

Quiz III

Solutions and Extension

Problem 1:

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. Bush has suggested that Jim either use a survey or a pilot study to test the market. The survey would be a sophisticated questionnaire administered to test the market. It will cost \$5,000. Another alternative is to actually run a pilot study. This would involve producing a limited number of the new razors and actually trying to sell them in two cities that are typical American cities. The pilot study is more accurate, but is also more expensive. It will cost \$20,000. Ron Bush has suggested 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 or not 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 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 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 unsuccessful pilot study result given a favorable market for razors is 0.2.

- Draw the decision tree for this problem without the probability values.
- Compute the revised probabilities needed to complete the decisions, and place these values in the decision tree.
- What is the best decision for Jim? Use expected monetary value as the decision criterion.

Figure for Problem 6-22a

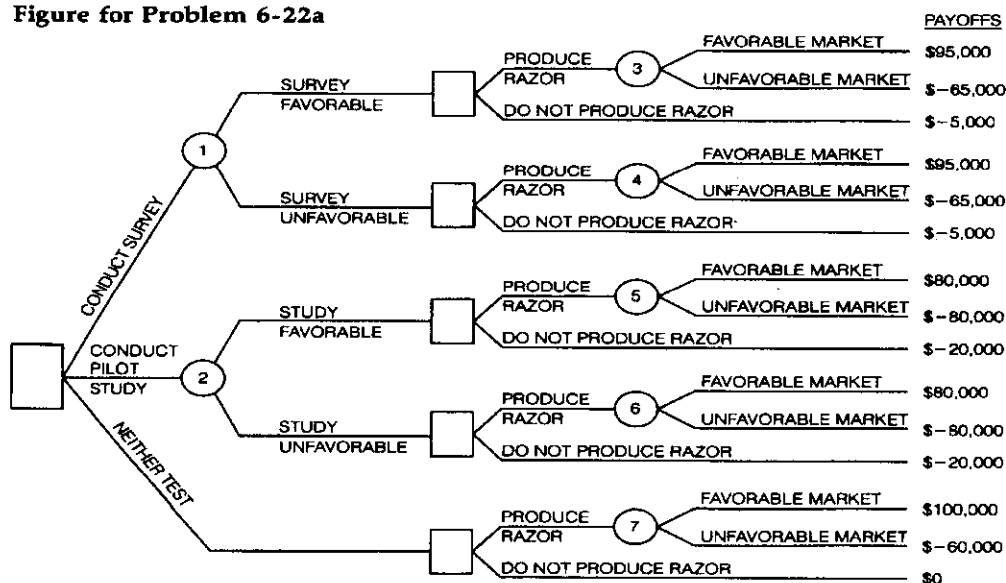


Figure for Problem 6-22b

S1: Survey Favorable
 S2: Survey Unfavorable
 S3: Study Favorable
 S4: Study Unfavorable
 S5: Market Favorable
 S6: Market Unfavorable

$$P(S5/S1) = (0.7 \times 0.5) / ((0.7 \times 0.5) + ((0.2 \times 0.5))) = 0.78$$

$$P(S6/S1) = 1 - 0.78 = 0.22$$

$$P(S5/S2) = (0.3 \times 0.5) / ((0.3 \times 0.5) + ((0.8 \times 0.5))) = 0.27$$

$$P(S6/S2) = 1 - 0.27 = 0.73$$

$$P(S5/S3) = 0.89 \text{ (use the same formula used for } P(S5/S1))$$

$$P(S6/S3) = 0.11$$

$$P(S5/S4) = 0.18 \text{ (use the same formula used for } P(S5/S1))$$

$$P(S6/S4) = 0.82$$

$$\text{EMV (node 3)} = (95000)(0.78) + (-65000)(0.22) = \$59800$$

$$\text{EMV (node 4)} = (95000)(0.27) + (-65000)(0.73) = \$-21800$$

$$\text{EMV (node 5)} = (80000)(0.89) + (-80000)(0.11) = \$62400$$

$$\text{EMV (node 6)} = (80000)(0.18) + (-80000)(0.82) = \$51200$$

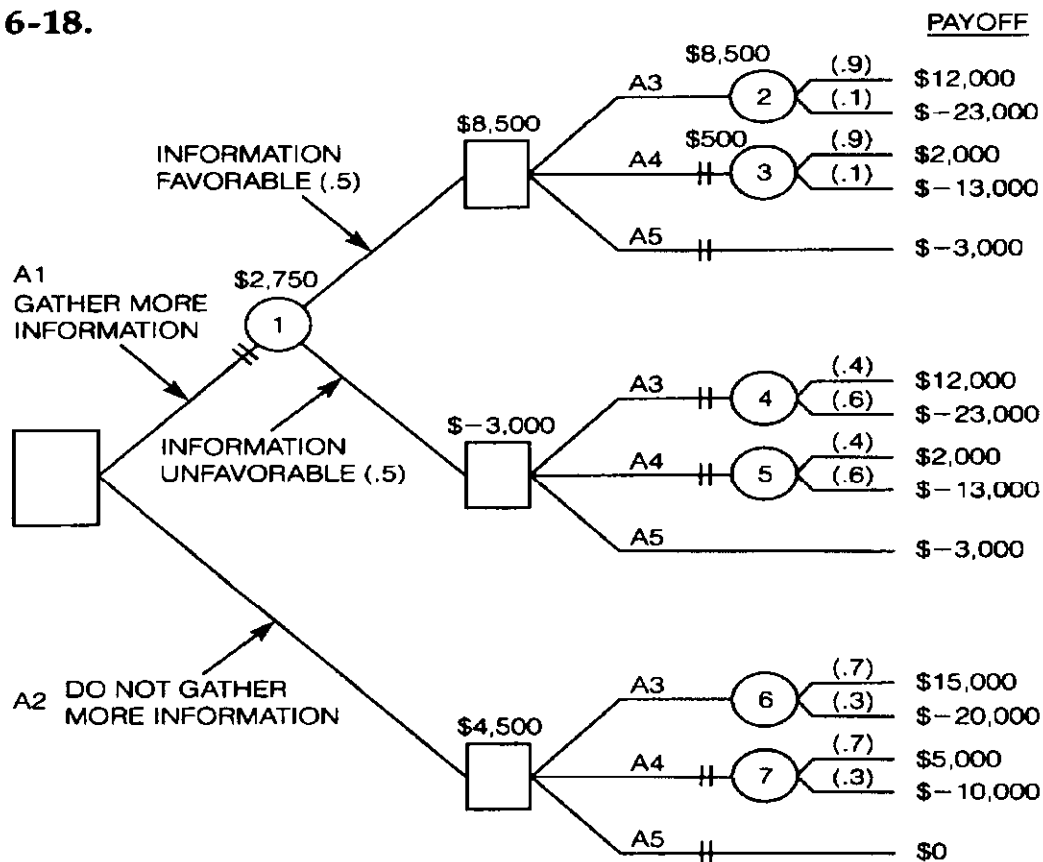
$$\text{EMV (node 7)} = (100000)(0.5) + (-60000)(0.50) = \$20000$$

$$\text{EMV (conduct a survey)} = (59800)(0.45) + (-5000)(0.55) = \$24160$$

Problem 2 (6-18):

Bill Holiday is not sure what he should do. He can either build a quadplex (that is, a building with 4 apartments), a duplex, gather additional information, or simply do nothing. If he gathers additional information, the results could be either favorable or unfavorable, but it would cost him \$3,000 to gather the information. Bill believes that there is a 50-50 chance that the information will be favorable. If the rental market is favorable, Bill will earn \$15,000 with the quadplex or \$5,000 with the duplex. Bill doesn't have the financial resources to do both. With an unfavorable rental market, however, Bill could lose \$20,000 with the quadplex or \$10,000 with the duplex. Without gathering additional information, Bill estimates that the probability of a favorable rental market is 0.7. A favorable report from the study would increase the probability of a favorable rental market to 0.9. Furthermore, an unfavorable report from the additional information would decrease the probability of a favorable rental market to 0.4. Of course Bill could forget all of these numbers and do nothing what is your advice to Bill?

6-18.



A₁: gather more information

A1: gather more information

A2: do not gather more information

A3: build quadplex

A4: build duplex

A5: do nothing

$$E(\text{node2}) = 0.9 \times 12000 - 0.1 \times 23000 = 8500$$

$$E(\text{node3}) = 0.9 \times 2000 - 0.1 \times 13000 = 500$$

$$E(\text{get information and do nothing}) = -3000$$

$$E(\text{node4}) = 0.4 \times 12000 - 0.6 \times 23000 = -9000$$

$$E(\text{node5}) = 0.4 \times 2000 - 0.6 \times 13000 = -7000$$

$$E(\text{node1}) = 0.5 \times 8500 - 0.5 \times 3000 = \$2750$$

$$E(\text{build quadplex}) = 0.7 \times 15000 - 0.3 \times 20000 = \$4500$$

$$E(\text{build duplex}) = 0.7 \times \$5000 - 0.3 \times 10000 = \$500$$

$$E(\text{do nothing}) = 0$$

Solution: do not gather information and build quadplex