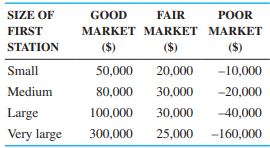
3-30

Even though independent gasoline stations have been having a difficult time, Susan Solomon has been thinking about starting her own independent gasoline station. Susan’s problem is to decide how large her station should be. The annual returns will depend on both the size of her station and a number of marketing factors related to the oil industry and demand for gasoline. After a careful analysis, Susan developed the following table:



For example, if Susan constructs a small station and the market is good, she will realize a profit of $50,000.

(a) Develop a decision table for this decision.

(b) What is the maximax decision?

(c) What is the maximin decision?

(d) What is the equally likely decision?

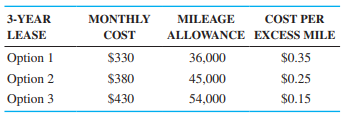
(e) What is the criterion of realism decision? Use an a value of 0.8.

(f) Develop an opportunity loss table.

(g) What is the minimax regret decision?

3-31

Beverly Mills has decided to lease a hybrid car to save on gasoline expenses and to do her part to help keep the environment clean. The car she selected is available from only one dealer in the local area, but that dealer has several leasing options to accommodate a variety of driving patterns. All the leases are for 3 years and require no money at the time of signing the lease. The first option has a monthly cost of $330, a total mileage allowance of 36,000 miles (an average of 12,000 miles per year), and a cost of $0.35 per mile for any miles over 36,000. The following table summarizes each of the three lease options:



Beverly has estimated that, during the 3 years of the lease, there is a 40% chance she will drive an average of 12,000 miles per year, a 30% chance she will drive an average of 15,000 miles per year, and a 30% chance that she will drive 18,000 miles per year. In evaluating these lease options, Beverly would like to keep her costs as low as possible.

(a) Develop a payoff (cost) table for this situation.

(b) What decision would Beverly make if she were optimistic?

(c) What decision would Beverly make if she were pessimistic?

(d) What decision would Beverly make if she wanted to minimize her expected cost (monetary value)?

(e) Calculate the expected value of perfect information for this problem.

3-32

Refer to the leasing decision facing Beverly Mills in Problem 3-31. Develop the opportunity loss table for this situation. Which option would be chosen based on the minimax regret criterion? Which alternative would result in the lowest expected opportunity loss?

3-36

A group of medical professionals is considering the construction of a private clinic. If the medical demand is high (i.e., there is a favorable market for the clinic), the physicians could realize a net profit of $100,000. If the market is not favorable, they could lose $40,000. Of course, they don’t have to proceed at all, in which case there is no cost. In the absence of any market data, the physicians’ best guess is that there is a 50–50 chance the clinic will be successful. Construct a decision tree to help analyze this problem. What should the medical professionals do?

3-37

The physicians in Problem 3-36 have been approached by a market research firm that offers to perform a study of the market at a fee of $5,000. The market researchers claim their experience enables them to use Bayes’ Theorem to make the following statements of probability:

Probability of a favorable market given a favorable study = 0.82

Probability of an unfavorable market given a favorable study = 0.18

Probability of a favorable market given an unfavorable study = 0.11

Probability of an unfavorable market given an unfavorable study = 0.89

Probability of a favorable research study = 0.55

Probability of an unfavorable research study = 0.45

(a) Develop a new decision tree for the medical professionals to reflect the options now open with the market study.

(b) Use the EMV approach to recommend a strategy.

(c) What is the expected value of sample information? How much might the physicians be willing to pay for a market study?

(d) Calculate the efficiency of this sample information.

3-38

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). Develop a decision tree for Jerry.

3-39

Jerry Smith (see Problem 3-38) 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 research results are not favorable. Jerry is confused.

(a) Should Jerry use the marketing research?

(b) Jerry, however, is unsure the 0.6 probability of a favorable marketing research study is correct. How sensitive is Jerry’s decision to this probability value? How far can this probability value deviate from 0.6 without causing Jerry to change his decision?

3-44

Jim Sellers is thinking about producing a new type of electric razor for men. If the market were favorable, he would get a return of $100,000, but if the market for this new type of razor were unfavorable, he would lose $60,000. Since Ron Bush is a good friend of Jim Sellers, Jim is considering the possibility of using Bush Marketing Research to gather additional information about the market for the razor. Ron has suggested that Jim use either a survey or a pilot study to test the market. The survey would be a sophisticated questionnaire administered to a test market. It will cost $5,000. Another alternative is to run a pilot study. This would involve producing a limited number of the new razors and trying to sell them in two cities that are typical of American cities. The pilot study is more accurate but is also more expensive. It will cost $20,000. Ron Bush has sugested that it would be a good idea for Jim to conduct either the survey or the pilot before Jim makes the decision concerning whether to produce the new razor. But Jim is not sure if the value of the survey or the pilot is worth the cost.

Jim estimates that the probability of a successful market without performing a survey or pilot study is 0.5. Furthermore, the probability of a favorable survey result given a favorable market for razors is 0.7, and the probability of a favorable survey result given an unsuccessful market for razors is 0.2. In addition, the probability of an unfavorable pilot study given an unfavorable market is 0.9, and the probability of an unsuccessful pilot study result given a favorable market for razors is 0.2

(a) Draw the decision tree for this problem without the probability values.

(b) Compute the revised probabilities needed to complete the decision, and place these values in the decision tree.

(c) What is the best decision for Jim? Use EMV as the decision criterion

3-45

Jim Sellers has been able to estimate his utility for a number of different values. He would like to use these utility values in making the decision in Problem 3-44:

U(-$80,000) = 0, U(-$65,000) = 0.5, U(-$60,000) = 0.55, U(-$20,000) = 0.7, U(-$5,000) = 0.8, U($0) = 0.81, U($80,000) = 0.9, U($95,000) = 0.95, and U($100,000) = 1. Resolve Problem 3-44 using utility values. Is Jim a risk avoider?