TIE4203 Decision Analysis in Industrial Operations and Management
Assignment #2
Due: Friday, 29 Sep 2023 (end of class)

You may use computing tools for your computations but you must show your workings. You may submit your solutions at the drop box outside the ISEM Department Office at E1A-06-25 any time before the due date, or turn it in at LT52 after the lecture.

Question (Total 50 marks)

Mabel is a baking enthusiast and is considering opening a bakery shop. In order to differentiate her shop from others, she needs a unique and attractive flagship product. She can self-develop such a product by herself and it would cost $1,000 and the probability of success is 0.6. Alternatively, she could also consult a famous baker to develop the product. It would cost $2,000 and the probability of success is 0.9. If Mabel fails to develop the product in any way, she will terminate her business plan immediately. On the other hand, if she succeeds in developing the product, she can open either a big shop, a small shop, or no shop. The demand for the product is uncertain, and it will be either High or Low with probabilities 0.75 and 0.25, respectively. The NPV of profit or loss (excluding the product development cost) over a study period of 3 years under different demand outcomes and alternatives are given in the table below:

Shop Alternative	Demand is High	Demand is Low
Big Shop	$12,000	- $8,000
Small Shop	$6,000	-$4,000
No shop	0	0

Mabel is risk neutral and she can also choose not to pursue the bakery venture if it is not financially feasible at all.

(*a*) Draw a decision tree representing Mabel's bakery shop decision problem. What is Mabel's optimal decision policy and certainty equivalent? (10 marks)

(*b*) Plot the risk profiles for the three initial alternatives, namely "Self-develop", "Consult famous baker", and "Do nothing", on the same graph paper. (5 marks)

(*c*) Is there any first or second-order stochastic dominance among the three initial alternatives? Explain your answers. (5 marks)

(*d*) What is the expected value of perfect information on product demand before Mabel's initial decision to pursue the bakery business or not? (10 marks)

(*e*) Mabel can consult an expert who can predict help to predict whether she would be successful in self-developing her own product. If she is going to be successful the expert will predict it correctly with probability 0.8. On the other hand, if she is going to be unsuccessful, the expert will predict it correctly with probability 0.75. What is the maximum Mabel is willing to pay the expert to conduct the prediction? (20 marks)