

Exam CFESDM

Date: Thursday, April 24, 2025

INSTRUCTIONS TO CANDIDATES

General Instructions

1. This examination has 6 questions numbered 1 through 6 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.

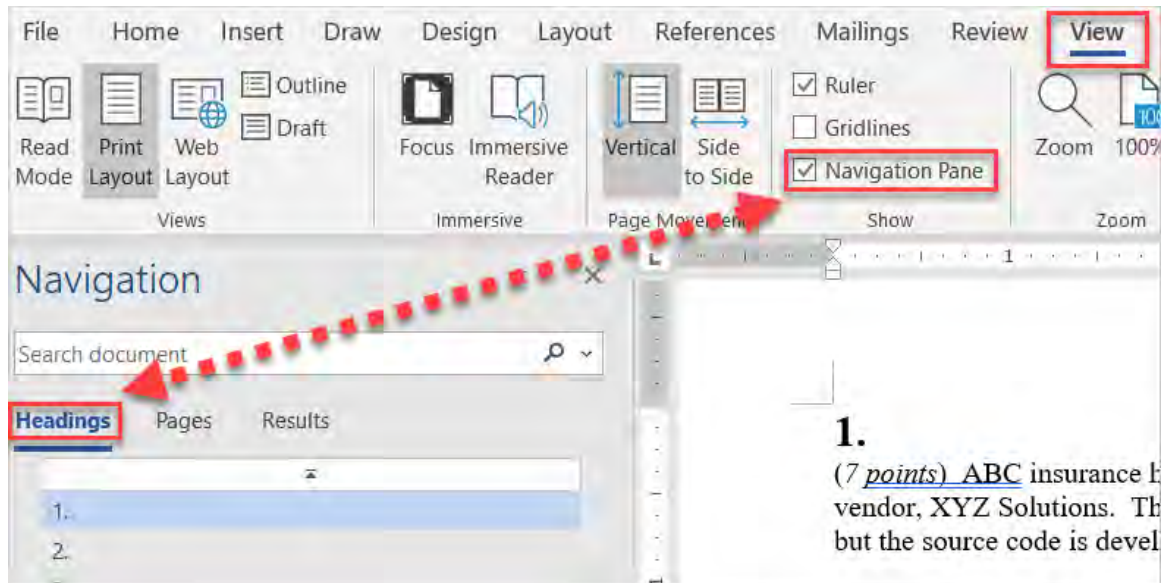
Written-Answer Instructions

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 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 time expires.

Navigation Instructions

Open the Navigation Pane to jump to questions.

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

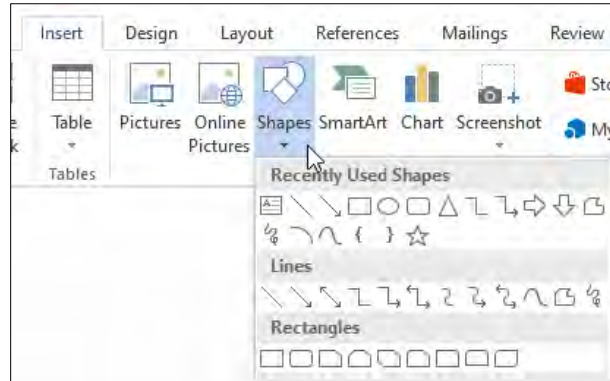


CASE STUDY INSTRUCTIONS

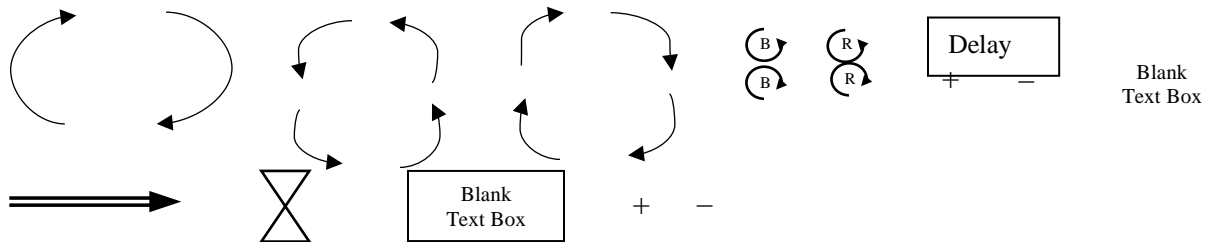
The case study will be used as a basis for all examination questions. Be sure to answer the question asked by referring to the case study. For example, when asked for the advantages of a particular plan design to a company referenced in the case study, your response should be limited to that company. 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 6 pertain to the Case Study.
Each question should be answered independently.***

1.

(10 points) Information about Darwin Life Insurance Company (Darwin) can be found in Section 6 of the Case Study.

Darwin is considering entering a new line of business. In order to evaluate the strategy, a junior actuary has constructed the decision tree provided in the Excel spreadsheet.

(a) (2 points)

(i) Describe the difference between a decision node and an event node.

ANSWER:

(ii) Identify the decision nodes and the event nodes in the decision tree modeled in the Excel spreadsheet.

ANSWER:

(b) (5 points) Critique the components of the Expected Monetary Value (EMV) calculation.

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

(c) (3 points)

(i) Identify two shortcomings of this decision tree model with respect to Darwin's situation. Justify your answer.

ANSWER:

(ii) Recommend two enhancements to the tree that address the shortcomings identified in (i). Justify your recommendation.

ANSWER:

*Questions 1 through 6 pertain to the Case Study.
Each question should be answered independently.*

2.

(16 points) Information about Darwin Life Insurance Company (Darwin) can be found in Section 6 of the Case Study.

A traditional planning and budgeting procedure historically has been performed by Darwin; however, the company is considering changing to zero-based budging (ZBB).

The following statements were made during a leadership meeting.

- I. ZBB could help Darwin's strategic business planning.
- II. A decision package should only consider the additional benefit created from additional funding.

(a) (2 points) Assess the accuracy of each of the statements I and II listed above.

ANSWER:

Darwin is considering the following initiatives described in Section 6.3 of the Case Study.

- I. Digital Distribution
- II. Innovation Program
- III. Product Innovation

(b) (5 points) Consider Darwin's company profile from Section 6.2 of the Case Study and the strategy map provided in the Excel spreadsheet.

- (i) Recommend whether or not Darwin should invest in each of the initiatives I to III. Justify your answer.

ANSWER:

- (ii) Recommend two measures for the balanced score card for one of the initiatives in I to III. Justify your answer.

ANSWER:

2. Continued

(c) (5 points) The following are the five prototypical quests:

- Global Presence
- Customer Focus
- Innovation
- Nimbleness
- Sustainability

(i) Explain which one or more of the five prototypical quests are associated with each of the initiatives I to III.

ANSWER:

(ii) Recommend what actions Darwin can take to avoid the three transformation traps when considering initiatives I to III. Justify your recommendation.

ANSWER:

Darwin's CEO has now prioritized the initiative on Acquisition and New Markets, described in Section 6.3 of the Case Study. The total funding for select areas in Darwin has been set to \$100 million in the next year, with the budgeting worksheet provided in the Excel spreadsheet. The budget has been designed following a zero-based budgeting process.

(d) (4 points)

(i) Identify the decision packages IT must have submitted to Darwin's management that were then used to come up with the budget items shown.

ANSWER:

(ii) Explain three decisions made by Darwin's management in developing its budget ranking given its strategy map.

ANSWER:

*Questions 1 through 6 pertain to the Case Study.
Each question should be answered independently.*

3.

(16 points) Information about Blue Jay Air (BJA) can be found in Section 2 of the Case Study.

BJA offers extensive training to its pilots. There are two types of pilot positions within BJA, as shown below. Trainees will either be promoted to a Qualified pilot position or leave when their contract expires.

- I. Trainee (two-year contract)
- II. Qualified pilot (full-time position)

- (a) (1 point) Identify the inflows and outflows for the BJA pilot labor force using the aging chain model.

ANSWER:

You are given the following information:

- Trainee requires two years of training to become eligible for a full-time position.
- All trainees honor the two-year contract.
- After becoming qualified, the pilot quit rate is $1/15$ per year.
- Trainee pilots are only 25% as productive as qualified pilots.
- BJA only hires trainees.
- Currently, BJA is at equilibrium.
- Speed of hiring is irrelevant.
- All trainees are eligible to be qualified after two years (none fail).

- (b) (1.5 point) Calculate the equilibrium trainee fraction for BJA. Show your work.

ANSWER:

- (c) (1.5 point) Calculate the equilibrium productivity. Show your work.

ANSWER:

3. Continued

With BJA's plans for expansion into international flights, BJA will increase the number of pilots by 30% over three years. Management is considering the impact on the following metrics:

I. The hiring rate of trainees

II. The trainee fraction

III. Productivity

(d) (6 points)

(i) Describe qualitatively how the increase in the number of pilots impacts metrics I to III within the first three years. Justify your answer.

ANSWER:

(ii) Analyze metrics I to III in the three-year growth period versus those after three years.

ANSWER:

(iii) Describe the effect on metrics I to III if BJA hires experienced pilots in addition to hiring trainees.

ANSWER:

(e) (2 points) Critique the use of the first-order formulation of the transition rate in the model described in (a).

ANSWER:

(f) (1 point) Recommend an improvement to the model described in (a) that will allow using the first-order outflow. Justify your recommendation.

ANSWER:

3. Continued

- (g) (3 points) Describe three potential impacts of an aging population on fixed cost for the BJA pilot workforce using the improved model in (f). Justify your answer.

ANSWER:

*Questions 1 through 6 pertain to the Case Study.
Each question should be answered independently.*

4.

(10 points) Information about Frenz Corporation (Frenz) can be found in Section 4 of the Case Study.

Frenz is considering adding baked goods to its food offerings to complement its coffee products. Frenz intends to test two new baked products at a few individual coffee shop locations.

- I. Muffins, priced at \$25 per tray of 10 units
- II. Cinnamon buns, priced at \$45 per tray of 10 units

Frenz's goal is to maximize the daily amount of potential revenue received from these two new product offerings per coffee shop location.

Frenz's daily production capacity per coffee shop is ten hours. It takes twelve minutes to produce one tray of muffins and twenty minutes to produce one tray of cinnamon buns.

To ensure adequate availability of baked goods per location, Frenz wants every coffee shop to produce at least 400 units in total.

(a) (2 points)

- (i) State the objective function.

ANSWER:

- (ii) State the constraint functions.

ANSWER:

(b) (3 points) For the optimization problem defined in part (a):

- (i) Sketch the feasible region, with binding constraints clearly labeled.

ANSWER:

4. Continued

- (ii) Calculate the optimal solution. Show your work.

ANSWER:

The initial test market results imply that customers are at least twice as likely to prefer muffins over cinnamon buns. As such, Frenz would like every store to produce at least twice as many muffins as cinnamon buns each day.

- (c) (1 point) State the constraint function to reflect the new information.

ANSWER:

- (d) (2 points) Calculate the optimal solution for the optimization problem defined in part (c). Show your work.

ANSWER:

- (e) (2 points)

- (i) Identify two implicit assumptions or limitations of the current model framework.

ANSWER:

- (ii) Describe how Frenz can address these implicit assumptions or limitations in its decision-making process. Justify your answer.

ANSWER:

*Questions 1 through 6 pertain to the Case Study.
Each question should be answered independently.*

5.

(10 points) Information about RPPC Dynasty Corporation (RPPC) can be found in Section 1 of the Case Study. Information about Frenz Corporation (Frenz) can be found in Section 4 of the Case Study.

RPPC is using both the P/E ratio and the Enterprise Value (EV) to NOPAT ratio (EV/NOPAT) to evaluate its performance against the industry.

RPPC defines EV as the net enterprise value equal to the value of operations, using the discounted cash flow (DCF) approach.

RPPC is considering the following actions to increase its earnings ratios.

- I. Transferring its pension liabilities to a third party.
- II. Bringing down excess cash through stock buybacks.
- III. Investing in a new growth initiative in one of its consolidated financial subsidiaries.

(a) (5 points)

- (i) Evaluate qualitatively the impact of each of the actions I to III on RPPC's P/E ratio.

ANSWER:

- (ii) Evaluate qualitatively the impact of each of the actions I to III on RPPC's EV/NOPAT ratio.

ANSWER:

5. Continued

The Board of RPPC is recommending a sale of the remaining portion of Frenz that it owns. The Finance area is valuing Frenz as of December 31, 2024. Industry ratios can be found in Exhibit 2 of RPPC in the Case Study. In order to use these ratios, RPPC is evaluating the P/E ratio and the EV/EBITA ratio.

(b) (4 points)

(i) Calculate Frenz' P/E ratio. Show your work.

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

(ii) Calculate Frenz' EV/EBITA ratio. Show your work.

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

(iii) Evaluate the Board's recommendation based on your answer to (i) and (ii).

ANSWER:

An investor has made a significant buy trade on RPPC based on rumors of the sale of Frenz.

(c) (1 point) Explain the potential impact on RPPC's stock price.

ANSWER:

*Questions 1 through 6 pertain to the Case Study.
Each question should be answered independently.*

6.

(8 *points*) Information about Star InsurTech (SIT) can be found in Section 9 of the Case Study.

The five tests of a good strategy, according to Porter, are as follows.

- I. A Distinctive Value Proposition
- II. A Tailored Value Chain
- III. Trade-offs Different from Rivals
- IV. Fit Across the Value Chain
- V. Continuity Over Time

- (a) (5 *points*) Analyze SIT's strategy under each of the five tests I to V.

ANSWER:

- (b) (3 *points*) Explain how three tests from (a) give SIT an advantage over a rival copying its strategy.

ANSWER:

END OF EXAMINATION*