**Module A: Linear Programming**

**Test Bank**

**Multiple Choice**

1. The limited availability of resources can be referred to as \_\_\_\_\_\_.

a. constraints

b. variables

c. consequences

d. state of nature

Ans: A

Cognitive Domain: Knowledge (Remember)

Learning Objective: A-1. Identify the critical features of linear programming (LP) and explain why it is critical for business operations success.

Answer Location: Introduction

Difficulty Level: Easy

AACSB: Systems and processes in organizations, including planning and design, production/operations, supply chains, marketing, and distribution

2. Which of the following is a mathematical modeling technique that managers can use in making decisions that involve optimizing an objective, subject to constraints?

a. optimization

b. estimation

c. linear programming

d. transportation model

Ans: C

Cognitive Domain: Knowledge (Remember)

Learning Objective: A-1. Identify the critical features of linear programming (LP) and explain why it is critical for business operations success.

Answer Location: Introduction

Difficulty Level: Medium

AACSB: Systems and processes in organizations, including planning and design, production/operations, supply chains, marketing, and distribution

3. In linear programming, advertising dollars budgeted for a marketing campaign is an example of \_\_\_\_\_\_.

a. a variable

b. a resource

c. a constraint

d. an objective

Ans: C

Cognitive Domain: Knowledge (Remember)

Learning Objective: A-1. Identify the critical features of linear programming (LP) and explain why it is critical for business operations success.

Answer Location: Introduction

Difficulty Level: Medium

AACSB: Systems and processes in organizations, including planning and design, production/operations, supply chains, marketing, and distribution

4. In linear programming, maximizing profits or minimizing costs is an example of \_\_\_\_\_\_.

a. a variable

b. a resource

c. a constraint

d. an objective

Ans: D

Cognitive Domain: Knowledge (Remember)

Learning Objective: A-1. Identify the critical features of linear programming (LP) and explain why it is critical for business operations success.

Answer Location: Introduction

Difficulty Level: Medium

AACSB: Systems and processes in organizations, including planning and design, production/operations, supply chains, marketing, and distribution

5. Determining the shipment of goods from multiple sources to multiple destinations to minimize transportation costs is an example of applying linear programming to solving \_\_\_\_\_\_ problems.

a. financial planning

b. production planning

c. assignment

d. transportation

Ans: D

Cognitive Domain: Knowledge (Remember)

Learning Objective: A-1. Identify the critical features of linear programming (LP) and explain why it is critical for business operations success.

Answer Location: Table A.1: Linear Programming Applications

Difficulty Level: Medium

AACSB: Systems and processes in organizations, including planning and design, production/operations, supply chains, marketing, and distribution

6. Determining the supply of resources needed to meet demand for the intermediate time frame at the minimum cost is an example of applying linear programming to solving \_\_\_\_\_\_ problems.

a. financial planning

b. production planning

c. assignment

d. transportation

Ans: B

Cognitive Domain: Knowledge (Remember)

Learning Objective: A-1. Identify the critical features of linear programming (LP) and explain why it is critical for business operations success.

Answer Location: Table A.1: Linear Programming Applications

Difficulty Level: Easy

AACSB: Systems and processes in organizations, including planning and design, production/operations, supply chains, marketing, and distribution

7. All linear programming problems must have \_\_\_\_\_\_ distinct features.

a. three

b. four

c. five

d. six

Ans: B

Cognitive Domain: Knowledge (Remember)

Learning Objective: A-1. Identify the critical features of linear programming (LP) and explain why it is critical for business operations success.

Answer Location: Features of a Linear Programming (LP) Problem

Difficulty Level: Medium

AACSB: Systems and processes in organizations, including planning and design, production/operations, supply chains, marketing, and distribution

8. Which of the following is NOT one of the features of a linear programming problem?

a. decision variables

b. consequences

c. constraints

d. linearity

Ans: B

Cognitive Domain: Knowledge (Remember)

Learning Objective: A-1. Identify the critical features of linear programming (LP) and explain why it is critical for business operations success.

Answer Location: Features of a Linear Programming (LP) Problem

Difficulty Level: Medium

AACSB: Systems and processes in organizations, including planning and design, production/operations, supply chains, marketing, and distribution

9. Which of the following is FALSE about objective functions in linear programming (LP)?

a. Every LP problem will have an objective function.

b. An objective function can be either maximized or minimized.

c. The objective of an LP problem expressed mathematically is referred to as an objective function.

d. The objective for an LP problem should be expressed explicitly in monetary units.

Ans: D

Cognitive Domain: Knowledge (Remember)

Learning Objective: A-1. Identify the critical features of linear programming (LP) and explain why it is critical for business operations success.

Answer Location: Features of a Linear Programming (LP) Problem

Difficulty Level: Hard

AACSB: Systems and processes in organizations, including planning and design, production/operations, supply chains, marketing, and distribution

10. \_\_\_\_\_\_ in linear programming are an alternative course of action—for example, determining the number of shipping routes for transporting goods from the available alternative choices.

a. Decision variables

b. Consequences

c. Constraints

d. Linearity

Ans: A

Cognitive Domain: Knowledge (Remember)

Learning Objective: A-1. Identify the critical features of linear programming (LP) and explain why it is critical for business operations success.

Answer Location: Features of a Linear Programming (LP) Problem

Difficulty Level: Medium

AACSB: Systems and processes in organizations, including planning and design, production/operations, supply chains, marketing, and distribution

11. The resource constraints are modeled in LP mathematically as \_\_\_\_\_\_.

a. inequalities

b. equalities or inequalities

c. linearity

d. variables

Ans: B

Cognitive Domain: Knowledge (Remember)

Learning Objective: A-1. Identify the critical features of linear programming (LP) and explain why it is critical for business operations success.

Answer Location: Features of a Linear Programming (LP) Problem

Difficulty Level: Medium

AACSB: Systems and processes in organizations, including planning and design, production/operations, supply chains, marketing, and distribution

12. The requirement of linear programming is that the objective function and the constraints have \_\_\_\_\_\_ relationship.

a. independent

b. linear

c. exponential

d. nonlinear

Ans: B

Cognitive Domain: Knowledge (Remember)

Learning Objective: A-1. Identify the critical features of linear programming (LP) and explain why it is critical for business operations success.

Answer Location: Features of a Linear Programming (LP) Problem

Difficulty Level: Medium

AACSB: Systems and processes in organizations, including planning and design, production/operations, supply chains, marketing, and distribution

13. Using linear programming (LP) to determine the optimum investment portfolio that will achieve certain returns while minimizing investment risks is an example of applying LP to solving \_\_\_\_\_\_ problems.

a. financial planning

b. production planning

c. assignment

d. transportation

Ans: A

Cognitive Domain: Knowledge (Remember)

Learning Objective: A-1. Identify the critical features of linear programming (LP) and explain why it is critical for business operations success.

Answer Location: Table A.1: Linear Programming Applications

Difficulty Level: Easy

AACSB: Systems and processes in organizations, including planning and design, production/operations, supply chains, marketing, and distribution

14. ABC, Inc., is a small clothing manufacturer that produces shirts and pants using two resources: sewing machine hours and cutting machine hours. The production manager can schedule up to 240 hours of sewing machine time and up to 150 hours of cutting machine time. Production of one shirt requires 3 hours of sewing time and 1 hour of cutting time. Each pair of pants requires 2 hours of sewing time and 1.5 hours of cutting time. Each shirt yields a profit of $5, and each pair of pants generates a $6 profit. The objective is to maximize profits. Which of the following is the decision variable for the LP formulation?

a. total revenue generated

b. number of sewing hours and number of cutting hours required

c. number of shirts and number of pairs of pants to be produced

d. total production time

Ans: C

Cognitive Domain: Knowledge (Remember)

Learning Objective: A-1. Identify the critical features of linear programming (LP) and explain why it is critical for business operations success.

Answer Location: Formulating a Linear Programming Problem

Difficulty Level: Medium

AACSB: Systems and processes in organizations, including planning and design, production/operations, supply chains, marketing, and distribution

15. ABC, Inc., is a small clothing manufacturer that produces polo shirts and pants using two resources: sewing machine hours and cutting machine hours. The production manager can schedule up to 240 hours of sewing machine time and up to 150 hours cutting machine time. Production of one polo shirt requires 3 hours of sewing time and 1 hour of cutting time. Each pair of pants requires 2 hours of sewing time and 1.5 hours of cutting time. Each polo shirt yields a profit of $5, and each pair of pants generates a $6 profit. The objective is to maximize profits. How many decision variables are there in this LP formulation?

a. one

b. two

c. three

d. four

Ans: B

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Formulating a Linear Programming Problem

Difficulty Level: Easy

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

16. ABC, Inc., is a small clothing manufacturer that produces shirts and pants using two resources: sewing machine hours and cutting machine hours. The production manager can schedule up to 240 hours of sewing machine time and up to 150 hour cutting machine time. Production of one shirt requires 3 hours of sewing time and 1 hour of cutting time. Each pair of pants requires 2 hours of sewing time and 1.5 hours of cutting time. Each shirt yields a profit of $5, and each pair of pants generates a $6 profit. The objective is to maximize profits. Determine the objective function for the LP formulation.

a. Maximize profit = $11 \* (Number of shirts to be produced + Number of pairs of pants to be produced)

b. Maximize profit = $5 \* Number of shirts to be produced

c. Maximize profit = $6 \* Number of pairs of pants to be produced

d. Maximize profit = ($5 \* Number of shirts to be produced) + ($6 \* Number of pairs of pants to be produced)

Ans: D

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Formulating a Linear Programming Problem

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

17. ABC, Inc., is a small clothing manufacturer that produces shirts and pants using two resources: sewing machine hours and cutting machine hours. The production manager can schedule up to 240 hours of sewing machine time and up to 150 hour cutting machine time. Production of one shirt requires 3 hours of sewing time and 1 hour of cutting time. Each pair of pants requires 2 hours of sewing time and 1.5 hours of cutting time. Each shirt yields a profit of $5, and each pair of pants generates a $6 profit. The objective is to maximize profits. Determine the nonnegative constraint for the LP formulation. Let X1 = Number of shirts to be produced, X2 = Number of pairs of pants to be produced.

a. X1 and X2 > 0

b. X1 and X2 ≥ 0

c. X1 and X2 ≤ 0

d. X1 and X2 = 0

Ans: B

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Formulating a Linear Programming Problem

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

18. ABC, Inc., is a small clothing manufacturer that produces shirts and pants using two resources: sewing machine hours and cutting machine hours. The production manager can schedule up to 240 hours of sewing machine time and up to 150 hour cutting machine time. Production of one shirt requires 3 hours of sewing time and 1 hour of cutting time. Each pair of pants requires 2 hours of sewing time and 1.5 hours of cutting time. Each shirt yields a profit of $5, and each pair of pants generates a $6 profit. The objective is to maximize profits. Determine sewing time constraint for the LP formulation. Let X1 = Number of shirts to be produced, X2 = Number of pairs of pants to be produced.

a. 3X1 + 2X2 ≤ 240

b. X1 + 1.5X2 ≤ 150

c. 3X1 + 2X2 ≤ 150

d. X1 + 1.5X2 ≤ 240

Ans: A

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Formulating a Linear Programming Problem

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

19. ABC, Inc., is a small clothing manufacturer that produces shirts and pants using two resources: sewing machine hours and cutting machine hours. The production manager can schedule up to 240 hours of sewing machine time and up to 150 hour cutting machine time. Production of one shirt requires 3 hours of sewing time and 1 hour of cutting time. Each pair of pants requires 2 hours of sewing time and 1.5 hours of cutting time. Each shirt yields a profit of $5, and each pair of pants generates a $6 profit. The objective is to maximize profits. Determine cutting time constraint for the LP formulation. Let X1 = Number of shirts to be produced, X2 = Number of pairs of pants to be produced.

a. 3X1 + 2X2 ≤ 240

b. X1 + 1.5X2 ≤ 150

c. 3X1 + 2X2 ≤ 150

d. X1 + 1.5X2 ≤ 240

Ans: B

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Formulating a Linear Programming Problem

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

20. The graphical method is appropriate for solving simple linear programming problems involving \_\_\_\_\_\_ decision variables.

a. one

b. two

c. three

d. four

Ans: B

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Solving Linear Programming Problems: The Graphical Method

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

21. Constraints in LP problems that do not affect the boundaries of the feasible solution region are referred to as \_\_\_\_\_\_.

a. redundant constraints

b. binding constraints

c. restrictive constraints

d. optimal constraints

Ans: A

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Solving Linear Programming Problems: The Graphical Method

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

22. According to the mathematical theory underlying LP problems, the optimal solution to an LP problem will occur at \_\_\_\_\_\_.

a. one of the corner points of the feasible space

b. all of the corner points of the feasible space

c. any point inside the feasible space

d. any point outside the feasible space

Ans: A

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Method 1: Corner Point Solution Method

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

23. ABC, Inc., is a small clothing manufacturer that produces shirts and pants using two resources: sewing machine hours and cutting machine hours. The production manager can schedule up to 240 hours of sewing machine time and up to 150 hour cutting machine time. Production of one shirt requires 3 hours of sewing time and 1 hour of cutting time. Each pair of pants requires 2 hours of sewing time and 1.5 hours of cutting time. Each shirt yields a profit of $5, and each pair of pants generates a $6 profit. The objective is to maximize profits. What is the total profit at the optimal solution?

a. $250

b. $398

c. $624

d. $583

Ans: C

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Method 1: Corner Point Solution Method

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

24. ABC, Inc., is a small clothing manufacturer that produces shirts and pants using two resources: sewing machine hours and cutting machine hours. The production manager can schedule up to 240 hours of sewing machine time and up to 150 hour cutting machine time. Production of one shirt requires 3 hours of sewing time and 1 hour of cutting time. Each pair of pants requires 2 hours of sewing time and 1.5 hours of cutting time. Each shirt yields a profit of $5, and each pair of pants generates a $6 profit. The objective is to maximize profits. Determine cutting time constraint for the LP formulation. Let X1 = Number of shirts to be produced, X2 = Number of pairs of pants to be produced. Which one of the following is NOT one of the corner points (x1, x2) in this LP formulation?

a. (24,84)

b. (80,100)

c. (0,100)

d. (80,0)

Ans: B

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Method 1: Corner Point Solution Method

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

25. ABC, Inc., is a small clothing manufacturer that produces shirts and pants using two resources: sewing machine hours and cutting machine hours. The production manager can schedule up to 240 hours of sewing machine time and up to 150 hour cutting machine time. Production of one shirt requires 3 hours of sewing time and 1 hour of cutting time. Each pair of pants requires 2 hours of sewing time and 1.5 hours of cutting time. Each shirt yields a profit of $5, and each pair of pants generates a $6 profit. The objective is to maximize profits. Let X1 = Number of shirts to be produced, X2 = Number of pairs of pants to be produced. Which one of the following corner point (x1, x2) yields the maximum profit in this LP formulation?

a. (24,84)

b. (80,100)

c. (84,24)

d. (80,0)

Ans: A

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Method 1: Corner Point Solution Method

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

26. ABC, Inc., is a small clothing manufacturer that produces shirts and pants using two resources: sewing machine hours and cutting machine hours. The production manager can schedule up to 240 hours of sewing machine time and up to 150 hour cutting machine time. Production of one shirt requires 3 hours of sewing time and 1 hour of cutting time. Each pair of pants requires 2 hours of sewing time and 1.5 hours of cutting time. Each shirt yields a profit of $5, and each pair of pants generates a $6 profit. The objective is to maximize profits. Let X1 = Number of shirts to be produced, X2 = Number of pairs of pants to be produced. Determine the value of X1 and X2 (that maximizes profit) using corner point method.

a. X1 = 0, X2 = 100

b. X1 = 120, X2 = 0

c. X1 = 84, X2 = 24

d. X1 = 24, X2 = 84

Ans: D

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Method 1: Corner Point Solution Method

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

27. Which of the following methods do we use in conjunction with the corner point method to determine the maximum profit solution to LP problems with profit maximization objective?

a. iso-cost line method

b. sensitivity analysis method

c. simplex method

d. iso-profit line method

Ans: D

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Method 2: Iso-Cost Line Solution Method

Difficulty Level: Easy

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

28. When the LP problem has more than two decision variables, the \_\_\_\_\_\_ is appropriate for searching the optimal solution.

a. graphical method

b. corner point method

c. simplex method

d. iso-profit line method

Ans: C

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Method 2: Iso-Cost Line Solution Method

Difficulty Level: Hard

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

29. \_\_\_\_\_\_ are constraints that form the corner points at the boundaries of the feasible solution region and limit the values of the decision variables, which in turn, limit the objective function values.

a. Binding constraints

b. Nonbinding constraints

c. Redundant constraints

d. Optimal constraints

Ans: A

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Method 1: Corner Point Solution Method

Difficulty Level: Hard

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

30. The \_\_\_\_\_\_ is a process in which each of the corner points occurring at the boundaries of the feasible solution space is examined to determine the optimal solution.

a. graphical method

b. corner point solution method

c. iso-cost line method

d. iso-profit line method

Ans: B

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Method 1: Corner Point Solution Method

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

31. Which of the following is a method in which parallel cost lines are plotted in the LP graphical solution approach to determine the least cost solution to LP problems with cost minimization objective?

a. graphical method

b. corner point solution method

c. iso-cost line method

d. iso-profit line method

Ans: C

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Solving Problems With Minimization Objective Using LP

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

32. Which of the following is a method in which parallel profit lines are plotted in the LP graphical solution approach to determine the maximum profit solution to LP problems with profit maximization objective?

a. graphical method

b. corner point solution method

c. iso-cost line method

d. iso-profit line method

Ans: D

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Method 2: Iso-Cost Line Solution Method

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

33. Under instances where the iso-profit line is parallel to one of the constraints that define the boundaries of the feasible solution region, every combination of values of the decision variables that fall on that segment of the constraint line that just touches the feasible solution region is referred to as \_\_\_\_\_\_.

a. multiple optimum solutions

b. local optimum solutions

c. global optimum solution

d. single optimum solutions

Ans: A

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Method 2: Iso-Cost Line Solution Method

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

34. \_\_\_\_\_\_ is the range of values of the objective function within which the optimal values of the decision variables will not change.

a. Range of feasibility

b. Range of optimality

c. Range of redundancy

d. Range of continuity

Ans: B

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location:

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

35. For binding constraints at optimality, the right-hand value should be \_\_\_\_\_\_ the left-hand value.

a. greater than

b. less than

c. equal to

d. in proportion to

Ans: C

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Method 2: Iso-Cost Line Solution Method

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

36. At optimality, if the left-hand side values are greater than the right-hand side values, we have \_\_\_\_\_\_.

a. slack

b. profit

c. loss

d. surplus

Ans: D

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Method 2: Iso-Cost Line Solution Method

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

37. At optimality, if the left-hand side values are lesser than the right-hand side values, we have \_\_\_\_\_\_.

a. slack

b. profit

c. loss

d. surplus

Ans: A

Cognitive Domain:

Learning Objective: A-

Answer Location: Method 2: Iso-Cost Line Solution Method

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

38. Which of the following is an algorithm that provides a systematic way of examining the corner or extreme points of the feasible region of more complex LP problems to determine the optimal value of the objective function?

a. graphical method

b. corner point method

c. simplex method

d. iso-profit line method

Ans: C

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: The Simplex Method of Linear Programming

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

39. In the Excel Solver parameters window, the cell reference for the objective function is an input into which of the following fields?

a. Set Objective

b. By Changing Variable Cells

c. Subject to Constraints

d. Select a Solving Method

Ans: A

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Solving Linear Programming Problems Using Excel

Difficulty Level: Easy

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

40. In the Excel Solver parameters window, which of the following options should be selected from the “Select a Solving Method” drop-down menu to solve an LP problem?

a. GRG Onlinear

b. Simplex LP

c. Evolutionary

d. Complex LP

Ans: B

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Solving Linear Programming Problems Using Excel

Difficulty Level: Easy

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

41. In the Excel Solver parameters window, the cell references for the decision variables are to be inputted into which field?

a. Set Objective

b. By Changing Variable Cells

c. Subject to Constraints

d. Select a Solving Method

Ans: B

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Solving Linear Programming Problems Using Excel

Difficulty Level: Easy

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

42. A(n) \_\_\_\_\_\_ helps in the determination of how sensitive the current optimal solution is to changes in the input parameter values.

a. feasibility report

b. answer report

c. sensitivity analysis report

d. error report

Ans: C

Cognitive Domain: Application (Apply)

Learning Objective: A-3. Perform sensitivity analysis on solutions to LP problems.

Answer Location: Sensitivity Analysis

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

43. In the Excel Solver parameters window, which of the following buttons should be clicked to add a constraint?

a. Add

b. Change

c. Reset

d. Load/Save

Ans: A

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Solving Linear Programming Problems Using Excel

Difficulty Level: Easy

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

44. Once the Solver tool is activated, it will appear under the \_\_\_\_\_\_ tab in the tool bar.

a. Formulas

b. Data

c. Developer

d. View

Ans: B

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Solving Linear Programming Problems Using Excel

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

45. The sensitivity analysis report generated by Excel solver has \_\_\_\_\_\_ major components.

a. two

b. three

c. four

d. five

Ans: A

Cognitive Domain: Application (Apply)

Learning Objective: A-3. Perform sensitivity analysis on solutions to LP problems.

Answer Location: Sensitivity Analysis

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

46. A sensitivity analysis report generated by Excel Solver includes the \_\_\_\_\_\_ and the \_\_\_\_\_\_.

a. fixed cells table, variable cells table

b. constraint table, variable cells table

c. constraint table, objective table

d. variable cells table, decision variables table

Ans: B

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Sensitivity Analysis

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

47. Consider the portion of the sensitivity analysis report that follows. The current optimal solution will not change as long as the objective coefficient of *X1* is within the range of \_\_\_\_\_\_.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *Cell* | *Name* | *Final Value* | *Reduced Cost* | *Objective Coefficient* | *Allowable Increase* | *Allowable Decrease* |
| $F$6 | Shirt (X1) | 24 | 0 | 5 | 4 | 1 |
| $G$6 | Pants (X2) | 84 | 0 | 6 | 1.5 | 2.666667 |

a. 4 to 9

b. 1 to 4

c. 5 to 9

d. 3 to 6

Ans: A

Cognitive Domain: Application (Apply)

Learning Objective: A-3. Perform sensitivity analysis on solutions to LP problems.

Answer Location: Sensitivity Analysis

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

48. The \_\_\_\_\_\_column(s) in the sensitivity analysis report show(s) the extent to which the profit per unit of the decision variables can be changed without affecting the current optimal solution.

a. final value

b. reduced cost

c. shadow price

d. allowable increase and allowable decrease

Ans: D

Cognitive Domain: Application (Apply)

Learning Objective: A-3. Perform sensitivity analysis on solutions to LP problems.

Answer Location: Sensitivity Analysis

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

49. Changing the value of the objective coefficient will change \_\_\_\_\_\_.

a. final value

b. optimal solution

c. total profits

d. constraints

Ans: C

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Sensitivity Analysis

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

50. The price associated with a resource that indicates how much more profit would be earned by increasing the amount of the resource by one unit is called \_\_\_\_\_\_.

a. final cost

b. reduced cost

c. shadow price

d. single price

Ans: C

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Sensitivity Analysis

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

51. \_\_\_\_\_\_\_\_\_\_ is the price one would will be willing to pay for acquiring an additional unit of a resource.

a. Final cost

b. Reduced cost

c. Shadow price

d. Single price

Ans: C

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Sensitivity Analysis

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

52. Consider the portion of the sensitivity analysis report that follows. Increasing the right-hand side constraint for $I$7 by 1 unit (240 to 241) will result in which of the following?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *Cell* | *Name* | *Final Value* | *Shadow Price* | *Constraint R.H. Side* | *Allowable Increase* | *Allowable Decrease* |
| $I$7 | <= Usage | 240 | 0.6 | 240 | 210 | 40 |
| $I$8 | <= Usage | 150 | 3.2 | 150 | 30 | 70 |

a. decrease the profit by $0.6

b. increase the profit by $3.2

c. increase the profit by $0.6

d. decrease the profit by $0.6

Ans: C

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Sensitivity Analysis

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

53. Consider the portion of the sensitivity analysis report that follows. Increasing the right-hand side constraint by 1 unit for $I$8 (150 to 151) will result in which of the following?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *Cell* | *Name* | *Final Value* | *Shadow Price* | *Constraint R.H. Side* | *Allowable Increase* | *Allowable Decrease* |
| $I$7 | <= Usage | 240 | 0.6 | 240 | 210 | 40 |
| $I$8 | <= Usage | 150 | 3.2 | 150 | 30 | 70 |

a. decrease the profit by $0.6

b. increase the profit by $3.2

c. increase the profit by $0.6

d. decrease the profit by $3.2

Ans: B

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Sensitivity Analysis

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

54. Consider the portion of the sensitivity analysis report that follows. Decreasing the right-hand side constraint by 1 unit for $I$8 (from 150 to 149) will result in which of the following?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *Cell* | *Name* | *Final Value* | *Shadow Price* | *Constraint R.H. Side* | *Allowable Increase* | *Allowable Decrease* |
| $I$7 | <= Usage | 240 | 0.6 | 240 | 210 | 40 |
| $I$8 | <= Usage | 150 | 3.2 | 150 | 30 | 70 |

a. decrease the profit by $0.6

b. increase the profit by $3.2

c. increase the profit by $0.6

d. decrease the profit by $3.2

Ans: D

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Sensitivity Analysis

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

55. Consider the sensitivity analysis report that follows. The shadow price of $0.6 is valid as long as the right-hand constraint of 240 is within the range of \_\_\_\_\_\_.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *Cell* | *Name* | *Final Value* | *Shadow Price* | *Constraint R.H. Side* | *Allowable Increase* | *Allowable Decrease* |
| $I$7 | <= Usage | 240 | 0.6 | 240 | 210 | 40 |
| $I$8 | <= Usage | 150 | 3.2 | 150 | 30 | 70 |

a. 200 to 450

b. 150 to 240

c. 200 to 300

d. 40 to 210

Ans: A

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Sensitivity Analysis

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

56. Consider the portion of the sensitivity analysis report that follows. The shadow price of $3.2 is valid as long as the right-hand constraint of 150 is within the range of \_\_\_\_\_\_.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *Cell* | *Name* | *Final Value* | *Shadow Price* | *Constraint R.H. Side* | *Allowable Increase* | *Allowable Decrease* |
| $I$7 | <= Usage | 240 | 0.6 | 240 | 210 | 40 |
| $I$8 | <= Usage | 150 | 3.2 | 150 | 30 | 70 |

a. 30 to 70

b. 30 to 150

c. 150 to 220

d. 80 to 180

Ans: D

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Sensitivity Analysis

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

57. XYZ manufactures four types of plywood panels. Each product must go through the following operations: patching, grading, gluing, and baking. The time requirements for each panel, the capacity available, the minimum production requirements, and the profit contributions per panel are tabled here. How many decision variables does this LP problem have?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | *Hours Required* | | | | | *Minimum Production Requirements* |
| Plywood Panel | Patching | Grading | Gluing | Baking | Profit |
| Soft | 0.60 | 1.00 | 1.50 | 1.00 | $8.00 | 120 |
| Hardwood | 1.00 | 2.50 | 4.00 | 2.00 | $12.00 | 150 |
| Tropical | 2.00 | 3.50 | 4.00 | 3.00 | $18.00 | 200 |
| Aircraft | 2.50 | 5.00 | 6.00 | 4.00 | $30.00 | 300 |
| Total Capacity Available in Hours | 2,500 | 3,500 | 5,000 | 4,000 |  |  |

a. two

b. three

c. four

d. eight

Ans: C

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

58. XYZ manufactures four types of plywood panels. Each product must go through the following operations: patching, grading, gluing, and baking. The time requirements for each panel, the capacity available, the minimum production requirements, and the profit contributions per panel are tabled here. Identify the objective function. Let x1 = Number of soft panels to be made, x2 = Number of hardwood panels to be made, x3 = Number of tropical panel to be made, and x4 = Number of aircraft panels to be made.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | *Hours Required* | | | | | *Minimum Production Requirements* |
| Plywood Panel | Patching | Grading | Gluing | Baking | Profit |
| Soft | 0.60 | 1.00 | 1.50 | 1.00 | $8.00 | 120 |
| Hardwood | 1.00 | 2.50 | 4.00 | 2.00 | $12.00 | 150 |
| Tropical | 2.00 | 3.50 | 4.00 | 3.00 | $18.00 | 200 |
| Aircraft | 2.50 | 5.00 | 6.00 | 4.00 | $30.00 | 300 |
| Total Capacity Available in Hours | 2,500 | 3,500 | 5,000 | 4,000 |  |  |

a. Maximize profits = 8X1 + 12X2 + 18X3 + 30X4

b. Maximize profits = 7X1 + 10X2 + 15X3 + 20X4

c. Minimize costs = 8X1 + 12X2 + 18X3 + 30X4

d. Minimize costs = 7X1 + 10X2 + 15X3 + 20X4

Ans: A

Cognitive Domain: Application (Apply)

Learning Objective: A-2. Solve LP problems with both maximization and minimization objectives, using graphical methods and Excel Solver.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

59. XYZ manufactures four types of plywood panels. Each product must go through the following operations: patching, grading, gluing, and baking. The time requirements for each panel, the capacity available, the minimum production requirements, and the profit contributions per panel are tabled here. Determine the capacity constraint for patching operation. Let x1 = Number of soft panels to be made, x2 = Number of hardwood panels to be made, x3 = Number of tropical panel to be made, and x4 = Number of aircraft panels to be made.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | *Hours Required* | | | | | *Minimum Production Requirements* |
| Plywood Panel | Patching | Grading | Gluing | Baking | Profit |
| Soft | 0.60 | 1.00 | 1.50 | 1.00 | $8.00 | 120 |
| Hardwood | 1.00 | 2.50 | 4.00 | 2.00 | $12.00 | 150 |
| Tropical | 2.00 | 3.50 | 4.00 | 3.00 | $18.00 | 200 |
| Aircraft | 2.50 | 5.00 | 6.00 | 4.00 | $30.00 | 300 |
| Total Capacity Available in Hours | 2,500 | 3,500 | 5,000 | 4,000 |  |  |

a. X1 ≥ 100

b. 0.6X1 + 1X2 + 2.0X3 + 2.5X4 ≤ 2,500

c. X4 ≥ 250

d. X1 + 2X2 + 3X3 + 4X4 ≤ 4,000

Ans: B

Cognitive Domain: Application (Apply)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

60. XYZ manufactures four types of plywood panels. Each product must go through the following operations: patching, grading, gluing, and baking. The time requirements for each panel, the capacity available, the minimum production requirements, and the profit contributions per panel are tabled here. Which of the following represents the production constraint for the aircraft plywood panel? Let x1 = Number of soft panels to be made, x2 = Number of hardwood panels to be made, x3 = Number of tropical panel to be made, and x4 = Number of aircraft panels to be made.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | *Hours Required* | | | | | *Minimum Production Requirements* |
| Plywood Panel | Patching | Grading | Gluing | Baking | Profit |
| Soft | 0.60 | 1.00 | 1.50 | 1.00 | $8.00 | 120 |
| Hardwood | 1.00 | 2.50 | 4.00 | 2.00 | $12.00 | 150 |
| Tropical | 2.00 | 3.50 | 4.00 | 3.00 | $18.00 | 200 |
| Aircraft | 2.50 | 5.00 | 6.00 | 4.00 | $30.00 | 300 |
| Total Capacity Available in Hours | 2,500 | 3,500 | 5,000 | 4,000 |  |  |

a. X1 ≥ 100

b. 0.5X1 + 1X2 + 2.0X3 + 1.5X4 ≤ 2,000

c. X4 ≥ 300

d. X1 + 2X2 + 3X3 + 4X4 ≤ 4,000

Ans: C

Cognitive Domain: Application (Apply)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

61. A school is trying to determine a nutritional diet to feed its students. The objective is to minimize cost, subject to meeting the minimum nutritional requirements of protein, calcium, and calories. The cost and nutritional content of each food, along with the minimum nutritional requirements, are shown here. Let *K* and *T* be the number pounds of kidney beans and tofu to be purchased. Determine the objective function.

|  |  |  |  |
| --- | --- | --- | --- |
| *Nutrient* | *Kidney Beans* | *Tofu* | *Minimum Daily Requirement* |
| Cost per pound | $0.90 | $1.50 |  |
| Calcium in units per pound | 15 | 6 | 30 |
| Protein in units per pound | 10 | 10 | 40 |
| Calories in units per pound | 3 | 9 | 18 |

a. Minimize cost = $0.90K + $1.50T

b. Minimize cost = 1K + 1T

c. Maximize cost = $0.90K + $1.50T

d. Maximize cost = $1.00K + $1.50T

Ans: A

Cognitive Domain: Application (Apply)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

62. A school is trying to determine a nutritional diet to feed its students. The objective is to minimize cost, subject to meeting the minimum nutritional requirements of protein, calcium, and calories. The cost and nutritional content of each food, along with the minimum nutritional requirements, are shown here. Let *K* and *T* be the number pounds of kidney beans and tofu to be purchased. Which of the following is the constraint on the units of calories?

|  |  |  |  |
| --- | --- | --- | --- |
| *Nutrient* | *Kidney Beans* | *Tofu* | *Minimum Daily Requirement* |
| Cost per pound | $0.90 | $1.50 |  |
| Calcium in units per pound | 15 | 6 | 30 |
| Protein in units per pound | 10 | 10 | 40 |
| Calories in units per pound | 3 | 9 | 18 |

a. 15K + 5T ≥ 30

b. 10K + 10T ≥ 40

c. 3K + 9T ≥ 18

d. K, T ≥ 0

Ans: C

Cognitive Domain: Application (Apply)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

63. A school is trying to determine a nutritional diet to feed its students. The objective is to minimize cost, subject to meeting the minimum nutritional requirements of protein, calcium, and calories. The cost and nutritional content of each food, along with the minimum nutritional requirements, are shown here. Let *K* and *T* be the number pounds of kidney beans and tofu to be purchased. Which of the following is the optimal solution values of the decision variables?

|  |  |  |  |
| --- | --- | --- | --- |
| *Nutrient* | *Kidney Beans* | *Tofu* | *Minimum Daily Requirement* |
| Cost per pound | $0.90 | $1.50 |  |
| Calcium in units per pound | 15 | 6 | 30 |
| Protein in units per pound | 10 | 10 | 40 |
| Calories in units per pound | 3 | 9 | 18 |

a. K=1, T =3

b. K=3, T =1

c. K=2, T=2

d. K=4, T=1

Ans: B

Cognitive Domain: Application (Apply)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

64. Consider the portion of the sensitivity analysis report that follows. The allowable range of optimality for variable *Kidney Beans* is from \_\_\_\_\_\_ to \_\_\_\_\_\_.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *Cell* | *Name* | *Final Value* | *Reduced Cost* | *Objective Coefficient* | *Allowable Increase* | *Allowable Decrease* |
| $D$4 | Kidney Beans | 1.000 | 0.000 | 1.000 | 0.500 | 0.100 |
| $E$4 | Tofu | 3.000 | 0.000 | 1.500 | 0.167 | 0.500 |

a. 0.9 to 1.5

b. 0.1 to 0.5

c. 0.5 to 0.167

d. 20 to 40

Ans: A

Cognitive Domain: Application (Apply)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

65. Consider the portion of the sensitivity analysis report that follows. Decreasing the right-hand constraint *Calcium* by 1 unit (30 to 29) will result in which of the following?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Constraints |  |  |  |  |  |  |
| *Cell* | *Name* | *Final Value* | *Shadow Price* | *Constraint R.H. Side* | *Allowable Increase* | *Allowable Decrease* |
| $H$5 | Calcium | 30 | 0 | 30 | 0 | 1E+30 |
| $H$6 | Protein | 40 | 0.025 | 40 | 20 | 0 |
| $H$7 | Calories | 18 | 0.25 | 18 | 0 | 6 |

a. decrease cost by $0.225

b. does not affect cost

c. increase cost by $0.225

d. increase cost by $0.025

Ans: B

Cognitive Domain: Application (Apply)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

66. Which of the following is NOT a feature common to all linear programming problems?

a. objective function

b. decision variable

c. profitability

d. constraints

Ans: C

Cognitive Domain: Comprehension (Understand)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

67. In an LP problem, changes in resource availability will result in a change of \_\_\_\_\_\_.

a. the objective function

b. the decision variables

c. the feasible solution region

d. the optimal solution

Ans: C

Cognitive Domain: Comprehension (Understand)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

68. Enrobe Textiles, Inc., is a small clothing manufacturer that produces men’s polo shirts and pants. The production manager, Zhang Wei, uses two primary resources: sewing machine hours and cutting machine hours. For next month’s production of shirts and pants, Mr. Wei can schedule up to 300 hours of sewing machine time and up to 240 hours of cutting machine time. Production of each polo shirt requires 3.0 hours of sewing time and 1.0 hour of cutting time. Each pair of pants requires 2.0 hours of sewing time and 2.0 hours of cutting time. Based on the analysis of cost and sales figures, Mr. Wei estimates that each polo shirt will yield a profit of $5, and each pair of pants will generate a profit of $7. Given this scenario, what will be the maximum profits that Enrobe Textiles can achieve?

a. $525

b. $390

c. $450

d. $885

Ans: D

Cognitive Domain: Analysis (Analyze)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

69. Enrobe Textiles, Inc., is a small clothing manufacturer that produces men’s polo shirts and pants. The production manager, Zhang Wei, uses two primary resources: sewing machine hours and cutting machine hours. For next month’s production of shirts and pants, Mr. Wei can schedule up to 300 hours of sewing machine time and up to 240 hours of cutting machine time. Production of each polo shirt requires 3.0 hours of sewing time and 1.0 hour of cutting time. Each pair of pants requires 2.0 hours of sewing time and 2.0 hours of cutting time. Based on the analysis of cost and sales figures, Mr. Wei estimates that each polo shirt will yield a profit of $5, and each pair of pants will generate a profit of $7. Given this scenario, what will be the combination of shirts and pants that will yield maximum profits?

a. 30 pants and 105 shirts

b. 210 pants and 45 shirts

c. 80 pants and 55 shirts

d. 120 pants and 185 shirts

Ans: A

Cognitive Domain: Analysis (Analyze)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

70. In order to fertilize his vegetable farm, John, a farmer, needs to choose from two fertilizers: Nitro Plus and Phosphate Max. Each bag of Nitro Plus costs $7 and contains 8 pounds of nitrogen and 6 pounds of phosphate. Each bag of Phosphate Max costs $9 and contains 4 pounds of nitrogen and 8 pounds of phosphate. John’s vegetable farm requires at least 32 pounds of nitrogen and 48 pounds of phosphate. (Assume fractions of a bag are allowed). At the optimal solution, the total fertilizer costs are \_\_\_\_\_\_.

a. $29.80

b. $54.40

c. $76.25

d. $80.00

Ans: B

Cognitive Domain: Analysis (Analyze)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

71. In order to fertilize his vegetable farm, John, a farmer, needs to choose from two fertilizers: Nitro Plus and Phosphate Max. Each bag of Nitro Plus costs $7 and contains 8 pounds of nitrogen and 6 pounds of phosphate. Each bag of Phosphate Max costs $9 and contains 4 pounds of nitrogen and 8 pounds of phosphate. John’s vegetable farm requires at least 32 pounds of nitrogen and 48 pounds of phosphate. (Assume fractions of a bag are allowed). At the optimal solution, how many bags of Phosphate Max does John use?

a. 3.2 bags

b. 1.6 bags

c. 2.1 bags

d. 4.8 bags

Ans: D

Cognitive Domain: Analysis (Analyze)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

72. In order to fertilize his vegetable farm, John, a farmer, needs to choose from two fertilizers: Nitro Plus and Phosphate Max. Each bag of Nitro Plus costs $7 and contains 8 pounds of nitrogen and 6 pounds of phosphate. Each bag of Phosphate Max costs $9 and contains 4 pounds of nitrogen and 8 pounds of phosphate. John’s vegetable farm requires at least 32 pounds of nitrogen and 48 pounds of phosphate. (Assume fractions of a bag are allowed). At the optimal solution, how many bags of Nitro Plus does John use?

a. 3.2 bags

b. 1.6 bags

c. 2.1 bags

d. 4.8 bags

Ans: B

Cognitive Domain: Analysis (Analyze)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

73. In order to fertilize his vegetable farm, John, a farmer, needs to choose from two fertilizers: Nitro Plus and Phosphate Max. Each bag of Nitro Plus costs $7 and contains 8 pounds of nitrogen and 6 pounds of phosphate. Each bag of Phosphate Max costs $9 and contains 4 pounds of nitrogen and 8 pounds of phosphate. John’s vegetable farm requires at least 32 pounds of nitrogen and 48 pounds of phosphate. (Assume fractions of a bag are allowed). At the optimal solution, what is the cost of Nitro Plus used by John?

a. $12.85

b. $11.20

c. $7.65

d. $16.45

Ans: B

Cognitive Domain: Analysis (Analyze)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

74. In order to fertilize his vegetable farm, John, a farmer, needs to choose from two fertilizers: Nitro Plus and Phosphate Max. Each bag of Nitro Plus costs $7 and contains 8 pounds of nitrogen and 6 pounds of phosphate. Each bag of Phosphate Max costs $9 and contains 4 pounds of nitrogen and 8 pounds of phosphate. John’s vegetable farm requires at least 32 pounds of nitrogen and 48 pounds of phosphate. (Assume fractions of a bag are allowed). At the optimal solution, what is the cost of Phosphate Max used by John?

a. $32.85

b. $43.20

c. $37.65

d. $26.45

Ans: B

Cognitive Domain: Analysis (Analyze)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

75. In order to fertilize his vegetable farm, John, a farmer, needs to choose from two fertilizers: Nitro Plus and Phosphate Max. Each bag of Nitro Plus costs $7 and contains 8 pounds of nitrogen and 6 pounds of phosphate. Each bag of Phosphate Max costs $9 and contains 4 pounds of nitrogen and 8 pounds of phosphate. John’s vegetable farm requires at least 32 pounds of nitrogen and 48 pounds of phosphate. (Assume fractions of a bag are allowed). At the optimal solution, what is the amount of phosphate from the Phosphate Max brand?

a. 23.20

b. 38.40

c. 17.65

d. 15.80

Ans: B

Cognitive Domain: Analysis (Analyze)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

76. In order to fertilize his vegetable farm, John, a farmer, needs to choose from two fertilizers: Nitro Plus and Phosphate Max. Each bag of Nitro Plus costs $7 and contains 8 pounds of nitrogen and 6 pounds of phosphate. Each bag of Phosphate Max costs $9 and contains 4 pounds of nitrogen and 8 pounds of phosphate. John’s vegetable farm requires at least 32 pounds of nitrogen and 48 pounds of phosphate. (Assume fractions of a bag are allowed). At the optimal solution, what is the amount of phosphate from the Nitro Plus brand?

a. 9.60

b. 12.35

c. 17.65

d. 11.55

Ans: A

Cognitive Domain: Analysis (Analyze)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

77. In order to fertilize his vegetable farm, John, a farmer, needs to choose from two fertilizers: Nitro Plus and Phosphate Max. Each bag of Nitro Plus costs $7 and contains 8 pounds of nitrogen and 6 pounds of phosphate. Each bag of Phosphate Max costs $9 and contains 4 pounds of nitrogen and 8 pounds of phosphate. John’s vegetable farm requires at least 32 pounds of nitrogen and 48 pounds of phosphate. (Assume fractions of a bag are allowed). At the optimal solution, what is the amount of nitrogen from the Nitro Plus brand?

a. 11.45

b. 12.80

c. 17.65

d. 11.55

Ans: B

Cognitive Domain: Analysis (Analyze)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

78. In order to fertilize his vegetable farm, John, a farmer, needs to choose from two fertilizers: Nitro Plus and Phosphate Max. Each bag of Nitro Plus costs $7 and contains 8 pounds of nitrogen and 6 pounds of phosphate. Each bag of Phosphate Max costs $9 and contains 4 pounds of nitrogen and 8 pounds of phosphate. John’s vegetable farm requires at least 32 pounds of nitrogen and 48 pounds of phosphate. (Assume fractions of a bag are allowed). At the optimal solution, what is the amount of nitrogen from the Phosphate Max brand?

a. 11.45

b. 19.20

c. 17.65

d. 11.55

Ans: B

Cognitive Domain: Analysis (Analyze)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

79. Diamond Plywood, Inc., manufactures four types of plywood panels. Each product must go through the following operations: patching, grading, gluing, and baking. The time in hours required for each operation for each panel, the total capacity available for each these operations in a given month, as well as the minimum production requirements and the profit contributions per panel are given in the following table. Based on this information, what is the maximum profit that Diamond Plywood can generate?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | *Hours Required* | | | | | *Minimum Production Requirements* |
| Plywood Panel | Patching | Grading | Gluing | Baking | Profit |
| Soft | 0.60 | 1.00 | 1.50 | 1.00 | $8.00 | 120 |
| Hardwood | 1.00 | 2.50 | 4.00 | 2.00 | $12.00 | 150 |
| Tropical | 2.00 | 3.50 | 4.00 | 3.00 | $18.00 | 200 |
| Aircraft | 2.50 | 5.00 | 6.00 | 4.00 | $30.00 | 300 |
| Total Capacity Available in Hours | 2,500 | 3,500 | 5,000 | 4,000 |  |  |

a. $21,800

b. $34,600

c. $18,900

d. $26,400

Ans: A

Cognitive Domain: Analysis (Analyze)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

80. Diamond Plywood, Inc., manufactures four types of plywood panels. Each product must go through the following operations: patching, grading, gluing, and baking. The time in hours required for each operation for each panel, the total capacity available for each these operations in a given month, as well as the minimum production requirements and the profit contributions per panel are given in the following table. Based on this information, at the optimal production point what is the quantity of soft plywood panels that Diamond Plywood will produce?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | *Hours Required* | | | | | *Minimum Production Requirements* |
| Plywood Panel | Patching | Grading | Gluing | Baking | Profit |
| Soft | 0.60 | 1.00 | 1.50 | 1.00 | $8.00 | 120 |
| Hardwood | 1.00 | 2.50 | 4.00 | 2.00 | $12.00 | 150 |
| Tropical | 2.00 | 3.50 | 4.00 | 3.00 | $18.00 | 200 |
| Aircraft | 2.50 | 5.00 | 6.00 | 4.00 | $30.00 | 300 |
| Total Capacity Available in Hours | 2,500 | 3,500 | 5,000 | 4,000 |  |  |

a. 1,050

b. 840

c. 925

d. 780

Ans: C

Cognitive Domain: Analysis (Analyze)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

81. Diamond Plywood, Inc., manufactures four types of plywood panels. Each product must go through the following operations: patching, grading, gluing, and baking. The time in hours required for each operation for each panel, the total capacity available for each these operations in a given month, as well as the minimum production requirements and the profit contributions per panel are given in the following table. Based on this information, at the optimal production point what is the quantity of hardwood plywood panels that Diamond Plywood will produce?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | *Hours Required* | | | | | *Minimum Production Requirements* |
| Plywood Panel | Patching | Grading | Gluing | Baking | Profit |
| Soft | 0.60 | 1.00 | 1.50 | 1.00 | $8.00 | 120 |
| Hardwood | 1.00 | 2.50 | 4.00 | 2.00 | $12.00 | 150 |
| Tropical | 2.00 | 3.50 | 4.00 | 3.00 | $18.00 | 200 |
| Aircraft | 2.50 | 5.00 | 6.00 | 4.00 | $30.00 | 300 |
| Total Capacity Available in Hours | 2,500 | 3,500 | 5,000 | 4,000 |  |  |

a. 1,050

b. 840

c. 925

d. 150

Ans: D

Cognitive Domain: Analysis (Analyze)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

82. Diamond Plywood, Inc., manufactures four types of plywood panels. Each product must go through the following operations: patching, grading, gluing, and baking. The time in hours required for each operation for each panel, the total capacity available for each these operations in a given month, as well as the minimum production requirements and the profit contributions per panel are given in the following table. Based on this information, at the optimal production point what is the quantity of tropical plywood panels that Diamond Plywood will produce?

a. 850

b. 450

c. 350

d. 200

Ans: D

Cognitive Domain: Analysis (Analyze)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

83. Diamond Plywood, Inc., manufactures four types of plywood panels. Each product must go through the following operations: patching, grading, gluing, and baking. The time in hours required for each operation for each panel, the total capacity available for each these operations in a given month, as well as the minimum production requirements and the profit contributions per panel are given in the following table. Based on this information, at the optimal production point what is the quantity of aircraft plywood panels that Diamond Plywood will produce?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | *Hours Required* | | | | | *Minimum Production Requirements* |
| Plywood Panel | Patching | Grading | Gluing | Baking | Profit |
| Soft | 0.60 | 1.00 | 1.50 | 1.00 | $8.00 | 120 |
| Hardwood | 1.00 | 2.50 | 4.00 | 2.00 | $12.00 | 150 |
| Tropical | 2.00 | 3.50 | 4.00 | 3.00 | $18.00 | 200 |
| Aircraft | 2.50 | 5.00 | 6.00 | 4.00 | $30.00 | 300 |
| Total Capacity Available in Hours | 2,500 | 3,500 | 5,000 | 4,000 |  |  |

a. 850

b. 300

c. 350

d. 200

Ans: B

Cognitive Domain: Analysis (Analyze)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

84. Diamond Plywood, Inc., manufactures four types of plywood panels. Each product must go through the following operations: patching, grading, gluing, and baking. The time in hours required for each operation for each panel, the total capacity available for each these operations in a given month, as well as the minimum production requirements and the profit contributions per panel are given in the following table. Based on this information, at the optimal production point what is the profit from soft plywood panels?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | *Hours Required* | | | | | *Minimum Production Requirements* |
| Plywood Panel | Patching | Grading | Gluing | Baking | Profit |
| Soft | 0.60 | 1.00 | 1.50 | 1.00 | $8.00 | 120 |
| Hardwood | 1.00 | 2.50 | 4.00 | 2.00 | $12.00 | 150 |
| Tropical | 2.00 | 3.50 | 4.00 | 3.00 | $18.00 | 200 |
| Aircraft | 2.50 | 5.00 | 6.00 | 4.00 | $30.00 | 300 |
| Total Capacity Available in Hours | 2,500 | 3,500 | 5,000 | 4,000 |  |  |

a. $7,400.00

b. $8,200.00

c. $6,640.00

d. $7,950.00

Ans: A

Cognitive Domain: Analysis (Analyze)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

85. Diamond Plywood, Inc., manufactures four types of plywood panels. Each product must go through the following operations: patching, grading, gluing, and baking. The time in hours required for each operation for each panel, the total capacity available for each these operations in a given month, as well as the minimum production requirements and the profit contributions per panel are given in the following table. Based on this information, at the optimal production point what is the profit from hardwood plywood panels?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | *Hours Required* | | | | | *Minimum Production Requirements* |
| Plywood Panel | Patching | Grading | Gluing | Baking | Profit |
| Soft | 0.60 | 1.00 | 1.50 | 1.00 | $8.00 | 120 |
| Hardwood | 1.00 | 2.50 | 4.00 | 2.00 | $12.00 | 150 |
| Tropical | 2.00 | 3.50 | 4.00 | 3.00 | $18.00 | 200 |
| Aircraft | 2.50 | 5.00 | 6.00 | 4.00 | $30.00 | 300 |
| Total Capacity Available in Hours | 2,500 | 3,500 | 5,000 | 4,000 |  |  |

a. $7,400.00

b. $1,800.00

c. $6,640.00

d. $7,950.00

Ans: B

Cognitive Domain: Analysis (Analyze)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

86. Diamond Plywood, Inc., manufactures four types of plywood panels. Each product must go through the following operations: patching, grading, gluing, and baking. The time in hours required for each operation for each panel, the total capacity available for each these operations in a given month, as well as the minimum production requirements and the profit contributions per panel are given in the following table. Based on this information, at the optimal production point what is the profit from tropical plywood panels?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | *Hours Required* | | | | | *Minimum Production Requirements* |
| Plywood Panel | Patching | Grading | Gluing | Baking | Profit |
| Soft | 0.60 | 1.00 | 1.50 | 1.00 | $8.00 | 120 |
| Hardwood | 1.00 | 2.50 | 4.00 | 2.00 | $12.00 | 150 |
| Tropical | 2.00 | 3.50 | 4.00 | 3.00 | $18.00 | 200 |
| Aircraft | 2.50 | 5.00 | 6.00 | 4.00 | $30.00 | 300 |
| Total Capacity Available in Hours | 2,500 | 3,500 | 5,000 | 4,000 |  |  |

a. $7,400.00

b. $3,600.00

c. $6,640.00

d. $7,950.00

Ans: B

Cognitive Domain: Analysis (Analyze)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

87. Diamond Plywood, Inc., manufactures four types of plywood panels. Each product must go through the following operations: patching, grading, gluing, and baking. The time in hours required for each operation for each panel, the total capacity available for each these operations in a given month, as well as the minimum production requirements and the profit contributions per panel are given in the following table. Based on this information, at the optimal production point what is the profit from aircraft plywood panels?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | *Hours Required* | | | | | *Minimum Production Requirements* |
| Plywood Panel | Patching | Grading | Gluing | Baking | Profit |
| Soft | 0.60 | 1.00 | 1.50 | 1.00 | $8.00 | 120 |
| Hardwood | 1.00 | 2.50 | 4.00 | 2.00 | $12.00 | 150 |
| Tropical | 2.00 | 3.50 | 4.00 | 3.00 | $18.00 | 200 |
| Aircraft | 2.50 | 5.00 | 6.00 | 4.00 | $30.00 | 300 |
| Total Capacity Available in Hours | 2500 | 3500 | 5000 | 4000 |  |  |

a. $9,000.00

b. $3,600.00

c. $6,640.00

d. $7,950.00

Ans: A

Cognitive Domain: Analysis (Analyze)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

88. Diamond Plywood, Inc., manufactures four types of plywood panels. Each product must go through the following operations: patching, grading, gluing, and baking. The time in hours required for each operation for each panel, the total capacity available for each these operations in a given month, as well as the minimum production requirements and the profit contributions per panel are given in the following table. If Diamond Plywood wishes to increase its capacity in one of the four operations, which operation should it be?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | *Hours Required* | | | | | *Minimum Production Requirements* |
| Plywood Panel | Patching | Grading | Gluing | Baking | Profit |
| Soft | 0.60 | 1.00 | 1.50 | 1.00 | $8.00 | 120 |
| Hardwood | 1.00 | 2.50 | 4.00 | 2.00 | $12.00 | 150 |
| Tropical | 2.00 | 3.50 | 4.00 | 3.00 | $18.00 | 200 |
| Aircraft | 2.50 | 5.00 | 6.00 | 4.00 | $30.00 | 300 |
| Total Capacity Available in Hours | 2,500 | 3,500 | 5,000 | 4,000 |  |  |

a. patching

b. grading

c. gluing

d. baking

Ans: B

Cognitive Domain: Analysis (Analyze)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

89. Diamond Plywood, Inc., manufactures four types of plywood panels. Each product must go through the following operations: patching, grading, gluing, and baking. The time in hours required for each operation for each panel, the total capacity available for each these operations in a given month, as well as the minimum production requirements and the profit contributions per panel are given in the following table. If Diamond Plywood wishes to reduce its capacity in one of the four operations, which one should it avoid?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | *Hours Required* | | | | | *Minimum Production Requirements* |
| Plywood Panel | Patching | Grading | Gluing | Baking | Profit |
| Soft | 0.60 | 1.00 | 1.50 | 1.00 | $8.00 | 120 |
| Hardwood | 1.00 | 2.50 | 4.00 | 2.00 | $12.00 | 150 |
| Tropical | 2.00 | 3.50 | 4.00 | 3.00 | $18.00 | 200 |
| Aircraft | 2.50 | 5.00 | 6.00 | 4.00 | $30.00 | 300 |
| Total Capacity Available in Hours | 2,500 | 3,500 | 5,000 | 4,000 |  |  |

a. patching

b. grading

c. gluing

d. baking

Ans: B

Cognitive Domain: Analysis (Analyze)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

90. Maureen, hospital administrator for Trinity Hospital, would like to set up a work schedule for the hospital’s nurses. Each nurse will work for 8 consecutive hours. The minimum number of nurses needed in each of six 4-hour time intervals is shown in the following table. How many nurses will be required to maintain the minimum staffing levels?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Time interval | 00–04 | 04–08 | 08–12 | 12–16 | 16–20 | 20–24 |
| Minimum number of nurses required | 7 | 8 | 22 | 26 | 18 | 12 |

a. 33

b. 29

c. 41

d. 47

Ans: D

Cognitive Domain: Analysis (Analyze)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

91. Maureen, hospital administrator for Trinity Hospital, would like to set up a work schedule for the hospital’s nurses. Each nurse will work for 8 consecutive hours. The minimum number of nurses needed in each of six 4-hour time intervals is shown in the following table. At the optimal staffing level, how many nurses will start their shift at 8 a.m.?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Time interval | 00–04 | 04–08 | 08–12 | 12–16 | 16–20 | 20–24 |
| Minimum number of nurses required | 7 | 8 | 22 | 26 | 18 | 12 |

a. 21

b. 4

c. 12

d. 8

Ans: A

Cognitive Domain: Analysis (Analyze)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

92. Maureen, hospital administrator for Trinity Hospital, would like to set up a work schedule for the hospital’s nurses. Each nurse will work for 8 consecutive hours. The minimum number of nurses needed in each of six 4-hour time intervals is shown in the following table. At the optimal staffing level, what will the maximum number of nurses during any 4-hour interval be?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Time interval | 00–04 | 04–08 | 08–12 | 12–16 | 16–20 | 20–24 |
| Minimum number of nurses required | 7 | 8 | 22 | 26 | 18 | 12 |

a. 27 nurses between 12 noon and 4 p.m.

b. 32 nurses between 4 p.m. and 8 p.m.

c. 21 nurses between 8 a.m. and 12 noon

d. 14 nurses between 4 a.m. and 8 a.m.

Ans: C

Cognitive Domain: Analysis (Analyze)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

93. A school is trying to determine a nutritional diet to feed its students. The school would like to offer some combination of milk and beans. The school’s objective is to minimize cost, subject to meeting the minimum nutritional requirements of protein, calcium, and calories. The cost and nutritional content of each food, along with the minimum nutritional requirements are shown here.

|  |  |  |  |
| --- | --- | --- | --- |
| *Nutrient* | *Kidney Beans* | *Tofu* | *Minimum Daily Requirement* |
| Cost per pound | $0.90 | $1.50 |  |
| Calcium in units per pound | 15 | 6 | 30 |
| Protein in units per pound | 10 | 10 | 40 |
| Calories in units per pound | 3 | 9 | 18 |

At the optimum solution, what is the cost of the nutritional diet?

a. $4.20

b. $3.55

c. $7.30

d. $8.25

Ans: A

Cognitive Domain: Analysis (Analyze)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

94. A school is trying to determine a nutritional diet to feed its students. The school would like to offer some combination of milk and beans. The school’s objective is to minimize cost, subject to meeting the minimum nutritional requirements of protein, calcium, and calories. The cost and nutritional content of each food, along with the minimum nutritional requirements are shown here.

|  |  |  |  |
| --- | --- | --- | --- |
| *Nutrient* | *Kidney Beans* | *Tofu* | *Minimum Daily Requirement* |
| Cost per pound | $0.90 | $1.50 |  |
| Calcium in units per pound | 15 | 6 | 30 |
| Protein in units per pound | 10 | 10 | 40 |
| Calories in units per pound | 3 | 9 | 18 |

At the optimum solution, what is the number of pounds of kidney beans included in the diet?

a. 1

b. 2

c. 3

d. 4

Ans: C

Cognitive Domain: Analysis (Analyze)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

95. A school is trying to determine a nutritional diet to feed its students. The school would like to offer some combination of milk and beans. The school’s objective is to minimize cost, subject to meeting the minimum nutritional requirements of protein, calcium, and calories. The cost and nutritional content of each food, along with the minimum nutritional requirements are shown here.

|  |  |  |  |
| --- | --- | --- | --- |
| *Nutrient* | *Kidney Beans* | *Tofu* | *Minimum Daily Requirement* |
| Cost per pound | $0.90 | $1.50 |  |
| Calcium in units per pound | 15 | 6 | 30 |
| Protein in units per pound | 10 | 10 | 40 |
| Calories in units per pound | 3 | 9 | 18 |

At the optimum solution, what is the number of pounds of tofu included in the diet?

a. 1

b. 2

c. 3

d. 4

Ans: A

Cognitive Domain: Analysis (Analyze)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

96. A school is trying to determine a nutritional diet to feed its students. The school would like to offer some combination of milk and beans. The school’s objective is to minimize cost, subject to meeting the minimum nutritional requirements of protein, calcium, and calories. The cost and nutritional content of each food, along with the minimum nutritional requirements are shown here.

|  |  |  |  |
| --- | --- | --- | --- |
| *Nutrient* | *Kidney Beans* | *Tofu* | *Minimum Daily Requirement* |
| Cost per pound | $0.90 | $1.50 |  |
| Calcium in units per pound | 15 | 6 | 30 |
| Protein in units per pound | 10 | 10 | 40 |
| Calories in units per pound | 3 | 9 | 18 |

At the optimum solution, what is the total number of units of calcium included in the diet?

a. 51

b. 30

c. 43

d. 22

Ans: A

Cognitive Domain: Analysis (Analyze)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

97. A school is trying to determine a nutritional diet to feed its students. The school would like to offer some combination of milk and beans. The school’s objective is to minimize cost, subject to meeting the minimum nutritional requirements of protein, calcium, and calories. The cost and nutritional content of each food, along with the minimum nutritional requirements are shown here.

|  |  |  |  |
| --- | --- | --- | --- |
| *Nutrient* | *Kidney Beans* | *Tofu* | *Minimum Daily Requirement* |
| Cost per pound | $0.90 | $1.50 |  |
| Calcium in units per pound | 15 | 6 | 30 |
| Protein in units per pound | 10 | 10 | 40 |
| Calories in units per pound | 3 | 9 | 18 |

At the optimum solution, what is the total number of units of protein included in the diet?

a. 30

b. 40

c. 51

d. 18

Ans: B

Cognitive Domain: Analysis (Analyze)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

98. A school is trying to determine a nutritional diet to feed its students. The school would like to offer some combination of milk and beans. The school’s objective is to minimize cost, subject to meeting the minimum nutritional requirements of protein, calcium, and calories. The cost and nutritional content of each food, along with the minimum nutritional requirements are shown here.

|  |  |  |  |
| --- | --- | --- | --- |
| *Nutrient* | *Kidney Beans* | *Tofu* | *Minimum Daily Requirement* |
| Cost per pound | $0.90 | $1.50 |  |
| Calcium in units per pound | 15 | 6 | 30 |
| Protein in units per pound | 10 | 10 | 40 |
| Calories in units per pound | 3 | 9 | 18 |

At the optimum solution, which of the following statements is true?

a. The number of calories contributed by tofu is equal to that provided by kidney beans.

b. The number of calories contributed by tofu is less than that provided by kidney beans.

c. The number of calories contributed by tofu is more than that provided by kidney beans.

d. The number of calories contributed by tofu is double that provided by kidney beans.

Ans: A

Cognitive Domain: Analysis (Analyze)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

99. A school is trying to determine a nutritional diet to feed its students. The school would like to offer some combination of milk and beans. The school’s objective is to minimize cost, subject to meeting the minimum nutritional requirements of protein, calcium, and calories. The cost and nutritional content of each food, along with the minimum nutritional requirements are shown here.

|  |  |  |  |
| --- | --- | --- | --- |
| *Nutrient* | *Kidney Beans* | *Tofu* | *Minimum Daily Requirement* |
| Cost per pound | $0.90 | $1.50 |  |
| Calcium in units per pound | 15 | 6 | 30 |
| Protein in units per pound | 10 | 10 | 40 |
| Calories in units per pound | 3 | 9 | 18 |

At the optimum solution, what is the cost of kidney beans in the diet?

a. $3.95

b. $4.22

c. $5.65

d. $2.70

Ans: D

Cognitive Domain: Analysis (Analyze)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)

100. A school is trying to determine a nutritional diet to feed its students. The school would like to offer some combination of milk and beans. The school’s objective is to minimize cost, subject to meeting the minimum nutritional requirements of protein, calcium, and calories. The cost and nutritional content of each food, along with the minimum nutritional requirements are shown here.

|  |  |  |  |
| --- | --- | --- | --- |
| *Nutrient* | *Kidney Beans* | *Tofu* | *Minimum Daily Requirement* |
| Cost per pound | $0.90 | $1.50 |  |
| Calcium in units per pound | 15 | 6 | 30 |
| Protein in units per pound | 10 | 10 | 40 |
| Calories in units per pound | 3 | 9 | 18 |

At the optimum solution, what is the cost of tofu in the diet?

a. $0.95

b. $1.22

c. $2.65

d. $1.50

Ans: D

Cognitive Domain: Analysis (Analyze)

Learning Objective: A-4. Apply LP to other problems, including product mixture, blending, and personnel scheduling situations.

Answer Location: Additional Linear Programming Models

Difficulty Level: Medium

AACSB: Application of knowledge (able to translate knowledge of business and management into practice)