

Decision Tree

Question 1

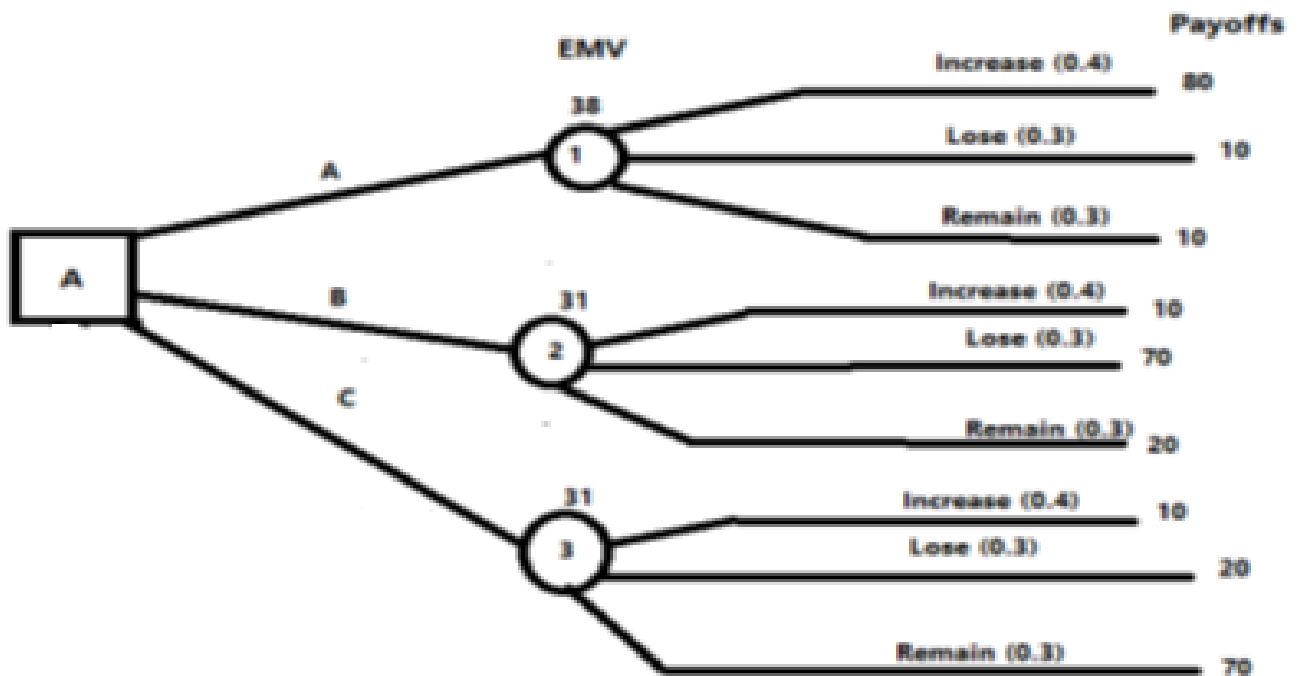
Alternative	Increase	Lose	Remain
A	80	10	10
B	10	70	20
C	10	20	70
Probabilities	0.4	0.3	0.3

A) Draw a Decision Tree.

B) Find optimal Decision.

Solution

a)



- Best decision is **A** since EMV = **38**

Question 2

3-36 Jerry Smith is thinking about opening a bicycle shop in his hometown. Jerry loves to take his own bike on 50-mile trips with his friends, but he believes that any

small business should be started only if there is a good chance of making a profit. Jerry can open a small shop, a large shop, or no shop at all. The profits will depend on the size of the shop and whether the market is favorable or unfavorable for his products. Because there will be a 5-year lease on the building that Jerry is thinking about using, he wants to make sure that he makes the correct decision. Jerry is also thinking about

hiring his old marketing professor to conduct a marketing research study. If the study is conducted, the study could be favorable (i.e., predicting a favorable market) or unfavorable (i.e., predicting an unfavorable market).

3-37 Jerry Smith (see Problem 3-36) has done some analysis about the profitability of the bicycle shop. If Jerry builds the large bicycle shop, he will earn \$60,000 if the market is favorable, but he will lose \$40,000 if the market is unfavorable. The small shop will return a \$30,000 profit in a favorable market and a \$10,000 loss in an unfavorable market. At the present time, he believes that there is a 50–50 chance that the market will be favorable. His old marketing professor will charge him \$5,000 for the marketing research. It is estimated that there is a 0.6 probability that the survey

will be favorable. Furthermore, there is a 0.9 probability that the market will be favorable given a favorable outcome from the study. However, the marketing

professor has warned Jerry that there is only a probability of 0.12 of a favorable market if the marketing results are not favorable. Jerry is confused.

A) Should Jerry use marketing research?

B) Compute EVSI

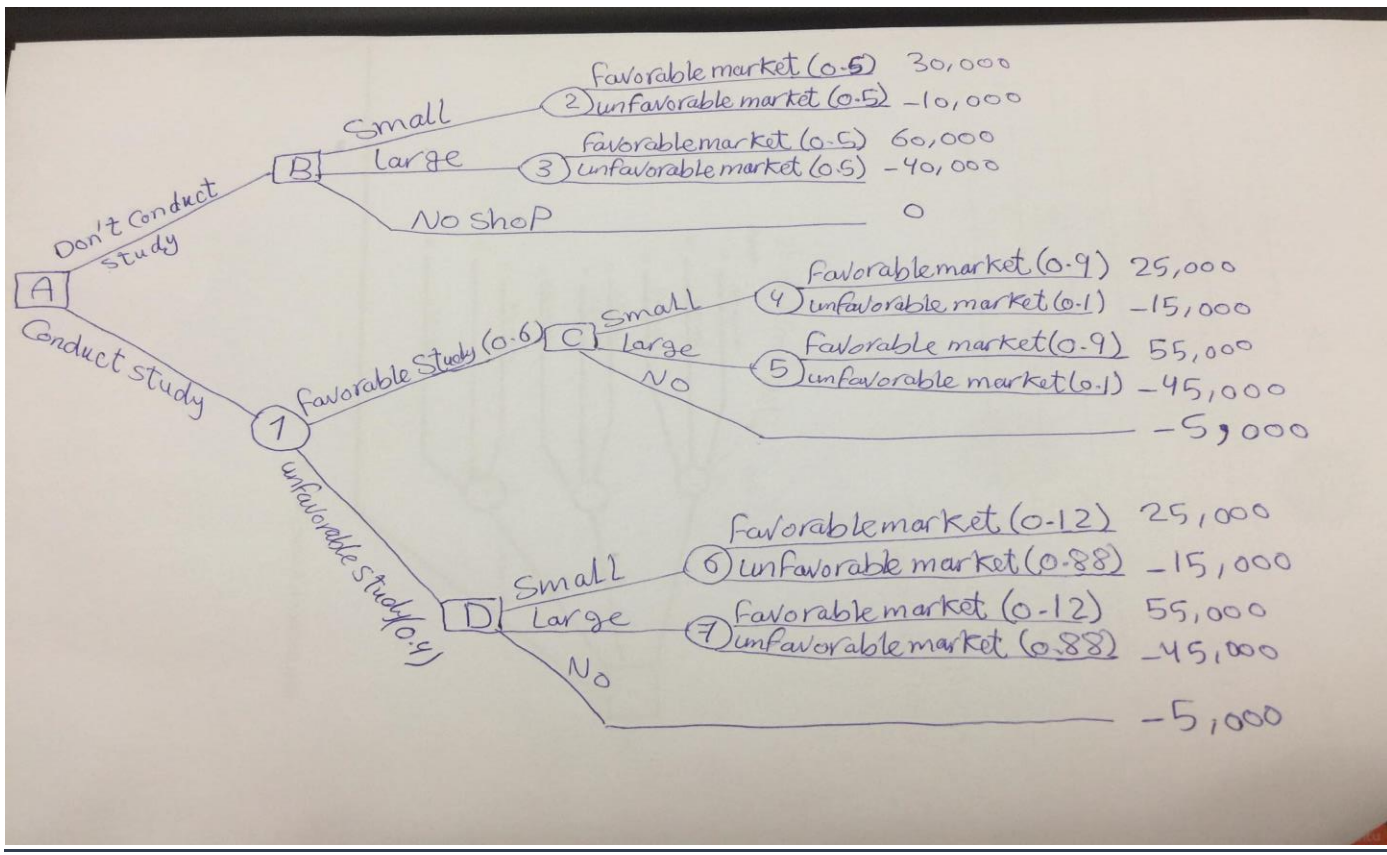
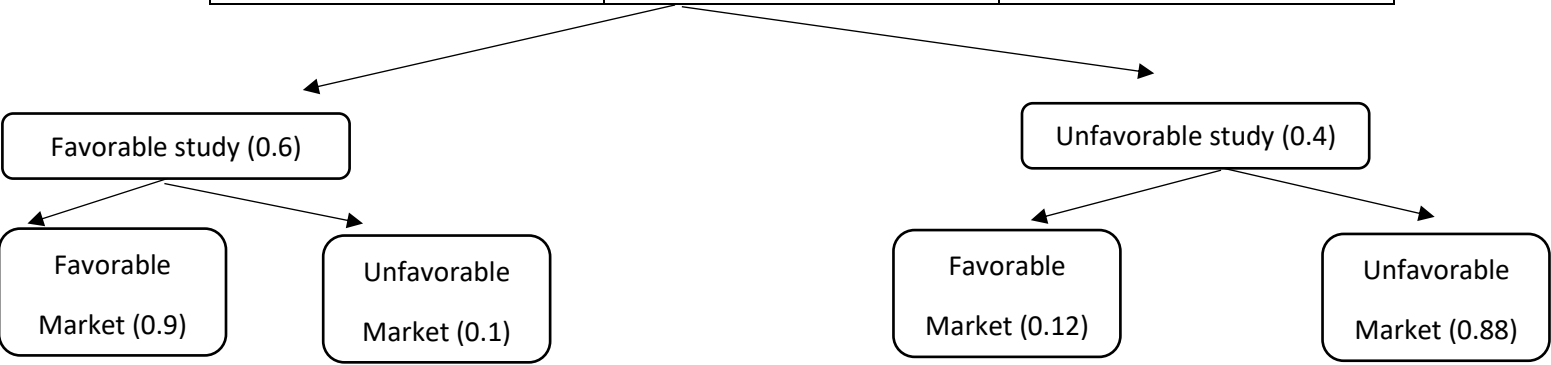
Solution:

Without doing market research

	Favorable market	Unfavorable market
Small shop	30,000	-10,000
Large shop	60,000	-40,000
No shop	0	0
probability	0.5	0.5

With doing market research (cost= \$5,000)

	Favorable market	Unfavorable market
Small shop	25,000	-15,000
Large shop	55,000	-45,000
No shop	-5,000	-5,000
probability		



$$\text{EMV (2)} = 30,000(0.5) + (-10,000) (0.5) = 10,000$$

$$\text{EMV (3)} = 60,000(0.5) + (-40,000) (0.5) = 10,000$$

$$\text{EMV (no)} = 0$$

So EMV for B is 10,000 so the best decision is to select a small shop or a large shop

$$\text{EMV (4)} = 25,000(0.9) + (-15,000) (0.1) = 21,000$$

$$\text{EMV (5)} = 55,000(0.9) + (-45,000) (0.1) = 45,000$$

$$\text{EMV (no)} = -5,000$$

So EMV for C is 45,000(large)

$$\text{EMV (6)} = 25,000(0.12) + (-15,000) (0.88) = -10,200$$

$$\text{EMV (7)} = 55,000(0.12) + (-45,000) (0.88) = -33,000$$

$$\text{EMV (no)} = -5,000$$

So EMV for D is -5,000 (no shop)

$$\text{EMV (1)} = 45,000(0.6) + (-5,000) (0.4) = 25,000$$

with the market survey, the best EMV is significantly greater than the best EMV without the survey.

$$\text{EVSI} = (\text{EV with SI} + \text{cost}) - (\text{EV without SI})$$

$$= 25,000 + 5,000 - 10,000$$

$$= 20,000$$

So, Jerry should use marketing research.

Note

$$\text{EVSI} = (\text{EV with SI} + \text{cost}) - (\text{EV without SI})$$

where

EVSI = expected value of sample information

EV with SI = expected value with sample information

EV without SI = expected value without sample information