TIE4203 Decision Analysis in Industrial and Operations Management
Assignment #2
Due: Friday, 20 Sep 2024, 8 pm

You may use computing tools or software for your computations but you must show your workings in your submission.
Submit your solutions at the drop box outside the ISEM Department Office at E1A-06-25 or to the Tutor at the end of tutorials.

Question (Total 60 marks)

ISEM Company wishes to develop a new product for an emerging market. The product requires a new technology and the company has the following alternatives to acquire it:

A: Self-develop the technology in-house. It will cost $50,000 and the probability of success is 0.6. The project will be terminated if this alternative fails.

B: License and customize an existing technology. It will cost $100,000 and the probability of success is 0.8. The project will be terminated if this alternative fails.

C: Do nothing and terminate the project.

If the company succeeds with either alternative A or B, it will decide if it will produce and market the product. The company can select Mass-production, Low-volume production or Terminate the project.

The future demand for the product is uncertain. It will either be High with probability 0.75 or Low with probability 0.25. The net profits/losses to the company in thousands of dollars from production and marketing the product under different alternatives and outcomes are given in the table below:

Product Demand	Self-Develop Technology		License and Customize Technology	
	Mass production	Low-volume production	Mass production	Low-volume production
High	650	250	400	200
Low	-350	-50	-100	50

The company is risk neutral and the effect of time value of money may be ignored.

(*a*) Draw a decision tree representing the company's problem. Determine the company's optimal decision policy and certainty equivalent. (15 marks)

(*b*) Determine the risk profiles of alternatives A, B and C and plot them as excess probability distributions on a common graph paper. (5 marks)

(*c*) Is there any first-order stochastic dominance among alternatives A, B and C? (5 marks)

(*d*) Is there any second-order stochastic dominance between Alternative A and Alternative B? Explain your answer. (5 marks)

Continue on Page 2

(*e*) What is the expected value of perfect information on whether self-developing the technology will succeed or not? (15 marks)

(*f*) A market study can be conducted. The study is imperfect and is expected to perform as follows: If the market demand is going to be "High", the study will report it correctly with probability 0.85. On the other hand, if the market demand is going to be "Low", the study will report it correctly with probability 0.7. What is the maximum cost the company will spend for such a market study? (15 marks)

*** End of Assignment ***