BAMS 517 HW Assignment 2

- **Section: BA1**

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Q1. Brainy Business Case (continued):
c. *What is the risk profile of the optimal decision from part (b), i.e., choosing the High price? Does this decision stochastically dominate either of the other two pricing options?*

High Pricing	Probability	
High Sales	0.245	2450000
Medium Sales	0.295	1450000
Low Sales	0.460	950000

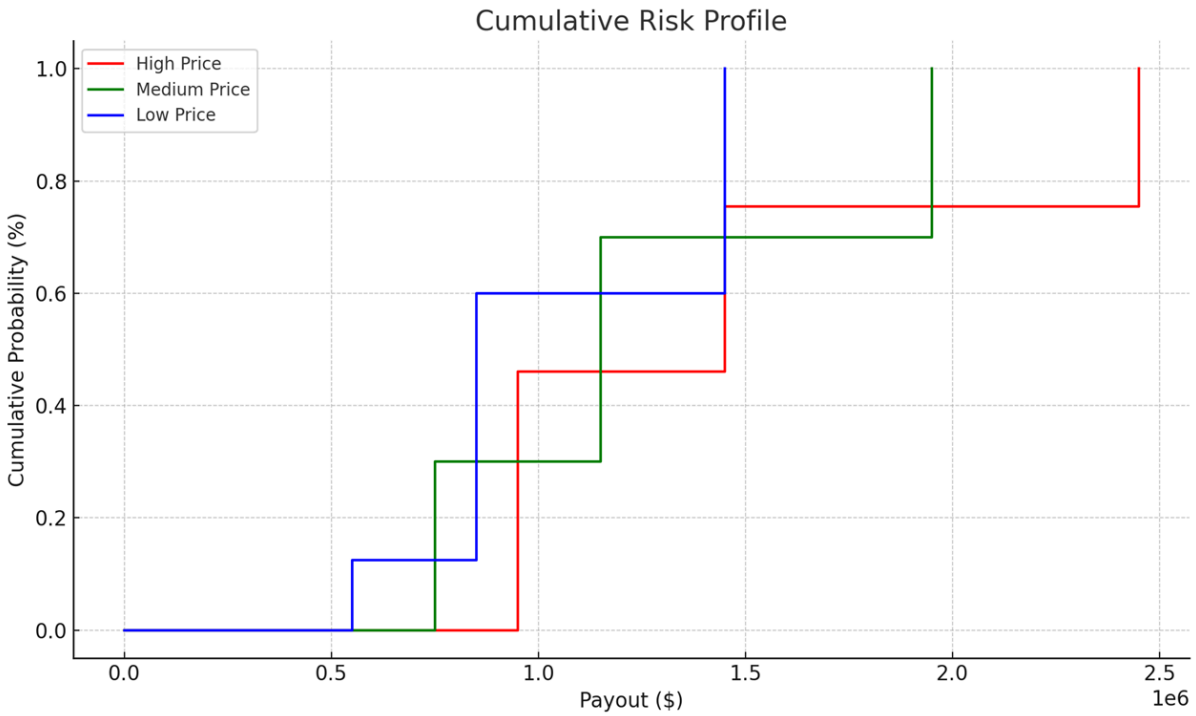
High Pricing	Probability (CDF)	
High Sales	1.000	2450000
Medium Sales	0.755	1450000
Low Sales	0.460	950000

Medium Pricing	Probability	
High Sales	0.300	1950000
Medium Sales	0.400	1150000
Low Sales	0.300	750000

Medium Pricing	Probability (CDF)	
High Sales	1.000	1950000
Medium Sales	0.700	1150000
Low Sales	0.300	750000

Low Pricing	Probability	
High Sales	0.400	1450000
Medium Sales	0.475	850000
Low Sales	0.125	550000

Low Pricing	Probability (CDF)	
High Sales	1.000	1450000
Medium Sales	0.600	850000
Low Sales	0.125	550000



The risk profile of choosing the **High Price** indicates that it does not stochastically dominate the **Medium Price** or **Low Price** options. While the High Price strategy has the potential for the highest payouts, its cumulative probability curve overlaps and crosses the others, meaning it does not consistently provide better outcomes at all levels of probability. At lower payout levels, the Medium and Low Price options have higher probabilities, while at higher payout levels, the High Price performs better. Thus, no clear stochastic dominance exists, as the trade-offs vary depending on the desired balance of risk and reward.

d. *Perform sensitivity analysis to provide Charlotte with managerial insights regarding conditions for the optimal price. More specifically, create a two-way Data Table showing the optimal price (High, Medium, or Low) as Prob{Severe Competition} and Prob{Moderate Competition} varies between 0 and 1 with a step size 0.1. Explain your answer intuitively.*

Managerial Insights:

1. **Dominance of High Pricing**:
    - The **High Price** option is consistently the optimal decision across most scenarios. This suggests that, under a wide range of competitive conditions, the potential for higher payouts outweighs the risks associated with Severe or Moderate competition.
2. **Impact of Severe and Moderate Competition**:
    - As the probabilities of **Severe Competition** and **Moderate Competition** increase significantly (combined close to or equal to 1), the **High Price** option might no longer remain valid due to unrealistic scenarios (Weak Competition probability would drop below zero).
3. **Intuitive Explanation**:
    - The High Price option leverages situations where competition is less intense (Weak Competition), offering the highest payout potential.

- Even with Moderate or Severe Competition probabilities rising, the expected payouts for High Price still outweigh those for Medium and Low prices under realistic conditions.

4. **Strategic Recommendation**:
   - Charlotte should focus on the **High Price** strategy as the default choice.

Severe	0.2
Moderate	0.7
Weak	0.1

	Severe											
	High	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1
	1	High										
	0.9	High	High									
	0.8	High	High	High								
	0.7	High	High	High	High							
Moderate	0.6	High	High	High	High	High						
	0.5	High	High	High	High	High	High					
	0.4	High	High	High	High	High	High	High				
	0.3	High	High	High	High	High	High	High	High			
	0.2	High	High	High	High	High	High	High	High	High		
	0.1	High	High	High	High	High	High	High	High	High	High	
	0	High	High	High	High	High	High	High	High	High	High	High

e. *See the new parts of the case below. Develop and analyze a decision tree to help Cerebrosoft decide whether to pay the $10,000 for the market research. Explain your results and conclusion.*

Insights from the Decision Tree:

1. **Expected Payoff Without Market Research**:
   - The **expected payoff is $1,465,000**. This is based on the prior probabilities of Severe (20%), Moderate (70%), and Weak (10%) competition.
2. **Expected Payoff With Market Research**:
   - The **expected payoff is $1,455,000**, after accounting for the $10,000 market research cost. This calculation incorporates the accuracy of the research company.
3. **Comparison**:
   - The expected payoff **without market research ($1,465,000)** is slightly higher than with market research ($1,455,000).
   - The $10,000 cost of the research, combined with its predictive accuracy, does not improve the decision-making enough to justify the expense.

Q2.

a. *On average, what does Erica gain in profit by having the opportunity to sample the one piece of fruit, and what should she do based on the outcome of the one sample*?

Insights:

Average Profit Gain by Sampling One Fruit:

- The Expected Monetary Value (EMV) with the opportunity to sample a fruit is **114** (as shown in the decision tree).

- Without sampling, the EMV of "Just Pack" is **80**.
- The gain in profit due to sampling is: Gain in Profit=EMV with Sampling−EMV without Sampling=114−80=34\text{Gain in Profit} = \text{EMV with Sampling} - \text{EMV without Sampling} = 114 - 80 = 34Gain in Profit=EMV with Sampling−EMV without Sampling=114−80=34 On average, Erica gains **$34** in profit by sampling one fruit before making the decision.

What Should Erica Do Based on the Outcome of the One Sample?

- If the sampled fruit tastes **excellent**, Erica should **accept the box**, as it strongly indicates that the box is satisfactory.
- If the sampled fruit tastes **poor**, Erica should **reject the box**, as it increases the likelihood that the box is unsatisfactory, which would result in a loss.