Sample Answers to In-Text Questions

# Module F: Decision Making Tools

## Discussion Questions

1. What are the two key reasons for poor decisions?   
   Answer: low levels of literacy about options, and the inability to understand the information itself
2. List and explain briefly the steps in the decision-making process.   
   Answer: Define the problem, define the decisions, determine the best tool to use, generate solutions, evaluate each solution, implement the best solution, monitor the results. This is sort of like DMAIC.
3. List and explain the four elements of a decision.   
   Answer: The decision alternatives, define the states of nature, define the consequences, and define the payoffs.
4. Discuss the three decision-making categories.   
   Answer: Decisions under certainty, under uncertainty, and under risk.
5. Define the following decision-making criteria:
   1. Laplace criterion: The states of probability are unknown, so we should evaluate using expected value.
   2. Maximin criterion: Used when the negative impact of making the wrong decision is so high that he or she chooses that alternative that guarantees at least the minimum payoff.
   3. Maximax criterion: In this case, the decision maker is optimistic about the future events and their outcomes. Therefore, the decision maker identifies the maximum payoff associated with each decision and then chooses the maximum of the maximum payoffs, or the best of the best.
   4. Hurwicz criterion: By applying a certain percentage weight (α) to the most optimistic outcome, and (1 – α) to the most pessimistic outcome, the Hurwicz criterion strikes a balance between the two.
   5. Minimax regret: It is the difference between the best payoff for a given state of nature and the payoff associated with the actual decision made for that particular state. The goal of the minimax regret criterion is to minimize the regret, or loss, associated with making a nonoptimal decision.
6. What is the expected value concept?  
   Answer: EV is the weighted average of the values of all possible outcomes.
7. Why is sensitivity analysis a useful tool for making decisions under uncertainty?

Answer: Although it is impossible to consider all of the combination of values these variables can take, at a minimum, you can conduct a **sensitivity analysis** of their estimated probabilities of occurring. In this case, a sensitivity analysis will provide a range of values over which one decision alternative is preferred to others

1. When are decision trees an appropriate tool to use in the decision making process?

Answer: When a sequence of decisions must be made over a period of time.

1. What are some criticisms of the Hurwicz and the Laplace criteria?

Answer: if there are more than two states of nature, then the Hurwicz criterion will omit part of the information in the payoff matrix. For example, if there are three states of nature and three decision alternatives, then the Hurwicz criterion will ignore three of the intermediate payoffs. The Laplace criteria is not a good method to use when the underlying states of nature are not equally probable as is in many cases.

1. In evaluating several capacity planning alternatives using EV, a manager arrives at a virtual tie between two alternatives. What are some additional factors he should consider to break the tie?

Answer: You might also consider other impacts such as quality of life, or the financial state of the decision maker, etc.

1. When is it appropriate to use the expected value approach as a decision criterion? When is it not appropriate?  
   Answer: The expected value approach is appropriate when the probabilities of the states of nature are unknown. This approach would be inappropriate when the downside risk is too high, or would be unethical due to its effect.
2. List some ways by which the tools of decision analysis can be used to promote potentially unethical behavior?  
   Answer: The decision maker is often not rational, and may make a decision out of fear or anxiety, and may not choose the optimum decision with the highest expected value. Or, the decision that would lead to the highest expected value may ignore elements other than monetary payoffs, which could have a damaging impact on individuals, society, or the environment.