

next year for each of three investment alternatives Mickey is considering:

DECISION ALTERNATIVE	STATE OF NATURE	
	GOOD ECONOMY	POOR ECONOMY
Stock market	80,000	-20,000
Bonds	30,000	20,000
CDs	23,000	23,000
Probability	0.5	0.5

- (a) What decision would maximize expected profits?  
 (b) What is the maximum amount that should be paid for a perfect forecast of the economy?

**Q:** 3-21 Develop an opportunity loss table for the investment problem that Mickey Lawson faces in Problem 3-20. What decision would minimize the expected opportunity loss? What is the minimum EOL?

**Q:** 3-22 Allen Young has always been proud of his personal investment strategies and has done very well over the past several years. He invests primarily in the stock market. Over the past several months, however, Allen has become very concerned about the stock market as a good investment. In some cases it would have been better for Allen to have his money in a bank than in the market. During the next year, Allen must decide whether to invest \$10,000 in the stock market or in a certificate of deposit (CD) at an interest rate of 9%. If the market is good, Allen believes that he could get a 14% return on his money. With a fair market, he expects to get an 8% return. If the market is bad, he will most likely get no return at all—in other words, the return would be 0%. Allen estimates that the probability of a good market is 0.4, the probability of a fair market is 0.4, and the probability of a bad market is 0.2, and he wishes to maximize his long-run average return.

- (a) Develop a decision table for this problem.  
 (b) What is the best decision?

**Q:** 3-23 In Problem 3-22 you helped Allen Young determine the best investment strategy. Now, Young is thinking about paying for a stock market newsletter. A friend of Young said that these types of letters could predict very accurately whether the market would be good, fair, or poor. Then, based on these predictions, Allen could make better investment decisions.

- (a) What is the most that Allen would be willing to pay for a newsletter?  
 (b) Young now believes that a good market will give a return of only 11% instead of 14%. Will this information change the amount that Allen would be willing to pay for the newsletter? If your answer is yes, determine the most that Allen would be willing to pay, given this new information.

**Q:** 3-24 Today's Electronics specializes in manufacturing modern electronic components. It also builds the equipment that produces the components. Phyllis Weinberger, who is responsible for advising the president of Today's Electronics on electronic manufacturing equipment, has developed the following table concerning a proposed facility:

	PROFIT (\$)		
	STRONG MARKET	FAIR MARKET	POOR MARKET
Large facility	550,000	110,000	-310,000
Medium-sized facility	300,000	129,000	-100,000
Small facility	200,000	100,000	-32,000
No facility	0	0	0

- (a) Develop an opportunity loss table.  
 (b) What is the minimax regret decision?

**Q:** 3-25 Brilliant Color is a small supplier of chemicals and equipment that are used by some photographic stores to process 35mm film. One product that Brilliant Color supplies is BC-6. John Kubick, president of Brilliant Color, normally stocks 11, 12, or 13 cases of BC-6 each week. For each case that John sells, he receives a profit of \$35. Like many photographic chemicals, BC-6 has a very short shelf life, so if a case is not sold by the end of the week, John must discard it. Since each case costs John \$56, he loses \$56 for every case that is not sold by the end of the week. There is a probability of 0.45 of selling 11 cases, a probability of 0.35 of selling 12 cases, and a probability of 0.2 of selling 13 cases.

- (a) Construct a decision table for this problem. Include all conditional values and probabilities in the table.  
 (b) What is your recommended course of action?  
 (c) If John is able to develop BC-6 with an ingredient that stabilizes it so that it no longer has to be discarded, how would this change your recommended course of action?

**Q:** 3-26 Megley Cheese Company is a small manufacturer of several different cheese products. One of the products is a cheese spread that is sold to retail outlets. Jason Megley must decide how many cases of cheese spread to manufacture each month. The probability that the demand will be six cases is 0.1, for 7 cases is 0.3, for 8 cases is 0.5, and for 9 cases is 0.1. The cost of every case is \$45, and the price that Jason gets for each case is \$95. Unfortunately, any cases not sold by the end of the month are of no value, due to spoilage. How many cases of cheese should Jason manufacture each month?

**Q:** 3-27 Farm Grown, Inc., produces cases of perishable food products. Each case contains an assortment of vegetables and other farm products. Each case costs \$5

## Discussion Questions and Problems

### Discussion Questions

- 3-1 Give an example of a good decision that you made that resulted in a bad outcome. Also give an example of a bad decision that you made that had a good outcome. Why was each decision good or bad?
- 3-2 Describe what is involved in the decision process.
- 3-3 What is an alternative? What is a state of nature?
- 3-4 Discuss the differences among decision making under certainty, decision making under risk, and decision making under uncertainty.
- 3-5 What techniques are used to solve decision-making problems under uncertainty? Which technique results in an optimistic decision? Which technique results in a pessimistic decision?
- 3-6 Define *opportunity loss*. What decision-making criteria are used with an opportunity loss table?
- 3-7 What information should be placed on a decision tree?
- 3-8 Describe how you would determine the best decision using the EMV criterion with a decision tree.
- 3-9 What is the difference between prior and posterior probabilities?
- 3-10 What is the purpose of Bayesian analysis? Describe how you would use Bayesian analysis in the decision-making process.
- 3-11 What is the EVSI? How is this computed?
- 3-12 How is the efficiency of sample information computed?
- 3-13 What is the overall purpose of utility theory?
- 3-14 Briefly discuss how a utility function can be assessed. What is a standard gamble, and how is it used in determining utility values?
- 3-15 How is a utility curve used in selecting the best decision for a particular problem?
- 3-16 What is a risk seeker? What is a risk avoider? How does the utility curve for these types of decision makers differ?

### Problems

- Q • 3-17 Kenneth Brown is the principal owner of Brown Oil, Inc. After quitting his university teaching job, Ken has been able to increase his annual salary by a factor of over 100. At the present time, Ken is forced to consider purchasing some more equipment for Brown Oil because of competition. His alternatives are shown in the following table:

EQUIPMENT	FAVORABLE MARKET		UNFAVORABLE MARKET	
	MARKET (\$)		MARKET (\$)	
Sub 100	300,000		-200,000	
Other J	250,000		-100,000	
Texan	75,000		-18,000	

For example, if Ken purchases a Sub 100 and if there is a favorable market, he will realize a profit of \$300,000. On the other hand, if the market is unfavorable, Ken will suffer a loss of \$200,000. But Ken has always been a very optimistic decision maker.

- (a) What type of decision is Ken facing?  
 (b) What decision criterion should he use?  
 (c) What alternative is best?

- Q • 3-18 Although Ken Brown (discussed in Problem 3-17) is the principal owner of Brown Oil, his brother Bob is credited with making the company a financial success. Bob is vice president of finance. Bob attributes his success to his pessimistic attitude about business and the oil industry. Given the information from Problem 3-17, it is likely that Bob will arrive at a different decision. What decision criterion should Bob use, and what alternative will he select?

- Q • 3-19 The *Lubricant* is an expensive oil newsletter to which many oil giants subscribe, including Ken Brown (see Problem 3-17 for details). In the last issue, the letter described how the demand for oil products would be extremely high. Apparently, the American consumer will continue to use oil products even if the price of these products doubles. Indeed, one of the articles in the *Lubricant* states that the chances of a favorable market for oil products was 70%, while the chance of an unfavorable market was only 30%. Ken would like to use these probabilities in determining the best decision.

- (a) What decision model should be used?  
 (b) What is the optimal decision?  
 (c) Ken believes that the \$300,000 figure for the Sub 100 with a favorable market is too high. How much lower would this figure have to be for Ken to change his decision made in part (b)?

- Q • 3-20 Mickey Lawson is considering investing some money that he inherited. The following payoff table gives the profits that would be realized during the

Note: Q means the problem may be solved with QM for Windows; X means the problem may be solved with Excel QM; and QX means the problem may be solved with QM for Windows and/or Excel QM.