Sample Answers to In-Text Questions

# Module D: Simulation

## Discussion Questions

1. What is simulation, and why is it a widely used tool for solving real world problems?

Answer: Simulation is trying to duplicate a real world process over time. If it is impractical to use another approach, models must be relied on. You can often draw conclusions of how the real process operates.

1. Provide some examples of real-world problems that have been studied using simulation.

Answer: Production lines, waiting lines, inventory planning, plant layout, distribution systems, and projects like space flight.

1. What steps should a manager follow in using the simulation tool?

Answer: Develop a model that represents real life; Define the problem; Formulate the model; Gather the data; translate the model to the computer; Validate the model; Experiment; document and recommend.

1. What is Monte Carlo simulation?

Answer: It is a simulation techniques using probabilities, to simulate a random variable.

1. What role do random numbers play in the Monte Carlo simulation process?

Answer: They simulate the random distribution of inputs, like arrivals.

1. Provide examples of how some companies use Monte Carlo simulation.

Answer: They could predict new products, costs, capacities, times, etc.

1. List the five basic steps of the Monte Carlo simulation technique.

Answer: 1. Generate a probability distribution for the various possible values of key random variables. 2. Compute a **cumulative probability distribution** for each random variable. 3. Assign an interval of **random numbers** for each potential value of the random variable. 4. Generate random numbers by using a random number table or a computer. 5. Simulate a series of trials, and analyze the results.

1. To draw meaningful conclusions about the simulation study of a real world system, a large number of simulation trials is required. Why?

Answer: A large number would ensure the randomness that would lend credibility to the study.

1. What are the advantages of computer simulations (compared to manual simulations) in analyzing real-world problems?

Answer: Speed is a major factor, as is the ability to calculate a large number of trials, such as randomness.

1. Why simulation may be the only choice (instead of other analytical tools) that a manager may have in studying inventory ordering policies and waiting line problems?

Answer: The advantage is that a large and random number of studies can be generated with much less cost and greater speed than other methods.

1. List the disadvantages of simulation.

Answer: Simulation can be risky because you assume you can mathematically predict a real and random situation. Your probabilities may be wrong or your assumptions may be false, and it takes a long time to create a complex simulation. Also the results of using the model would probably not be able to use on other problems, since they are all unique.