SOCIETY OF ACTUARIES

Strategic Decision Making Exam

Exam CFESDM

Date: Thursday, April 25, 2024

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This examination has 3 questions numbered 1 through 3 with a total of 70 points.

   The points for each question are indicated at the beginning of the question. All questions 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) Individual exams may provide additional directions that apply throughout the exam or to individual items.

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 five-digit candidate number in the filename.

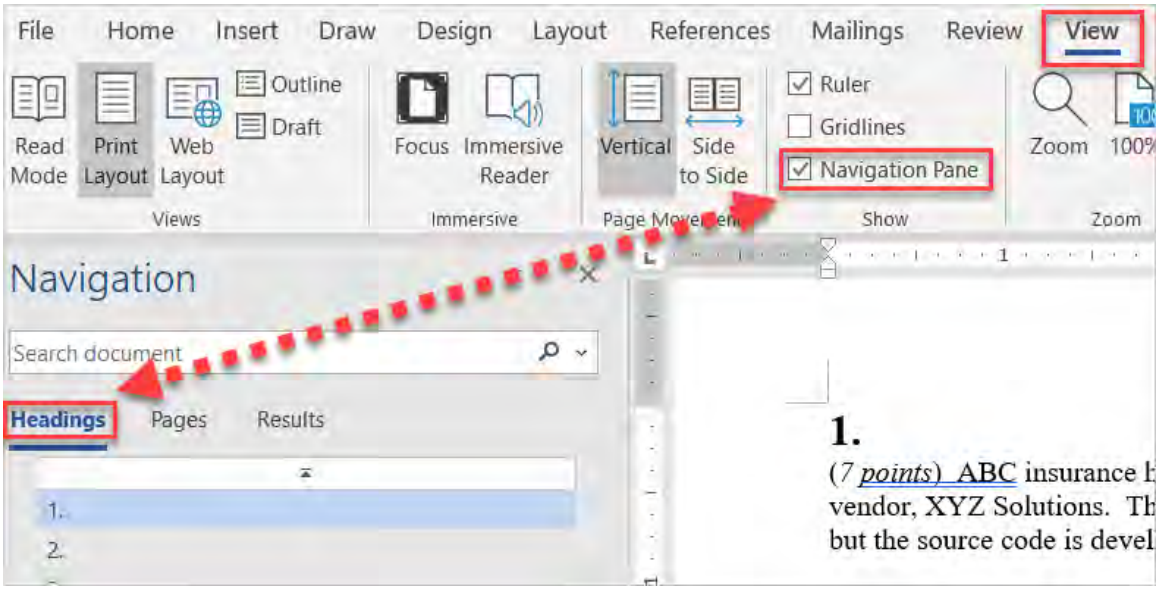
4. The Word and Excel files that contain your answers must be uploaded before time expires.

8770 W. Bryn Mawr Avenue, Suite 1000
Chicago, IL 60631

Navigation Instructions

Open the Navigation Pane to jump to questions.

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

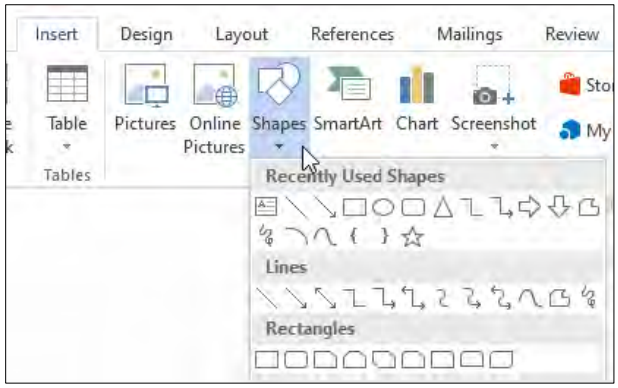


CASE STUDY INSTRUCTIONS

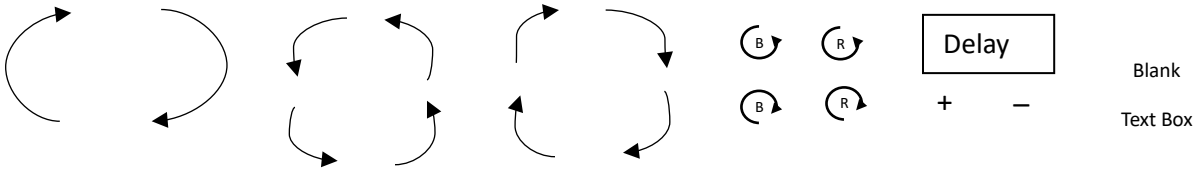
The case study will be used as a basis for all examination questions. Be sure to answer the question asked by referring to the case study. For example, when asked for the advantages of a particular plan design to a company referenced in the case study, your response should be limited to that company. 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.

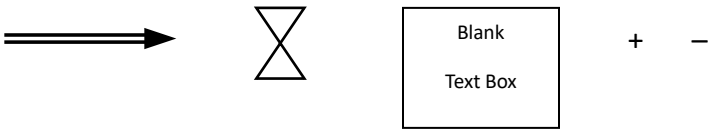
Drawing Models in a CBT Setting

The following shapes are commonly used when modelling dynamic process and complex systems, such as those in *Business Dynamics* (Sterman, John D., 2000). Not all shapes may be needed, nor should this be considered an exhaustive list of possible shapes. Candidates may copy, paste, and manipulate shapes to answer questions where a sketch is required. For reference, candidates can also insert a variety of shapes using either Microsoft Excel or Microsoft Word under the insert menu:



Selected shapes used in Business Dynamics:





Questions 1 through 3 pertain to the Case Study.
Each question should be answered independently.

1

(*25 points*)
Information about Big Ben Bank (Big Ben) can be found in Section 5 of the Case Study.
Information about Darwin Life Insurance Company (Darwin) can be found in Section 6 of the Case Study.

(a) (*1 point*) Describe the three types of income that Big Ben generates.

ANSWER:

(b) (*4 points*)

(i) Explain why equity discounted cashflows (equity DCF) is an appropriate valuation method for Big Ben. Justify your answer.

ANSWER:

(ii) Explain three pitfalls of equity DCF valuation.

ANSWER:

(c) (*2 points*)

(i) Critique the use of Price-to-Earnings as a metric for comparing the value of financial institutions.

ANSWER:

(ii) Recommend a more appropriate ratio for comparing the value of financial institutions. Justify your answer.

ANSWER:

1. Continued

Big Ben is considering decreasing its commercial banking business as it may not be creating sufficient value. The balance sheet and income statement specific to the commercial banking business as well as a template that your colleague used in a similar valuation a few months ago are included in the exam Excel file.

(d) (*6 points*) Assume that Big Ben's growth rate, as defined for equity DCF, will be 3.5% every year after the year 2027.

(i) Calculate the value of the commercial banking business equity using an equity DCF model as of January 1, 2024. Show your work.

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

(ii) Recommend whether Big Ben should decrease its commercial banking operations. Justify your answer.

ANSWER:

Two initiatives are being considered to improve the value creation of the commercial banking business:

1. Create an online reward system which incentivizes customers to increase their deposits.

2. Create an employee incentive program to increase the loan portfolio.

(e) (*2 points*) Calculate the economic spread on the loans and on the deposits for the commercial banking business for the year 2024. Show your work.

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

(f) (*3 points*)

(i) Calculate the Matched Capital Charge for Big Ben's commercial banking business for 2024. Show your work.

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

(ii) Calculate the Mismatched Capital Charge for Big Ben's commercial banking business for 2024. Show your work.

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

1. Continued

(iii) Explain what the Matched and Mismatched Capital Charges for Big Ben's commercial banking business indicate about the value created for Big Ben.

ANSWER:

If Big Ben creates an incentive program to increase the loan portfolio, management wants to maintain the existing risk culture at Big Ben as well as the profitability of the loan business. Your colleague recommends using growth in interest income as the measure that will determine incentive compensation.

(g) (*2 points*)

(i) Critique your colleague's recommendation.

ANSWER:

(ii) Recommend an alternative metric. Justify your answer.

ANSWER:

Big Ben and Darwin have a common owner, but operate independently from one another, with different distribution channels and technologies. Big Ben's CFO has approached Darwin's CFO to discuss using a common customer service software under a single contract.

(h) (*2 points*)

(i) Explain the diversification strategy being proposed.

ANSWER:

(ii) Explain how this diversification strategy can be value-creating.

ANSWER:

1. Continued

(iii) Explain a potential risk of using a common customer service software. Justify your response.

ANSWER:

Big Ben's CFO and Darwin's CFO are also considering transferring Big Ben's marketing core competency to Darwin.

(i) (*3 points*)

(i) Describe how to transfer a core competency.

ANSWER:

(ii) Explain two ways value is created for Darwin by transferring the marketing core competency from Big Ben.

ANSWER:

(iii) Explain two potential pitfalls in transferring Big Ben's marketing core competency to Darwin.

ANSWER:

Questions 1 through 3 pertain to the Case Study.
Each question should be answered independently.

2

(*25 points*)

(a) (*1 point*)

(i) Define "oscillation" as a mode of behavior in a dynamic system.

ANSWER:

(ii) State the equilibrium condition for inventory.

ANSWER:

Information about Blue Jay Tire (BJT) can be found in Section 3 of the Case Study.

Following recent disruptions and setbacks, BJT management is concerned with revenue stability.

(b) (*6 points*)

(i) Identify four factors that may affect the oscillation of BJT's revenue. Justify your answer.

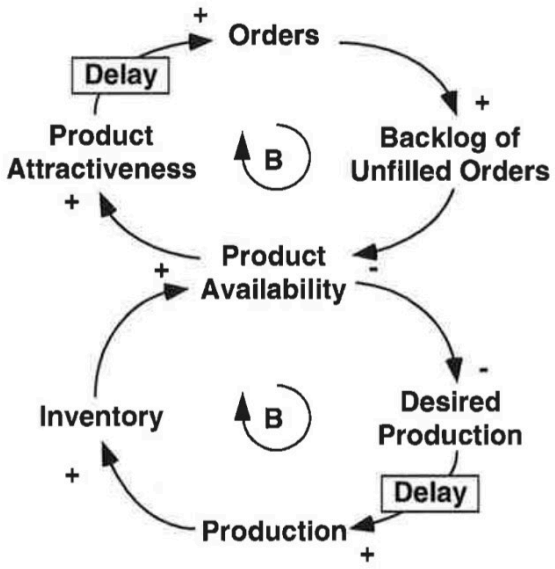
ANSWER:

(ii) Explain how each of the factors identified in part (i) affects the North American tire industry using Porter's Five Forces. Justify your answer.

ANSWER:

2. Continued

You have decided to use Adam Smith's free market theory to illustrate how equilibrium may be shifted by various aspects of BJT's business.



You are incorporating the activity of "Replacing Tires Under the Warranty Program" as a node in the above model.

(c) (*2 points*) Explain the feedback loop created by the addition of this node.

ANSWER:

BJT management expects demand to grow by 50% over the next two years. In response, they plan to grow inventories by 50% in the next 18 months. The BJT production expansion committee has acquired and refitted a third US tire plant to meet the expected increase in demand.

(d) (*4 points*) Critique BJT management's plan to grow inventories with respect to BJT's Risk Profile.

ANSWER:

2. Continued

(e) (*2 points*) Explain how oscillation is exhibited by a system with a steady state error.

ANSWER:

(f) (*3 points*) Critique BJT management's plan to grow inventories with respect to inventory stability.

ANSWER:

Your colleague states that once tire inventory levels have reached the desired level, revenues will oscillate less.

(g) (*4 points*) Critique your colleague's statement.

ANSWER:

Employees at the new plant are expected to adopt BJT's existing culture. This will be a significant change management exercise.

(h) (*3 points*) Recommend three change management principles BJT management should use to make the cultural change stick.

ANSWER:

Questions 1 through 3 pertain to the Case Study.
Each question should be answered independently.

3.

(*20 points*) Information about Seaplane Expeditions and Aviation Company (SEA) can be found in Section 7 of the Case Study.

SEA is evaluating whether to make a change to a scheduled service route. The original route has constant economics with one flight per day. The new route will have variable economics described in the table below, with 0 to 3 flights per day.

A 100-day simulation model will be constructed using the following information. A template can be found in the exam Excel File.

<table>
<tr><th></th><th>Input</th><th>Original</th><th>New</th></tr>
<tr><td>N</td><td>Flights (per day)</td><td>1</td><td>0,1,2, or 3
<table><tr><th>N (Flights)</th><th>Binomial</th></tr><tr><td>Probability</td><td>50%</td></tr><tr><td>Number</td><td>3.0</td></tr></table></td></tr>
<tr><td>P</td><td>Price per flight</td><td>$1,000</td><td><table><tr><th>P (Price)</th><th>Normal</th></tr><tr><td>μ</td><td>$1010</td></tr><tr><td>σ</td><td>200</td></tr></table></td></tr>
<tr><td>R</td><td>Total revenues (per day)</td><td>$1,000</td><td>N x P</td></tr>
<tr><td>C</td><td>Cost (per day)</td><td>$800</td><td><table><tr><th>C (Cost)</th><th>N</th></tr><tr><td>$800</td><td>0</td></tr><tr><td>$800</td><td>1</td></tr><tr><td>$1,550</td><td>2</td></tr><tr><td>$2,300</td><td>3</td></tr></table></td></tr>
<tr><td>I</td><td>Income (per day)</td><td>$200</td><td>R - C</td></tr>
</table>

3. Continued

It is assumed that each variable is independent with no additional impacts on supply and demand.

(a) (*12 points*) Complete the 100-day simulation model template provided in the exam Excel File to answer the following items.

(i) Calculate the expected income for the 100-day simulation of the original route and the new route. Show your work.

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

(ii) Calculate the probability that the new route earns more than the original route on any given day. Show your work.

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

(iii) Calculate the probability that SEA will lose money on the new route on any given day. Show your work.

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

3. Continued

(b) (*4 points*)

(i) Identify four limitations of the current model architecture. Justify your answers.

ANSWER:

(ii) Recommend how to address each limitation identified in part (i).

ANSWER:

(iii) Describe the expected impacts on the model results if the recommendations in part (ii) are adopted.

ANSWER:

(c) (*4 points*) Recommend whether SEA should implement the new route. Justify your answer.

ANSWER:

END OF EXAMINATION*