INSTRUCTIONS TO CANDIDATES

General Instructions

1. This examination has a total of 40 points.

   This exam consists of 6 questions, numbered 1 through 6.

   The points for each question are indicated at the beginning of the question.

2. Failure to stop writing after time is called will result in the disqualification of your answers or further disciplinary action.

3. While every attempt is made to avoid defective questions, sometimes they do occur. If you believe a question is defective, the supervisor or proctor cannot give you any guidance beyond the instructions on the exam booklet.

Written-Answer Instructions

1. Write your candidate number at the top of each sheet. Your name must not appear.

2. Write on only one side of a sheet. Start each question on a fresh sheet. On each sheet, write the number of the question that you are answering. Do not answer more than one question on a single sheet.

3. The answer should be confined to the question as set.

4. When you are asked to calculate, show all your work including any applicable formulas. When you are asked to recommend, provide proper justification supporting your recommendation.

5. When you finish, insert all your written-answer sheets into the Essay Answer Envelope. Be sure to hand in all your answer sheets because they cannot be accepted later. Seal the envelope and write your candidate number in the space provided on the outside of the envelope. Check the appropriate box to indicate Exam QFIIRM.

6. Be sure your written-answer envelope is signed because if it is not, your examination will not be graded.

Tournez le cahier d’examen pour la version française.

Recognized by the Canadian Institute of Actuaries.
1. (7 points) You are responsible for managing operational due diligence at hedge fund XYZ.

(a) (0.5 points) Describe two ways that documentation facilitates a risk management process.

(b) (1 point) Describe four ways to create a risk-conscious culture at XYZ.

You are currently reviewing ABC, an asset management company, for a potential investment opportunity. You have noted the following:

1. Low employee turnover at ABC over the last few years.
2. Some asset managers at ABC make impulsive decisions on speculative investments.
3. Each manager at ABC imposes his/her own operational risk management philosophy onto his/her team.
4. Your operational due diligence team is relying on the interviews conducted by XYZ’s investment team of ABC’s asset managers.

(c) (2 points) Critique the positive and negative aspects of the facts noted above from an operational due diligence perspective.

The teams working in the back office are having communication issues with the front office. A colleague of yours suggests using the following to solve the issues:

1. System diagrams
2. Workflow diagrams

(d) (1.5 points) Compare and contrast the two approaches above.
1. **Continued**

Your assistant draws the following workflow diagram:

![Workflow Diagram](image)

(e) **(2 points)** Recommend improvements to this workflow diagram. Justify your response.
2. (7 points) You are the CEO at a research advisory firm specializing in the insurance sector.

A potential client questions the value of your company’s research.

(a) (1.5 points) Describe three advantages and three disadvantages of investors doing their own independent research.

You are looking into the gift policy of the firm.

(b) (0.5 points) List two issues with a research analyst accepting a gift from a subject company.

Your company’s gift policy states “Gifts from traders, subject companies, or other parties may be accepted up to a value of USD 100. All gifts must be disclosed to your manager.”

(c) (1 point) Describe two ways that the policy addresses the issues related to accepting gifts.

A research analyst and his manager have each been given event tickets valued at USD 75. The manager offers his ticket to the analyst so he can enjoy the event with his wife.

(d) (1.5 points)

(i) Identify the action the analyst should take in this situation. Justify your response.

(ii) Recommend two improvements that can be made to your company’s current gift policy.
2. Continued

You analyze the company’s exposure to fraud risk in order to draft a fraud policy. During your research, you find the following:

- Mr. Johnson has served in senior management roles in companies A and B, and is currently the CEO of Company C
- A research analyst has only been covering companies A, B, and C and consistently made strong buy recommendations
- The analyst’s reports contain only sparse financial information
- Your reviews of industry competitive analysis and recent earnings reports from companies A, B, and C do not justify strong buy recommendations

(e) (2.5 points)

(i) Identify two signs of potential fraud in this situation.

(ii) Recommend two actions to address the potential fraud identified in (i).

(iii) Propose four rules to include in the fraud policy that would prevent fraud in similar situations in the future.
3. (7 points) John is a consultant working on an outsourcing study for ABC, a domestic manufacturing company.

ABC is looking to outsource the production and is concerned with the following variables:

- Foreign exchange rate
- Number of sick days taken in a year by factory workers

(a) (1.5 points)

(i) Define “wild randomness”.

(ii) Identify whether the type of randomness expected for each variable is mild or wild. Justify your response.

ABC is concerned with annual revenue loss due to factory worker strikes. John has modeled the probability of revenue loss with the following formula:

\[ P(Y > y) = Ky^{-a} \]

where:

- \( Y \) = Revenue loss due to strike
- \( P(Y > \$1M) = 1.0000\% \)
- \( P(Y > \$4M) = 0.0625\% \)
- \( K \) and \( a \) are positive constants

(b) (2.5 points)

(i) Identify whether the distribution of \( Y \) is scalable. Justify your response.

(ii) Explain whether this is an appropriate distribution for modeling revenue loss.

(iii) Calculate the value of \( a \).
3. **Continued**

John is evaluating the vulnerability of ABC’s employee pension portfolio to severe losses. He considers the following scenarios:

- A loss that is two standard deviations below the mean portfolio return
- A stock market crash similar to the 1987 market crash, where geographical diversification in stock markets failed to dampen losses

(c) **(3 points)**

(i) Compare and contrast the copula and fractal approaches to modeling tail risks.

(ii) Explain whether the copula or fractal approach is more appropriate in each scenario above. Justify your response.
4. **(7 points)** You are a market risk analyst at BCD Company, a U.S. based investment firm and have noted the following information about the firm’s asset portfolio:

- The portfolio has a market value of USD 225 million and is fully allocated to equity
- The expected return on equity is 9%, and the standard deviation is 15%
- There is a cash inflow of USD 75 million that will be fully allocated to bonds
- The expected return on bonds is 3.5%, and the standard deviation is 4%
- The correlation between the two asset classes is 0.35
- All figures are annual

(a) **(1.5 points)** Use the analytical method to complete the following:

(i) Calculate a 1% weekly VaR of the new USD 300 million portfolio.

(ii) Calculate the change in the weekly VaR due to addition of bonds in the portfolio.

(iii) Interpret your results.

BCD is looking to further reduce its equity exposure and is considering two options:

1. Reallocate a portion of the equity position into cash with a standard deviation of 0%
2. Purchase equity put options

(b) **(1 point)** For each option above:

(i) Describe the impact on the 1% weekly VaR of the portfolio.

(ii) Explain whether the analytical VaR method is appropriate.

Management expresses two main concerns with the performance of BCD’s asset portfolio:

1. Loss in excess of that of a 1-in-100 year event
2. Exposure to a very unlikely market decline, such as the 2008 financial crisis

(c) **(1.5 points)** For each of the above concerns:

(i) Evaluate the use of VaR to quantify the risk.

(ii) Recommend an alternate risk measure to supplement VaR.
4. Continued

BCD is considering investing in Company XYZ. XYZ is issuing its first and only bond in the form of a zero-coupon bond to finance its expansion. The bond is due in one year and is the firm’s only liability. The face value of the bond is USD 250 million.

Let $A_t$ represent the market value of XYZ’s assets in 1 year. You construct the table below to illustrate the payoff structure for XYZ’s bondholders and stockholders:

<table>
<thead>
<tr>
<th>Payoff</th>
<th>$A_t &lt; $250M$</th>
<th>$A_t \geq $250M$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bondholders</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Stockholders</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(d) (1.5 points)

(i) Determine the payoff structure by completing the table above.

(ii) Explain the implicit options that each capital supplier faces.

(iii) Identify the supplier that is more exposed to credit risk. Justify your response.

Rather than issuing this bond in its home country (the U.S.), XYZ decides to issue the bond in Japanese Yen (JPY). XYZ also enters a one-year forward contract (buy yen, sell dollars) at a rate of JPY 110 per USD 1 on a notional of JPY 27,500 million.

BCD decides to purchase the bond.

(e) (1.5 points) Explain how BCD and XYZ are each exposed to the following risks with respect to these transactions:

(i) Credit risk

(ii) Liquidity risk

(iii) Exchange rate risk
5. (7 points) You are a consultant assisting an investment management firm with their risk management process.

(a) (1.5 points) Describe six risk identification tools or techniques.

After meeting with the CEO, you learn the following:

1. The firm uses hedge funds, leverage, and arbitrage opportunities in currency markets, often through government bonds, as its main trading strategy.

2. The CEO has cultivated a hands-off culture, in which traders are given little oversight and traders are awarded bonuses based upon the performance of their funds. He believes this best motivates his employees and encourages morale because it demonstrates he trusts their judgment.

The CEO was intrigued by the possibility of using case studies to inform their risk management process.

(b) (1 point) Identify two relevant case studies for the managers of the firm.

(c) (1 point) Identify two lessons from the risk management failures in each of the case studies.

You follow up on a conversation with the firm’s board and learn:

1. The board meets infrequently and relies on reports from the CEO.
2. The board’s compensation committee redesigns the CEO’s compensation annually.
3. The firm’s Chief Risk Officer (CRO) reports to the CEO.

(d) (1.5 points) Recommend three ways that the firm could improve its risk management culture.
5. Continued

The managers of the firm described the risk identification techniques they have used in the past. The firm primarily relied upon interviews of senior personnel. The interviews were all designed and conducted by the CEO of the firm.

(e) (2 points)

(i) Describe the advantages and disadvantages of using interviews as a risk identification technique.

(ii) Critique the firm’s approach to interviews as a risk identification technique.

(iii) Recommend two improvements to the firm’s approach to interviews.
6. *(5 points)* You are a junior employee at ABC Investments. You recently heard your manager told your peer to skip the second review because the initial work was done by a trustworthy analyst. The company policy is to peer review all files, but it is often overlooked so that resources can be deployed towards achieving financial goals.

(a) *(1 point)* Identify the two most relevant ways that a top-down risk culture program can lead to unethical behavior for ABC.

Your manager has the following request:

“For the Q2 investment performance reports to clients, please switch selection criteria from ex ante to ex post. We are still reporting based on the same facts and it will help make it easier for us to explain the returns we are seeing.”

(b) *(1 point)* Describe the benefits and ethical concerns of ex post reporting.

The ABC compliance department is conducting an audit of the company’s investment department.

(c) *(0.5 points)* List the four Fundamental Principles of Investment Ethics.

Your manager is concerned about losing clients due to recent poor performance. A long-time client demands strong returns in the following quarter. You develop two investment opportunities that have worked 5 years ago for this client:

- Opportunity #1: Borrow $100,000 at 4% interest to invest in an IPO opportunity
- Opportunity #2: Borrow and sell 100 shares of Company X and agree to purchase the shares back in six months

(d) *(2.5 points)*

(i) Identify investment strategies used in opportunities #1 and #2.

(ii) Describe the risks of each opportunity.

(iii) Explain how these opportunities could violate the Fundamental Principles of Investment Ethics.

**END OF EXAMINATION**
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