Enterprise Risk Management

Exam ERM

Date: Thursday, May 1, 2025

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This examination has 5 questions numbered 1 through 5 with a total of 60 points.

   The points for each question are indicated at the beginning of the question. Questions 1, 4, and 5 pertain to the Case Study.

2. 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 provided in this document.

Written-Answer Instructions

1. Each question part or subpart should be answered either in the Word document or the Excel file as directed. Graders will only look at work in the indicated file.

   a) In the Word document, answers should be entered in the box marked ANSWER. The box will expand as lines of text are added. There is no need to use special characters or subscripts (though they may be used). For example, β_1 can be typed as beta_1 (and ^ used to indicate a superscript).

   b) In the Excel document formulas should be entered. Performing calculations on scratch paper or with a calculator and then entering the answer in the cell will not earn full credit. Formatting of cells or rounding is not required for credit.

   c) For each question part requiring an answer in Excel, (1) clearly identify the inputs to the calculations, (2) show the necessary interim calculations, adding rows and / or columns, if necessary, and (3) enter the final answer in some or all of the cells highlighted in yellow, as applicable in each circumstance. These cells should contain formulas with links to other calculations in the worksheet. Minimize the use of hard-coded figures and maximize the number of interim steps in the calculations that would demonstrate your line of thinking.

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

3. Prior to uploading your Word and Excel files, each file should be saved and renamed with your unique candidate number in the filename. To maintain anonymity, please refrain from using your name and instead use your candidate number.

4. The Word and Excel files that contain your answers must be uploaded before the five-minute upload period expires.

Navigation Instructions

Open the Navigation Pane to jump to questions.

Press Ctrl+F, or click View > Navigation Pane:
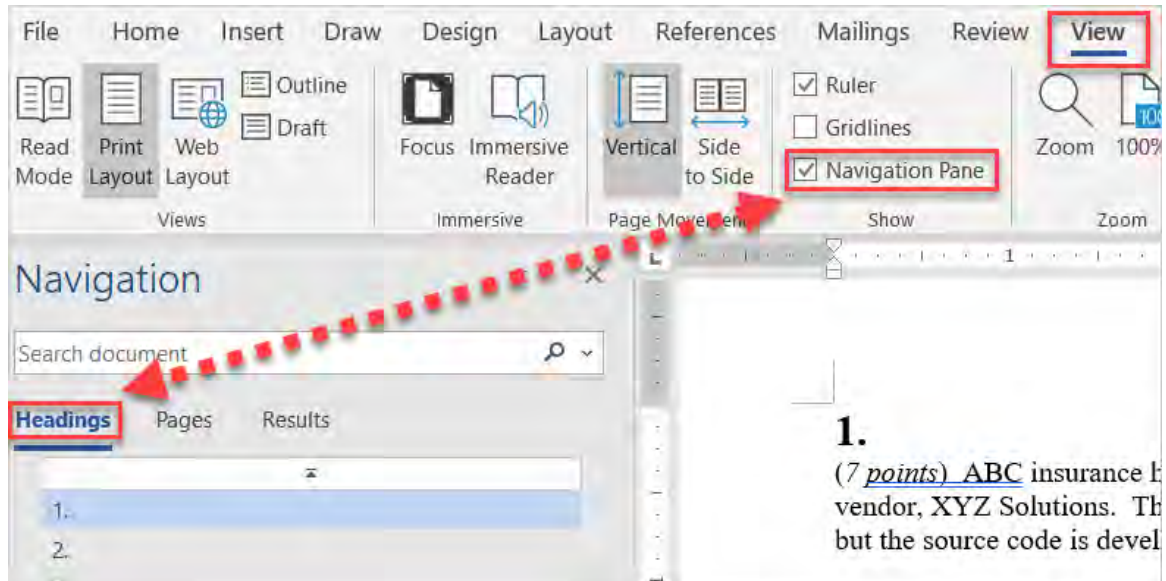
CASE STUDY INSTRUCTIONS

The case study will be used as a basis for some examination questions. Be sure to answer the question asked by referring to the case study. For example, when asked for advantages of a particular plan design to a company referenced in the case study, your response should be limited to that company. Other advantages should not be listed, as they are extraneous to the question and will result in no additional credit. Further, if they conflict with the applicable advantages, no credit will be given.

1.

(*10 points*) You are an actuary hired by Pryde to consult on tasks related to climate risk assessment. Refer to Sections 3.4 and 4.5 of the Case Study, including the e-mail dated December 5, 2023, from the CRO about climate change risk.

(a)   (*7 points*)

(i)   Describe two examples of physical risk from a *chronic* shift of climate patterns specific to Pryde's Commercial Multiple Peril (CMP) line of business.

ANSWER:

(ii)   Assess the effectiveness of the two risk monitors proposed in the CRO e-mail in their ability to measure climate-related risk for Pryde.

ANSWER:

(iii)   Identify one additional consideration for each of the following climate-related risks as they relate specifically to Pryde:

- Transition Risk
- Legal Risk
- Reputational Risk

Justify your response.

ANSWER:

1.   Continued

(b)   (*3 points*) You have been tasked with developing appropriate scenarios for assessing climate-related impacts to Pryde's profitability and to the reinsurance in place for its CMP line.

Describe, using the Case Study, an example relevant to Pryde CMP claims for each of the following types of scenarios and explain how it might be useful to Pryde in assessing impacts.

      I.   Single Factor Sensitivity
      II.   Single Factor Multi-Period Scenario
      III.   Multi-Factor Stress Scenario

ANSWER:

2.

(*14 points*) MOK Life is an insurance company currently selling whole life and term life products. MOK Life's product development team proposes the addition of a new payout annuity product to its product portfolio. You have been asked to assist with evaluating the capital impacts of adding the new product.

MOK Life is based in the U.S. and follows the NAIC RBC framework.

(a)   (*3 points*) MOK Life starts by evaluating how rating agencies view an expansion into a new product line. Rating agencies consider the following factors while evaluating MOK Life's balance sheet strength:

- Capital adequacy
- Investment and ALM strategies
- Liquidity

Explain how each of these three factors will be impacted with the addition of the new product line.

> ANSWER:

(b)   (*4 points*) MOK Life is concerned about the regulatory implications of adding a new product line. Currently, MOK Life's RBC results are as shown in the "Q2.b" tab of the Excel spreadsheet. The addition of the payout annuity product line is expected to cause an increase in C2 longevity risk capital amount of $350 million.

The C2 correlation factor between life products and annuity products is assumed to be -0.25, and the addition of the payout annuity product line is expected to have no immediate impact on Total Available Capital (TAC).

(i)   Calculate the new C2 insurance risk charge after adding the payout annuity product line. Show your work.

> *The response for this part is to be provided in the Excel spreadsheet.*

(ii)   Calculate the Authorized Control Level (ACL) and ACL ratio for MOK Life before and after the addition of the payout annuity product. Show your work.

> *The response for this part is to be provided in the Excel spreadsheet.*

2.   **Continued**

(iii)   Recommend if MOK Life should go ahead with the product expansion based on your previous responses. Justify your response.

The response for this part is to be provided in the Excel spreadsheet.

(c)   (*7 points*) MOK Life decides to evaluate what impact adding the payout annuities to its product portfolio will have on its internal capital allocation model. Currently, MOK Life uses a correlation matrix for risk aggregation.

MOK decides to use the discrete marginal allocation method to allocate capital to its product lines.

(i)   Calculate the total capital before and after the addition of payout annuities. Show your work.

The response for this part is to be provided in the Excel spreadsheet.

(ii)   Calculate capital allocation for MOK Life **before** the addition of payout annuities, assuming that capital is first allocated to the Whole Life product. Show your work.

The response for this part is to be provided in the Excel spreadsheet.

(iii)   Calculate capital allocation for MOK Life **after** addition of payout annuities, assuming the following orders for allocating capital to the individual product lines:

I.   Whole Life, Term Life, Payout Annuity
II.   Term Life, Payout Annuity, Whole Life
III.   Payout Annuity, Whole Life, Term Life

Show your work.

The response for this part is to be provided in the Excel spreadsheet.

3.

(*12 points*) ABC Insurance is a growing medium-sized U.S.-based life insurance company selling term and whole-life products. ABC is considering acquiring a small life insurer, XYZ, as its first foreign subsidiary.

XYZ currently sells low face value life insurance products to older individuals. It has struggled to raise capital for supporting and growing the business.

XYZ has a developing ERM framework based on the three lines of defense model, but currently does not have a CRO.

(a)   (*3 points*) ABC is currently assessing the potential integration of XYZ's businesses. ABC's management has highlighted the following potential challenges:

- Understanding sensitivity to interest rate and other asset-liability related sensitivities.
- Identifying the new risks introduced by the acquisition and assessing how to manage them.
- Determining the revised capital position and solvency ratios for ABC post-acquisition.

ABC's ERM department has rarely used Stress & Scenario Testing (SST) before but now wants to employ SST to address the challenges identified above.

Justify the use of SST by ABC for making strategic decisions related to XYZ's acquisition.

ANSWER:

3.   Continued

(b)   (*4 points*) ABC is reviewing the various risk responses it currently employs and whether they would be appropriate for dealing with the increased risk exposure from the potential acquisition. ABC currently employs reinsurance as a risk transfer technique but is exploring alternative risk response options.

ABC's ERM department wants to update its risk register especially since the two companies, ABC and XYZ, have different underlying liability profiles.

(i)   Identify the key features of a good risk response.

ANSWER:

(ii)   Explain two key financial risks that would be introduced or would have increased exposure because of the acquisition.

ANSWER:

(iii)   Suggest a risk mitigation technique as a risk response to each risk identified in (ii). Justify your response.

ANSWER:

(c)   (*5 points*) ABC's ERM department needs to understand the three lines of defense model as used by XYZ in order to identify shortcomings and to aid with the potential acquisition.

(i)   Describe the role each of the three lines of defense should play in the acquisition of XYZ.

ANSWER:

(ii)   Explain how the risk framework feedback loop can be used by ABC in evaluating the potential acquisition.

ANSWER:

4.

(*14 points*) AHA Board Chairman, Dr. Jerry Graham, lost weight by using recently approved FDA prescription drugs. Dr. Graham recently informed the Lyon Corporation's Board of Directors that these drugs are becoming increasingly popular. In his communication with the Board, he noted that the costs per user of these drugs are in excess of $1,000 each month and most of that cost is paid by AHA. Dr. Graham was unable to provide any estimates about how many AHA members might want these drugs.

Refer to Section 3.3 of the Case Study.

(a)   (*1.5 points*) Dr. Graham would like high-cost weight loss drugs to be added to the risk register.

Identify three factors of an ideal risk register entry for which AHA does not have sufficient internal data for this risk. Justify your response.

ANSWER:

(b)   (*4.5 points*) Dr. Graham would like to better understand scenario analysis as it pertains to the risk associated with high-cost weight loss prescription drugs. He would like to consider the following types of scenarios:

       I.   Reverse Scenario
      II.   Historical Scenario
     III.   Company-Specific Scenario

(i)   Describe each of the types of scenarios.

ANSWER:

(ii)   Describe the pros and cons of each type of scenario as it pertains to the risk.

ANSWER:

4. Continued

    (iii)   Recommend which one of the types of scenarios should be used to determine the potential financial impact to AHA. Justify your response.

> ANSWER:

(c)   (*2 points*) Lyon Corporation has just been informed of this new risk. Lyon senior leaders are concerned that AHA did not alert them of this risk earlier.

    Describe Key Risk Indicators that would have helped identify this risk sooner. Justify your answer.

> ANSWER:

(d)   (*6 points*)

    (i)   Describe a specific risk response AHA could implement for each of the following risk response types:

        I.   Reduce
        II.   Remove
        III.   Transfer

> ANSWER:

    (ii)   Describe the pros and cons for each of the risk responses you provided in part (i).

> ANSWER:

    (iii)   Recommend one of the responses you provided in part (i) that AHA should pursue to mitigate this risk. Justify your recommendation.

> ANSWER:

5.

(*10 points*) You are the new CRO at Energetix Power and have been asked to develop a comprehensive ERM program. The Energetix CFO is particularly interested in political risk, and he is concerned with social activism risk because of the nature of the company.

Refer to Section 1.7 of the Case Study.

(a)   (*2 points*) Identify the three types of political risk other than social activism, that are most relevant to Energetix. Justify your response.

> ANSWER:

(b)   (*2 points*) The CFO states that political risks are emerging risks for Energetix and will need to be given greater priority within the context of all risks.

 Assess the CFO's statement that political risk should be characterized as an emerging risk.

> ANSWER:

(c)   (*3 points*) Recently, a social activist leaked a video of an Energetix board meeting to social media. In the video, a board member is seen talking about a project that is being discussed internally but has not yet moved forward. This project is controversial due to its potential for significant environmental impact. Fortunately, news of the video did not spread widely.

 The Board of Directors would like Energetix to be better prepared to respond to a similar social activist situation.

 Construct a crisis response plan for social activist risk, detailing the actions the company should take at each step.

> ANSWER:

5. Continued

(d)   (*3 points*) Energetix senior management has developed a better understanding of the company's exposure to political risks and would like to establish a risk appetite statement. The following risk appetite statement for political risk has been proposed:

- *Energetix has a Moderate appetite for Political Risk.*
- *We chose Moderate since an energy company must accept some political risk as part of doing business.*
- *We will only accept the risk of operating in and trading with countries that are established U.S trading partners*
- *We will not accept the risk of trading with countries defined by the UN as State Sponsors of Terrorism*
- *We will accept Political Risk to the extent that our probability of remaining a going concern (solvent) does not go below 85%.*

Recommend improvements to this risk appetite statement. Justify your response.

> ANSWER:

END OF EXAMINATION