Sample Answers to In-Text Questions

# Module A: Linear Programming

## Discussion Questions

1. State the conditions under which linear programming can be used as a decision making tool.

Answer: Linear programming is a mathematical modeling technique that managers can use in making decisions that involve optimizing an objective, such as maximizing profits or minimizing cost, subject to constraints such as limited resource availability

1. What does the term “linear” refers to in linear programming?

Answer: It means the effect of changing a variable is proportional to its magnitude, and therefore have a straight-line relationship.

1. How is the feasible solution region defined on the graph of a linear programming model?

Answer: The feasible solution region is defined as the upper or outer boundary of the variables that we are trying to optimize.

1. Discuss briefly the steps involved in formulating a linear programming model

Answer:

* + - 1. *Draw a two dimensional graph for plotting the two decision variables*
      2. *Define the objective function*
      3. *Plot the constraints on the graph with the decision variables and identify the feasible region.*
      4. *Find the optimal solution to the LP problem*

1. What are the steps to be followed in the graphical method of solving linear programming problems?

Answer: Use steps 1,3, and 4, as in Question 4 above

1. What are the limitations of the graphical method of solving linear programming problems?

Answer: The graphical method is limited to LP problems involving two decision variables and a limited number of constraints due to the difficulty of graphing and evaluating more than two decision variables. This restriction severely limits the use of the graphical method for real-world problems.

1. What do iso-profit and iso-cost lines refer to in the graphical approach to solving linear programming problems?

Answer: to find the optimum solution point we draw a series of profit lines that are parallel to each other. The profit line that just touches one of the corner points of the feasible solution space is the optimum solution at that point. The iso-cost lines work the same way.

1. What does moving the objective function line to the boundaries of the feasible solution space mean in a maximization linear programming problem?

Answer: That would give the maximum solution to the problem.

1. What does the term shadow price mean in the linear programming sensitivity analysis output obtained using Excel Solver?

Answer: It is the price that one would be willing to pay for one additional unit of that resource.

1. What do the terms “allowable increase” and “allowable decrease” refer to in the linear programming sensitivity analysis output obtained using Excel Solver?

Answer: The allowable increase and allowable decrease columns show the extent to

which the profit per unit of the decision variables can be changed without affecting the current optimal solution

1. What are some possible effects that adding an additional constraint can have on the feasible solution space and the optimal values of a linear programming solution?

Answer: I f you add a constraint to a problem, two things can happen. Your original

Solution satisfies the constraint or it doesn't. If it does, then you are finished. If you had a solution before and the solution is still feasible for the new problem, then you must still have a solution. If the original solution does not satisfy the new constraint, then possibly the new problem is infeasible. If not, then there is another solution. The value must go down. (Adding a constraint makes the problem harder to satisfy, so you cannot possibly do better than before). If your original solution satisfies your new constraint, then you can do as well as before. If not, then you will do worse.