40 and a risk of 16.0%

**Required:**

(i) The optimal amount of aggressiveness in the actively managed portfolio. (3 marks)

(ii) The sharpe ratio assuming that the actively managed portfolio is constructed with the amount of active risk. (3 marks)

(iii) Determine how the active risk can be lowered to the optimal level of 6.0% assuming that the constrained portfolio has an active risk of 8.0%. (2 marks)

**(Total: 20 marks)**

**QUESTION THREE**

(a) Explain three differences between "mutual funds" and "exchange traded funds (ETFs)" with reference to pooled investment products. (6 marks)

(b) Evaluate five items that could be included in a framework for a disciplined approach to setting capital market expectations. (5 marks)

(c) (i) Examine four differences between "time-weighted rate of return" and "money-weighted rate of return". (4 marks)

(ii) The following information relates to Akamba Ltd.'s portfolio for the month of March 2017:

| | **Sh."000"** |
|---|---|
| Fair value (28 February 2017) | 16,575 |
| Cash contribution (12 March 2017) | 2,265 |
| Fair value (12 March 2017) | 19,550 |
| Fair value (31 March 2017) | 19,250 |

Note: The fair value on 12 March 2017 includes a cash contribution of Sh.2,265,000 received and available for investment on 12 March 2017.

**Required:**

The time-weighted rate of return for the month of March 2017. (5 marks)

**(Total: 20 marks)**

**QUESTION FOUR**

(a) (i) Explain the term "risk management". (2 marks)

(ii) Discuss four techniques of managing credit risk (4 marks)

(b) As a portfolio manager, explain how you could mitigate the following biases:

(i) Gamblers's fallacy. (2 marks)

(ii) Overconfidence. (2 marks)

(c) Jose Kigen, aged 40 years is a manager at a public limited company. He plans to retire at the age of 55 years. He is a divorcee and a father of teenage children. He intends to fund a dedicated trust to provide for his children's needs until they reach the age of 25 years. He will require Sh.2.5 million in the next few months to fund the trust.

Jose Kigen's income tax rate is 30%. Other than his cash reserve, he holds investment assets in a tax-exempt account with a current value of Sh.9 million. He saves Sh.250,000 of his after-tax income annually to the account and plans to do so until retirement. His next contribution will be made in one year's time. As part of his normal expenses, he provides Sh.300,000 annual contribution to St. Elizabeth's Children Home.

When he retires in 15 years time, he plans to purchase a 25-year annuity that pays Sh.1 million after-tax annually. He will need Sh.16 million at retirement to fund the annuity. He expects the annual payout to be sufficient to meet all his needs on an inflation-adjusted basis. He does not plan to leave any estate at the time of his death.

**Required:**

(i) The required annual return that would enable Jose Kigen to purchase the retirement annuity at the age of 55 years.
Note: All cash flows occur at the end of each period. (6 marks)

(ii) Discuss four reasons that would make Jose Kigen's ability to take risk to be considered above average. (4 marks)

**(Total: 20 marks)**

**QUESTION FIVE**

(a) Ahmed Fadhili has decided to invest Sh.1 million by purchasing shares of two companies namely; ABC Ltd. and XYZ Ltd. The projections of returns from the shares of the two companies along with their probabilities are as follows:

| Probability | Return projections (%) | |
|---|---|---|
| | ABC Ltd. | XYZ Ltd. |
| 0.20 | 12 | 16 |
| 0.25 | 14 | 10 |
| 0.25 | -7 | 28 |
| 0.30 | 28 | -2 |

**Required:**

The proportion of each of the above shares required to formulate the minimum risk portfolio. (10 marks)

(b) Berry Charo, an assistant fund manager at Adeo Ltd. pension scheme which practices a passive management strategy has been provided with the following information about the fund manager's annual returns for the last 5 years:

| Period | Fund Manager's returns (%) | Market returns (%) |
|---|---|---|
| 2016 | 9.7 | 10.1 |
| 2015 | 14.6 | 13.0 |
| 2014 | 15.3 | 14.7 |
| 2013 | 12.7 | 12.5 |
| 2012 | 10.5 | 10.0 |

**Required:**

(i) The fund manager's tracking error. (3 marks)

(ii) Comment on the results obtained in (b)(i) above. (2 marks)



(c) Zenith and Mackenzie Investment Consultants Ltd. employs a two factor arbitrage pricing theory (APT) model to measure portfolio risk and return for their clients investments.

The following information is available:

| | Factor 1 | Factor 2 |
|---|---|---|
| Investment fund beta | 1.5000 | 2.0000 |
| Risk premium | 0.0300 | 0.0125 |

The risk-free rate is 5%.

**Required:**

(i) The expected return for the investment fund. (2 marks)

(ii) Assume that Factor 1 improves by 33.33% while Factor 2 becomes adverse by 25.00%. Using suitable computations, establish whether there is any arbitrage gain in the expected return. (3 marks)

**(Total: 20 marks)**

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## Present Value of 1 Received at the End of $n$ Periods:

$$PVIF_{r,n} = 1/(1+r)^n = (1+r)^{-n}$$

| Period | 1% | 2% | 3% | 4% | 5% | 6% | 7% | 8% | 9% | 10% | 12% | 14% | 15% | 16% | 18% | 20% | 24% | 28% | 32% | 36% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | .9901 | .9804 | 9709 | .9615 | 9524 | 9434 | .9346 | 9259 | .9174 | .9091 | .8929 | 8772 | 8696 | 8621 | .8475 | .8333 | .8065 | 7813 | 7576 | 7353 |
| 2 | .9803 | 9612 | .9426 | .9246 | .9070 | .8900 | 8734 | .8573 | .8417 | .8264 | .7972 | 7695 | 7561 | .7432 | 7182 | .6944 | 6504 | .6104 | 5739 | 5407 |
| 3 | 9706 | .9423 | .9151 | 8890 | .8638 | .8396 | .8163 | 7938 | 7722 | .7513 | 7118 | 6750 | 6575 | .6407 | 6086 | 5787 | .5245 | .4768 | 4348 | 3975 |
| 4 | .9610 | .9238 | .8885 | .8548 | .8227 | 7921 | .7629 | .7350 | 7084 | 6830 | .6355 | 5921 | 5718 | .5523 | .5158 | .4823 | .4230 | .3725 | 3294 | 2923 |
| 5 | .9515 | .9057 | .8626 | .8219 | .7835 | .7473 | 7130 | 6806 | 6499 | .6209 | .5674 | 5194 | 4972 | 4761 | .4371 | .4019 | .3411 | 2910 | 2495 | .2149 |
| 6 | .9420 | .8880 | .8375 | .7903 | .7462 | .7050 | .6663 | 6302 | .5963 | .5645 | 5066 | .4556 | 4323 | .4104 | .3704 | .3349 | .2751 | .2274 | 1890 | .1580 |
| 7 | .9327 | 8706 | .8131 | .7599 | .7107 | .6651 | .6227 | .5835 | 5470 | .5132 | .4523 | 3996 | 3759 | .3538 | .3139 | .2791 | .2218 | 1776 | .1432 | .1162 |
| 8 | .9235 | .8535 | .7894 | .7307 | .6768 | .6274 | .5820 | 5403 | .5019 | .4665 | .4039 | .3506 | .3269 | .3050 | .2660 | 2326 | .1789 | .1388 | 1085 | .0854 |
| 9 | .9143 | .8368 | .7664 | .7026 | .6446 | .5919 | .5439 | .5002 | .4604 | .4241 | .3606 | 3075 | .2843 | .2630 | .2255 | .1938 | .1443 | .1084 | 0822 | .0628 |
| 10 | .9053 | 8203 | .7441 | .6756 | .6139 | .5584 | .5083 | .4632 | 4224 | .3855 | 3220 | 2697 | .2472 | .2267 | 1911 | .1615 | .1164 | .0847 | .0623 | 0462 |
| 11 | 8963 | 8043 | 7224 | .6496 | .5847 | .5268 | .4751 | 4289 | .3875 | .3505 | .2875 | 2366 | 2149 | .1954 | .1619 | .1346 | .0938 | .0662 | 0472 | 0340 |
| 12 | .8874 | .7885 | 7014 | .6246 | .5568 | .4970 | .4440 | 3971 | .3555 | 3186 | .2567 | 2076 | .1869 | 1685 | .1372 | .1122 | .0757 | .0517 | .0357 | .0250 |
| 13 | .8787 | 7730 | .6810 | .6006 | .5303 | .4688 | .4150 | 3677 | .3262 | 2897 | .2292 | .1821 | .1625 | .1452 | .1163 | .0935 | .0610 | .0404 | .0271 | 0184 |
| 14 | .8700 | .7579 | .6611 | .5775 | .5051 | .4423 | .3878 | .3405 | 2992 | .2633 | .2046 | .1597 | 1413 | .1252 | .0985 | .0779 | 0492 | .0316 | 0205 | .0135 |
| 15 | .8613 | .7430 | .6419 | .5553 | .4810 | .4173 | .3624 | 3152 | .2745 | .2394 | .1827 | 1401 | 1229 | .1079 | 0835 | .0649 | 0397 | .0247 | 0155 | 0099 |
| 16 | .8528 | .7284 | .6232 | .5339 | .4581 | .3936 | .3387 | .2919 | .2519 | .2176 | 1631 | .1229 | 1069 | .0930 | 0708 | .0541 | .0320 | .0193 | .0118 | 0073 |
| 17 | 8444 | 7142 | .6050 | .5134 | .4363 | .3714 | .3166 | 2703 | .2311 | .1978 | .1456 | 1078 | 0929 | .0802 | .0600 | .0451 | .0258 | .0150 | .0089 | 0054 |
| 18 | .8360 | .7002 | .5874 | .4936 | .4155 | .3503 | .2959 | 2502 | .2120 | .1799 | .1300 | 0946 | .0808 | 0691 | .0508 | .0376 | .0208 | .0118 | .0068 | 0039 |
| 19 | .8277 | .6864 | 5703 | .4746 | .3957 | .3305 | .2765 | 2317 | 1945 | .1635 | .1161 | .0829 | 0703 | .0596 | .0431 | .0313 | .0168 | .0092 | .0051 | 0029 |
| 20 | 8195 | .6730 | .5537 | .4564 | .3769 | .3118 | .2584 | 2145 | 1784 | 1486 | 1037 | .0728 | 0611 | .0514 | 0365 | .0261 | 0135 | .0072 | 0039 | .0021 |
| 25 | .7798 | .6095 | 4776 | .3751 | .2953 | .2330 | .1842 | 1460 | .1160 | .0923 | .0588 | 0378 | .0304 | .0245 | 0160 | .0105 | 0046 | .0021 | .0010 | 0005 |
| 30 | 7419 | .5521 | .4120 | .3083 | .2314 | .1741 | .1314 | 0994 | .0754 | .0573 | 0334 | 0196 | .0151 | 0116 | .0070 | .0042 | .0016 | 0006 | 0002 | .0001 |
| 40 | .6717 | 4529 | 3066 | .2083 | .1420 | .0972 | .0668 | 0460 | .0318 | 0221 | .0107 | 0053 | 0037 | .0026 | .0013 | 0007 | .0002 | .0001 | | |
| 50 | .6080 | .3715 | .2281 | .1407 | .0872 | .0543 | .0339 | .0213 | 0134 | .0085 | 0035 | 0014 | 0009 | .0006 | 0003 | 0001 | | | | |
| 60 | .5504 | .3048 | .1697 | .0951 | 0535 | .0303 | .0173 | .0099 | .0057 | .0033 | .0011 | .0004 | .0002 | .0001 | | | | | | |

* The factor is zero to four decimal places

## Present Value of an Annuity of 1 Per Period for n Periods:

$$PVIF_{r,n} = \sum_{t=1}^{n} \frac{1}{(1+r)^t} = \frac{1 - \frac{1}{(1+r)^n}}{r}$$

| Number of payments | 1% | 2% | 3% | 4% | 5% | 6% | 7% | 8% | 9% | 10% | 12% | 14% | 15% | 16% | 18% | 20% | 24% | 28% | 32% |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.9901 | 0.9804 | 0.9709 | 0.9615 | 0.9524 | 0.9434 | 0.9346 | 0.9259 | 0.9174 | 0.9091 | 0.8929 | 0.8772 | 0.8696 | 0.8621 | 0.8475 | 0.8333 | 0.8065 | 0.7813 | 0.7576 |
| 2 | 1.9704 | 1.9416 | 1.9135 | 1.8861 | 1.8594 | 1.8334 | 1.8080 | 1.7833 | 1.7591 | 1.7355 | 1.6901 | 1.6467 | 1.6257 | 1.6052 | 1.5656 | 1.5278 | 1.4568 | 1.3916 | 1.3315 |
| 3 | 2.9410 | 2.8839 | 2.8286 | 2.7751 | 2.7232 | 2.6730 | 2.6243 | 2.5771 | 2.5313 | 2.4869 | 2.4018 | 2.3216 | 2.2832 | 2.2459 | 2.1743 | 2.1065 | 1.9813 | 1.8684 | 1.7663 |
| 4 | 3.9020 | 3.8077 | 3.7171 | 3.6299 | 3.5460 | 3.4651 | 3.3872 | 3.3121 | 3.2397 | 3.1699 | 3.0373 | 2.9137 | 2.8550 | 2.7982 | 2.6901 | 2.5887 | 2.4043 | 2.2410 | 2.0957 |
| 5 | 4.8534 | 4.7135 | 4.5797 | 4.4518 | 4.3295 | 4.2124 | 4.1002 | 3.9927 | 3.8897 | 3.7908 | 3.6048 | 3.4331 | 3.3522 | 3.2743 | 3.1272 | 2.9906 | 2.7454 | 2.5320 | 2.3452 |
| 6 | 5.7955 | 5.6014 | 5.4172 | 5.2421 | 5.0757 | 4.9173 | 4.7665 | 4.6229 | 4.4859 | 4.3553 | 4.1114 | 3.8887 | 3.7845 | 3.6847 | 3.4976 | 3.3255 | 3.0205 | 2.7594 | 2.5342 |
| 7 | 6.7282 | 6.4720 | 6.2303 | 6.0021 | 5.7864 | 5.5824 | 5.3893 | 5.2064 | 5.0330 | 4.8684 | 4.5638 | 4.2883 | 4.1604 | 4.0386 | 3.8115 | 3.6046 | 3.2423 | 2.9370 | 2.6775 |
| 8 | 7.6517 | 7.3255 | 7.0197 | 6.7327 | 6.4632 | 6.2098 | 5.9713 | 5.7466 | 5.5348 | 5.3349 | 4.9676 | 4.6389 | 4.4873 | 4.3436 | 4.0776 | 3.8372 | 3.4212 | 3.0758 | 2.7860 |
| 9 | 8.5660 | 8.1622 | 7.7861 | 7.4353 | 7.1078 | 6.8017 | 6.5152 | 6.2469 | 5.9952 | 5.7590 | 5.3282 | 4.9464 | 4.7716 | 4.6065 | 4.3030 | 4.0310 | 3.5655 | 3.1842 | 2.8681 |
| 10 | 9.4713 | 8.9826 | 8.5302 | 8.1109 | 7.7217 | 7.3601 | 7.0236 | 6.7101 | 6.4177 | 6.1446 | 5.6502 | 5.2161 | 5.0188 | 4.8332 | 4.4941 | 4.1925 | 3.6819 | 3.2689 | 2.9304 |
| 11 | 10.3676 | 9.7868 | 9.2526 | 8.7605 | 8.3064 | 7.8869 | 7.4987 | 7.1390 | 6.8052 | 6.4951 | 5.9377 | 5.4527 | 5.2337 | 5.0286 | 4.6560 | 4.3271 | 3.7757 | 3.3351 | 2.9776 |
| 12 | 11.2551 | 10.5753 | 9.9540 | 9.3851 | 8.8633 | 8.3838 | 7.9427 | 7.5361 | 7.1607 | 6.8137 | 6.1944 | 5.6603 | 5.4206 | 5.1971 | 4.7932 | 4.4392 | 3.8514 | 3.3868 | 3.0133 |
| 13 | 12.1337 | 11.3484 | 10.6350 | 9.9856 | 9.3936 | 8.8527 | 8.3577 | 7.9038 | 7.4869 | 7.1034 | 6.4235 | 5.8424 | 5.5831 | 5.3423 | 4.9095 | 4.5327 | 3.9124 | 3.4272 | 3.0404 |
| 14 | 13.0037 | 12.1062 | 11.2961 | 10.5631 | 9.8986 | 9.2950 | 8.7455 | 8.2442 | 7.7862 | 7.3667 | 6.6282 | 6.0021 | 5.7245 | 5.4675 | 5.0081 | 4.6106 | 3.9616 | 3.4587 | 3.0609 |
| 15 | 13.8651 | 12.8493 | 11.9379 | 11.1184 | 10.3797 | 9.7122 | 9.1079 | 8.5595 | 8.0607 | 7.6061 | 6.8109 | 6.1422 | 5.8474 | 5.5755 | 5.0916 | 4.6755 | 4.0013 | 3.4834 | 3.0764 |
| 16 | 14.7179 | 13.5777 | 12.5611 | 11.6523 | 10.8378 | 10.1059 | 9.4466 | 8.8514 | 8.3126 | 7.8237 | 6.9740 | 6.2651 | 5.9542 | 5.6685 | 5.1624 | 4.7296 | 4.0333 | 3.5026 | 3.0882 |
| 17 | 15.5623 | 14.2919 | 13.1661 | 12.1657 | 11.2741 | 10.4773 | 9.7632 | 9.1216 | 8.5436 | 8.0216 | 7.1196 | 6.3729 | 6.0472 | 5.7487 | 5.2223 | 4.7746 | 4.0591 | 3.5177 | 3.0971 |
| 18 | 16.3983 | 14.9920 | 13.7535 | 12.6593 | 11.6896 | 10.8276 | 10.0591 | 9.3719 | 8.7556 | 8.2014 | 7.2497 | 6.4674 | 6.1280 | 5.8178 | 5.2732 | 4.8122 | 4.0799 | 3.5294 | 3.1039 |
| 19 | 17.2260 | 15.6785 | 14.3238 | 13.1339 | 12.0853 | 11.1581 | 10.3356 | 9.6036 | 8.9501 | 8.3649 | 7.3658 | 6.5504 | 6.1982 | 5.8775 | 5.3162 | 4.8435 | 4.0967 | 3.5386 | 3.1090 |
| 20 | 18.0456 | 16.3514 | 14.8775 | 13.5903 | 12.4622 | 11.4699 | 10.5940 | 9.8181 | 9.1285 | 8.5136 | 7.4694 | 6.6231 | 6.2593 | 5.9288 | 5.3527 | 4.8696 | 4.1103 | 3.5458 | 3.1129 |
| 25 | 22.0232 | 19.5235 | 17.4131 | 15.6221 | 14.0939 | 12.7834 | 11.6536 | 10.6748 | 9.8226 | 9.0770 | 7.8431 | 6.8729 | 6.4641 | 6.0971 | 5.4669 | 4.9476 | 4.1474 | 3.5640 | 3.1220 |
| 30 | 25.8077 | 22.3965 | 19.6004 | 17.2920 | 15.3725 | 13.7648 | 12.4090 | 11.2578 | 10.2737 | 9.4269 | 8.0552 | 7.0027 | 6.5660 | 6.1772 | 5.5168 | 4.9789 | 4.1601 | 3.5693 | 3.1242 |
| 40 | 32.8347 | 27.3555 | 23.1148 | 19.7928 | 17.1591 | 15.0463 | 13.3317 | 11.9246 | 10.7574 | 9.7791 | 8.2438 | 7.1050 | 6.6418 | 6.2335 | 5.5482 | 4.9966 | 4.1659 | 3.5712 | 3.1250 |
| 50 | 39.1961 | 31.4236 | 25.7298 | 21.4822 | 18.2559 | 15.7619 | 13.8007 | 12.2335 | 10.9617 | 9.9148 | 8.3045 | 7.1327 | 6.6605 | 6.2463 | 5.5541 | 4.9995 | 4.1666 | 3.5714 | 3.1250 |
| 60 | 44.9550 | 34.7609 | 27.6756 | 22.6235 | 18.9293 | 16.1614 | 14.0392 | 12.3766 | 11.0480 | 9.9672 | 8.3240 | 7.1401 | 6.6651 | 6.2402 | 5.5553 | 4.9999 | 4.1667 | 3.5714 | 3.1250 |

# KASNEB

## CIFA PART II SECTION 4

## PORTFOLIO MANAGEMENT

**FRIDAY: 25 November 2016.** **Time Allowed: 3 hours.**

**Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings.**

**QUESTION ONE**

(a) The way investors think and feel affects the way they behave when making investment decisions.

In relation to the above statement, describe four behavioural biases that could be faced by financial analysts when conducting portfolio research. (4 marks)

(b) The distribution of return of security F and that of the market portfolio P is given below:

| | Return (%) | |
|---|---|---|
| **Probability** | **Security F** | **Market portfolio, P** |
| 0.30 | 30 | -10 |
| 0.40 | 20 | 20 |
| 0.30 | 0 | 30 |

**Required:**

(i) The standard deviation of security F. (2 marks)

(ii) The expected return of the market portfolio P. (2 marks)

(iii) The beta for the security. (4 marks)

(c) Amos Koech is a pension fund consultant in your country. He is at a meeting with a group of pensioners where they are discussing matters relating to making retirement portfolio decisions.

**Required:**

(i) Discuss two risks which could be faced by investors when making retirement portfolio decisions. (4 marks)

(ii) Suggest one way of mitigating each of the risks identified in (c) (i) above. (4 marks)

**(Total: 20 marks)**



**QUESTION TWO**

(a) Explain the following terms as used in active portfolio management:

(i) Alpha. (2 marks)

(ii) Valued added. (2 marks)

(b) Examine three assumptions underlying the fundamental law of active portfolio management. (6 marks)

(c) John Muli is an equity analyst with Mali Mingi asset management firm. He currently follows 100 stocks and makes quarterly forecast. His information coefficient is 0.05.

Muli decides to follow an additional 100 stocks with quarterly forecast but with an information coefficient of 0.04.

**Required:**

The new information ratio for John Muli. (3 marks)

(d) Summit Bank Limited (SBL) is a commercial bank with operations in East Africa.

**Required:**
Evaluate the effect of each of the following scenarios on SBL's investment objectives, constraints, or risk taking ability:

(i) The target average maturity of loans is increased, with overall risk tolerance unchanged. (1 mark)

(ii) The Asset Liability Committee (ALCO) decides to increase SBL's credit standards for loans although the bank's overall risk tolerance is unchanged. (1 mark)

(iii) More opportunities exist for expanding net interest margins with low risk in SBL's loan portfolio in its securities portfolio. (1 mark)

(e) Jackline Moraa is a portfolio manager in a leading investment firm. She is interested in using Value at Risk (VaR) model to monitor risk exposure of her employer's government bond portfolio. The current information relating to the government bond portfolio is shown below:

- Portfolio value Sh. 1,400 million
- Expected annualised rate of return 6%
- Standard deviation of annualised rate of return 7%

**Note:** The standard normal distribution Z-values for the 0.05 and 0.01 probability levels are 1.65 and 2.33 respectively.

**Required:**
The 1% monthly Value at Risk (VaR), in shillings, for the government bond portfolio. (4 marks)
**(Total: 20 marks)**

**QUESTION THREE**

(a) Discuss five elements of investment policy statement (IPS). (5 marks)

(b) With reference to Markowitz portfolio theory, examine three problems associated with instability of the minimum variance frontier. (3 marks)

(c) You have been appointed as a portfolio manager of a big fund. After evaluating the investment portfolio of the fund, you divide the market into four portfolios following two dimensions: Value/Growth and Small/Large. The weight of each portfolio in the index is given below. You designed the following model:

| **Portfolio** | **Weight (%)** | **Sensitivity to factor 1 (Market beta)** | **Sensitivity to factor 2 (Price/Book)** | **Sensitivity to factor 3 (Average capitalisation)** |
|---|---|---|---|---|
| Small value | 5 | 0.85 | 0.80 | 1 |
| Small growth | 5 | 0.95 | 0.30 | 1 |
| Large value | 40 | 0.90 | 2 | 8 |
| Large growth | 50 | 1.10 | 3 | 10 |
| Risk premium | | 8% | -2% | 0.10% |

The risk free rate is 2%.

**Required:**

(i) Using the arbitrage pricing theory (APT), determine the portfolio that has the highest expected return. (4 marks)

(ii) One of your competitors uses the capital asset pricing model (CAPM) to calculate the expected return. Based on the betas illustrated above, determine the portfolio that he should choose in order to maximise his expected return. (4 marks)

(iii) In order to diversify his perceived risk, another competitor wants to combine the small value and large growth portfolios. The new portfolio should have an overall sensitivity to factor 1 (market beta) of 1.

Show how your competitor should invest in the small value portfolio and by how much. (4 marks)
**(Total: 20 marks)**

**QUESTION FOUR**

(a) Explain the following terms as used in portfolio asset allocation:

(i) Horse Race or "equal balanced managers" system. (2 marks)

(ii) Strategic asset allocation. (2 marks)

(iii) Tactical asset allocation. (2 marks)

(b) Summarise four advantages of using Monte Carlo Simulation approach in personal retirement planning. (4 marks)

(c) A financial analyst has gathered the following information for the asset allocation of three portfolios:

| Portfolio | Fixed Income (%) | Equity (%) | Alternative investments (%) |
|---|---|---|---|
| X | 25 | 60 | 15 |
| Y | 60 | 25 | 15 |
| Z | 15 | 60 | 25 |

**Required:**
Giving a suitable reason, determine the portfolio that is appropriate for a client who has a high degree of risk tolerance. (2 marks)

(d) The following information relates to historic geometric rates of return for various asset classes:

| Asset class | Geometric rate of return (%) |
|---|---|
| Equities | 8.0 |
| Corporate bonds | 6.5 |
| Treasury bills | 2.5 |
| Inflation rate | 2.1 |

**Required:**

(i) The real rate of return for equities. (2 marks)

(ii) The real rate of return for corporate bonds. (2 marks)

(iii) The risk premium for equities. (2 marks)

(iv) The risk premium for corporate bonds. (2 marks)

**(Total: 20 marks)**



**QUESTION FIVE**

(a) Outline three assumptions in behavioural finance that are necessary in specifying investors portfolios. (3 marks)

(b) (i) Explain the term "financial engineering". (2 marks)

(ii) Propose four factors responsible for growth in financial engineering in your country. (4 marks)

(c) Analyse four ethical responsibilities of a portfolio manager. (4 marks)

(d) An investor has a risk aversion of 5% with the following asset mix:

| Asset allocation | Expected rate of return E(R) (%) | Standard deviation (σ) (%) |
|---|---|---|
| A | 18 | 12 |
| B | 17 | 9 |
| C | 7 | 5 |

**Required:**
Using the risk-adjusted rate of return measure, advise the investor on the appropriate asset mix. (4 marks)

(e) The information given below relates to the beta coefficient and the amount of investment for a fund:

| Stock | Investment (Sh."million") | Stock's Beta Coefficient |
|---|---|---|
| A | 120 | 0.5 |
| B | 100 | 2.0 |
| C | 60 | 4.0 |
| D | 80 | 1.0 |
| E | 40 | 3.0 |

The current risk-free rate is 7%, and the market return has the following probability distribution for the next one year:

| Probability | Market return (%) |
|---|---|
| 0.1 | 8 |
| 0.2 | 10 |
| 0.4 | 12 |
| 0.2 | 14 |
| 0.1 | 16 |

**Required:**
The rate of return on the fund. (3 marks)

**(Total: 20 marks)**

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# KASNEB

## CIFA PART II SECTION 4

## PORTFOLIO MANAGEMENT

**FRIDAY: 27 May 2016.** **Time Allowed: 3 hours.**

**Answer ALL questions. Marks allocated to each question are shown at the end of the question. Show ALL your workings.**

**QUESTION ONE**

(a) Analyse five constraints that investors are likely to face when making investment decisions. (5 marks)

(b) Paul Letting' wishes to invest in a securities exchange. He has obtained the following information relating to individual securities of interest:

| Security | Expected return (%) | Beta | Unsystematic risk (%) |
|---|---|---|---|
| A | 15 | 1.5 | 40 |
| B | 12 | 2.0 | 20 |
| C | 10 | 2.5 | 30 |
| D | 09 | 1.0 | 10 |
| E | 08 | 1.2 | 20 |
| F | 14 | 1.5 | 30 |

**Additional information:**

1. The market index variance is 10%.
2. The risk free rate of return is 7%.
3. Assume no short sales is allowed.

**Required:**

Determine the optimal portfolio. (10 marks)



(c) Highlight five benefits that would accrue to an investor who includes pooled investment products in his portfolio. (5 marks)

**(Total: 20 marks)**

**QUESTION TWO**

(a) Explain the following types of risks associated with emerging market investments:

(i) Accounting convections. (2 marks)

(ii) Settlement risk. (2 marks)

(iii) Information barriers. (2 marks)

(iv) Custodial facilities. (2 marks)

(b) A portfolio manager is provided with the following data relating to an investment account:

| Date | 1 November 2014 Sh. "000" | 1 March 2015 Sh. "000" | 1 August 2015 Sh. "000" | 1 February 2016 Sh. "000" | 1 April 2016 Sh. "000" |
|---|---|---|---|---|---|
| Account balance (Before deposit or withdrawal) | 14,516 | 14,547 | 18,351 | 16,969 | 18,542 |
| Deposit | - | 3,000 | - | 2,500 | - |
| Withdrawal | - | - | 2,000 | - | - |

**Required:**

Annual effective yield rate using the time weighted method. (3 marks)

(c) Nicholas Timamo, the Chief Financial Officer (CFO) of Sinet Ltd.,' chairs the investment committee of the company's Sh.100 million defined benefit (DB) pension plan. Sinet Ltd. operates exclusively in the domestic market and has recently completed a five year early retirement program. As a result of this program, many long time employees decided to retire early at age 50 and receive full pension benefits.

The actuary of the pension plan has determined the following:

1. 60% of all participants in Sinet Ltd.'s DB pension plan are now retired and receiving their pension.
2. The required real rate of return based on actuarial assumptions for the pension fund is 5.5% annually.
3. The average age of active employees who will eventually collect retirement benefits is 45 years.
4. Inflation has been stable at 2% per annum. This rate is forecasted to remain the same for the foreseeable future.
5. The pension plan is currently fully funded and Nicholas would like to minimise the amount of the company contributions required in future.

**Required:**
Formulate an investment policy objective for Sinet Ltd.'s pension plan under the following headings:

(i) Return objective. (3 marks)

(ii) Risk tolerance. (3 marks)

(iii) Time horizon. (3 marks)

**(Total: 20 marks)**

**QUESTION THREE**

(a) (i) Discuss two factors that could affect the level of tracking error in a portfolio of ordinary shares. (4 marks)

(ii) The following information relates to Signature Investment Limited for the year ended 2015:

1. Risk free rate of return is 5.0%.
2. Benchmark standard deviation is 15.0%.
3. Beta of the benchmark index is 1.0.
4. Average annual rate of return is 19.8%.
5. Standard deviation of return of the company is 11.9%.
6. Sharpe ratio is 1.24.
7. Residual standard deviation is 11.5%.
8. Company's beta is 0.80.

**Required:**
Tracking error for Signature Investment Limited portfolio. (3 marks)

(b) Evaluate four categories of assets that could be used to construct a portfolio. (4 marks)

(c) Justus Mutinda, a portfolio manager for a money market fund at Alpha Asset Managers (AAM), provides advisory services to his two clients; Tricend Limited and Quantum Limited portfolios.

The following information is relevant to the two clients:

**Tricend Limited:**
The company's portfolio is managed on behalf of an endowment. Justus Mutinda employs a regression model using the data over the past eight years as shown below:

$(R_{pt} - R_{ft}) = \alpha + B\,(R_{Bt} - R_{ft}) + \Sigma t$

Where:
$R_{pt}$, $R_{ft}$, $R_{Bt}$ = The return on the portfolio, risk free assets and benchmark at time t, respectively.
$\alpha$, B = Regression intercept and slope coefficient, respectively.
$\Sigma t$ = Random regression error term.

**Results:**

| Parameter | Coefficient estimate | Standard error |
|---|---|---|
| $\alpha$ | 0.025 | 0.121 |
| B | 1.05 | 0.336 |

**Quantum Limited:**
The company's portfolio is managed on behalf of a pension fund with a high risk aversion ($\lambda = 0.15$). The portfolio is anticipated to generate quarterly residual return of 0.5% with a residual risk of 1%.

**Required:**

(i) The ex-post information ratio (IR) for Tricend Limited portfolio. (3 marks)

(ii) The annualised value added (VA) for Quantum Limited portfolio using the estimates of residual risk and residual return. (3 marks)

(iii) The optimal level of annualised residual risk for Quantum Limited Portfolio. (3 marks)

**(Total: 20 marks)**

**QUESTION FOUR**

(a) An investor's background, past experiences and attitudes can play a significant role in decisions made during the asset allocation process.

**Required:**
In relation to the above statement, explain how investors could be classified under the following models:

(i) Barnewall Two-Way model. (4 marks)

(ii) Bailard, Biehl and Kaiser (BKK) Five-Way model. (5 marks)

(iii) Highlight three limitations of classifying investors using both of the models identified in (a)(i) and (a)(ii) above. (3 marks)

(b) Cyrus Mwamba and his wife Lucy, aged 40 years and 39 years respectively are considering what to do with a recent windfall that they received from participating in an online sports game. The windfall is estimated to be Sh.2,500,000 (after taxes). Cyrus is currently a supervising mechanic at a local luxury car dealership and earns a salary of Sh.100,000 per month while Lucy is not employed. The couple has two children: Henry and Abby aged 12 and 10 years respectively. By design, the couple owe no debt and pay their expenses on a monthly basis. Family expenses last year amounted to approximately Sh.1,010,000.



In addition to the windfall, the couple have an additional Sh.1,250,000 in cash equivalents. Cyrus and his wife have approached you for assistance in managing their portfolio. The couple made the following statements at a recent client discovery meeting:

1. One of our goals at this stage in our lives is to pay for the university education of our children.
2. We expect our annual expenses to increase at the general rate of inflation of 5% per annum.
3. We want to retire at the age of 65 years and be able to live comfortably but not extravagantly.
4. We are taxed at the rate of 30% on both income and capital gains.
5. We believe our portfolio should never suffer an annual loss of more than 5%. In addition, we do not want to invest in any individual investment or security that is too risky.
6. We do not foresee any unsual expenses over the short-term. As always, we would like to have enough cash at hand for emergencies.

**Required:**

(i) The couple's after-tax nominal return for the coming year. (4 marks)

(ii) The couple's risk tolerance. (4 marks)

**(Total: 20 marks)**

**QUESTION FIVE**

(a) With the aid of a well labelled diagram, illustrate the meaning of the following terms as used in portfolio theory:

(i) An efficient frontier (2 marks)

(ii) A feasible set. (2 marks)

(iii) Capital market line (CML). (2 marks)

(b) The returns on Hydromax Oil Corporation Limited ordinary shares has been found to be influenced by three risk factors: $X_1$, $X_2$ and $X_3$.

Where:
$X_1$ - An index reflecting energy cost.
$X_2$ - Changes in the level of market share prices.
$X_3$ - Changes in the exchange rate of the local currency relative to other currencies.

The following table indicates the risk factor, risk premium and the beta factor for the returns of the company:

| Risk factor | Risk premium | Beta factor |
|---|---|---|
| $X_1$ | 4.5% | 0.7 |
| $X_2$ | 7.5% | 0.3 |
| $X_3$ | 11.25% | 1.1 |

The risk free rate is 8.25%.

**Required:**

(i) The required rate of return of the company's share using the Arbitrage Pricing Theory (APT). (3 marks)

(ii) The required rate of return of the company's share using the Capital Asset Pricing Model (CAPM). (3 marks)

(iii) Highlight four assumptions of Arbitrage Pricing Theory (APT). (4 marks)

(c) Distinguish between "strategy breadth (BR)" and "information coefficient (IC)" in relation to active portfolio management. (4 marks)

**(Total: 20 marks)**

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# KASNEB

**CIFA PART II SECTION 4**

**PORTFOLIO MANAGEMENT**

**PILOT PAPER**

**September 2015.** **Time Allowed: 3 hours.**

**Answer any FIVE questions.** **ALL questions carry equal marks.**

**QUESTION ONE**

(a) Briefly explain the drawbacks of the following composite measures of portfolio performance:

(i) Trenor's measure. (2 marks)

(ii) Sharpe's measure. (2 marks)

(iii) Jensen's measure. (2 marks)

(b) Critically evaluate the assumptions of the capital asset pricing model. (4 marks)

(c) Orbit Ltd. is considering two investments; A and B. The risk return characteristics of the two projects are shown below:

| | Project A | Project B |
|---|---|---|
| | % | % |
| Expected return | 14 | 18 |
| Risk (Standard deviation) | 6 | 8 |

The company plans to invest 80% and 20% of its available funds in Project A and B respectively. The correlation coefficient of returns between Project A and B is 0.5

**Required:**

(i) The expected return from the proposed portfolio comprising of Project A and B. (2 marks)

(ii) The total risk of the portfolio. (2 marks)

(iii) Suppose the correlation coefficient between Projects A and B is -1. Determine how the company should invest its funds in order to obtain zero portfolio risk. (4 marks)



(d) The following information relates to securities X and Y which lie on the Security Market Line (SML):

| Security | Required rate of return | Beta coefficient |
|---|---|---|
| X | 18% | 1.0 |
| Y | 22% | 1.5 |

**Required:**

Determine the risk free rate of return. (2 marks)

**(Total: 20 marks)**

**QUESTION TWO**

(a) Assuming that you work for an investment and financial analyst at Elite Investors. The portfolio manager provides you with the following annual rates of return for a portfolio and the relevant benchmark index for the years 2010 to 2014:

| Year | Portfolio return (%) | Benchmark return (%) |
|---|---|---|
| 2010 | 13 | 15 |
| 2011 | 15 | 11 |
| 2012 | 21 | 13 |
| 2013 | 15 | 17 |
| 2014 | 17 | 14 |

**Required:**

(i) The tracking error for the portfolio. (5 marks)

(ii) Appraise three ways in which the tracking error in a (i) above could have arisen. (3 marks)

(b) Amos Odongo is reviewing the performance of his largest asset, Fair Mutual fund for the month of December 2014. He obtained the following data to undertake the task:

| | Fair Mutual fund | Market |
|---|---|---|
| Expected return (%) | 14 | 12 |
| Beta coefficient | 1.2 | 1.0 |
| Standard deviation (%) | 28 | 26 |

The return on government treasury bonds is 5%.

**Required:**

(i) Evaluate the performance of the fund using:

(a) Trenor's ratio. (3 marks)

(b) Sharpe's measure. (3 marks)

(c) Jensen's (Alpha) measure. (3 marks)

(ii) Explain whether Fair Mutual outperformed the market using the results obtained in (b) (i) above. (3 marks)

**(Total: 20 marks)**

**QUESTION THREE**

(a) In relation to portfolio management, explain the meaning of the following terms:

(i) Passive portfolio management. (2 marks)

(ii) Active portfolio management. (2 marks)

(iii) Tactical asset allocation. (2 marks)

(b) Explain the term "window dressing" as used in portfolio management. (2 marks)

(c) An investment adviser is counselling Stephen Gerald, a client who recently inherited Sh.12,000,000 and has above average risk tolerance ($R_A = 2$). Because Gerald is young and one of his purposes is to fund a comfortable retirement, he wants to earn returns that will outpace inflation in the long term. Gerald expects to liquidate Sh.600,000 of the portfolio in 12 months, however, to make a down payment on a house. If that need arises, he states that it is important for him to be able to take out the Sh.600,000 without affecting the initial capital of Sh.12,000,000.

The following are the three alternative strategic asset allocations available to him:

| | Investor's forecasts | |
|---|---|---|
| **Asset Allocation** | **Expected return** | **Standard deviation of return** |
| A | 10 | 20 |
| B | 7 | 10 |
| C | 5.25 | 5 |

**Required:**

(i) Based only on Gerald's risk adjusted expected returns for asset allocations, identify the asset allocation that he would prefer. (5 marks)

(ii) Given Gerald's desire not to affect the Sh.12,000,000 principal, determine the shortfall level. (3 marks)

(iii) According to Roy's safety first criterion, identify the best of the three strategic asset allocation. (3 marks)

(iv) Recommend a strategic asset allocation for Gerald. (1 mark)

**(Total: 20 marks)**

**QUESTION FOUR**

(a) Define the term 'portfolio upgrading' clearly stating any two principle objectives of portfolio upgrading. (4 marks)

(b) (i) Explain the term 'money weighted rate of return". (2 marks)

(ii) Explain the following terms in relation to active bond portfolio management strategies:

(a) Barbell strategy. (2 marks)

(b) Bullet strategy. (2 marks)

(c) Laddered strategy. (2 marks)

(c) The policy committee of Kubwa Investment Ltd. uses reports from various security analysts to develop inputs for the single index model consisting of the following efficient portfolios:

| Portfolio | Expected return | Standard deviation of return |
|---|---|---|
| | % | % |
| A | 9 | 4 |
| B | 11 | 7 |
| C | 14.5 | 5.2 |
| D | 18 | 11 |
| E | 21 | 19 |

The probability distribution of the market return is given as follows:

| Probability | Market return |
|---|---|
| 0.2 | 15 |
| 0.3 | 10 |
| 0.4 | 20 |
| 0.1 | 5 |



**Required:**

(i) The optimal portfolio at a risk free rate of 7%. (6 marks)

(ii) The required portfolio return at a standard deviation of 12%. (2 marks)

**(Total: 20 marks)**

**QUESTION FIVE**

(a) On 1 January 2014, Peter Njuguna, a Kenyan investor, invested 500,000 Kenya Shillings (KSh.) by buying shares in Ugandan Securities Exchange (USE) at Uganda Shillings (USh.) 30 per share.

**Additional information:**

1. The current spot rate (1 January 2014) was USh. 32/1KSh. and on 30 September 2014 the rate was USh.28/1KSh.
2. The market price per share on 30 September 2014 was USh.35.

**Required:**

(i) The total return on the investment as at 30 September 2014. (4 marks)

(ii) Comment on the relationship between the share price and foreign exchange rate based on your result in (a) (i) above. (2 marks)

(iii) In the context of behavioural finance, explain Festinger's theory of financial cognitive dissonance. (4 marks)

(b) Dani Kwendo, an investment specialist has been entrusted with Sh.10 million by a unit trust and instructed to invest the money optimally over a 2 year period. Part of the instructions are:

1. The funds be invested in one or more of the four specified projects and in the money market.

2. The four projects are not divisible and cannot be postponed.

3. The unit trust requires a return of 24% over the two year period.

The following are the details of the investment in the projects and the money market:

| | **Initial cost** | **Return over the two years** | **Expected standard deviation of return over the two years** |
|---|---|---|---|
| | **KSh. ('000')** | **%** | **%** |
| Project 1 ($P_1$) | 6,000 | 22 | 7 |
| Project 2 ($P_2$) | 4,000 | 26 | 9 |
| Project 3 ($P_3$) | 6,000 | 28 | 15 |
| Project 4 ($P_4$) | 6,000 | 34 | 13 |
| Money Market (MM) | 1,000 (minimum) | 18 | 5 |

The correlation coefficient of returns over the two years are as follows:

| **Between projects** | **Between projects and market portfolio (mp)** | **Between projects and money market (mm)** | **Between money market and portfolio (mp)** |
|---|---|---|---|
| $P_1$ and $P_2$ = 0.7 | $P_1$ and mp = 0.68 | $P_1$ and mm = 0.4 | mm and mp = 0.4 |
| $P_1$ and $P_3$ = 0.62 | $P_2$ and mp = 0.65 | $P_2$ and mm = 0.45 | |
| $P_1$ and $P_4$ = 0.56 | $P_3$ and mp = 0.75 | $P_3$ and mm = 0.55 | |
| $P_2$ and $P_4$ = 0.57 | $P_4$ and mp = 0.88 | $P_4$ and mm = 0.6 | |
| $P_3$ and $P_4$ = 0.76 | | | |

Over the two year period, the risk free rate is estimated to be 16%, market portfolio return is 27% and the variance of returns on the market is 100%.

**Required:**

(i) Using portfolio theory, evaluate how Dan Kwendo should invest Sh.10 million. (5 marks)

(ii) Determine the beta coefficients and the required rate of returns for the portfolio. (2 marks)

(iii) Apply the capital asset pricing model (CAPM) to evaluate how Dan Kwendo should invest the Sh.10 million. (3 marks)

**(Total: 20 marks)**

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