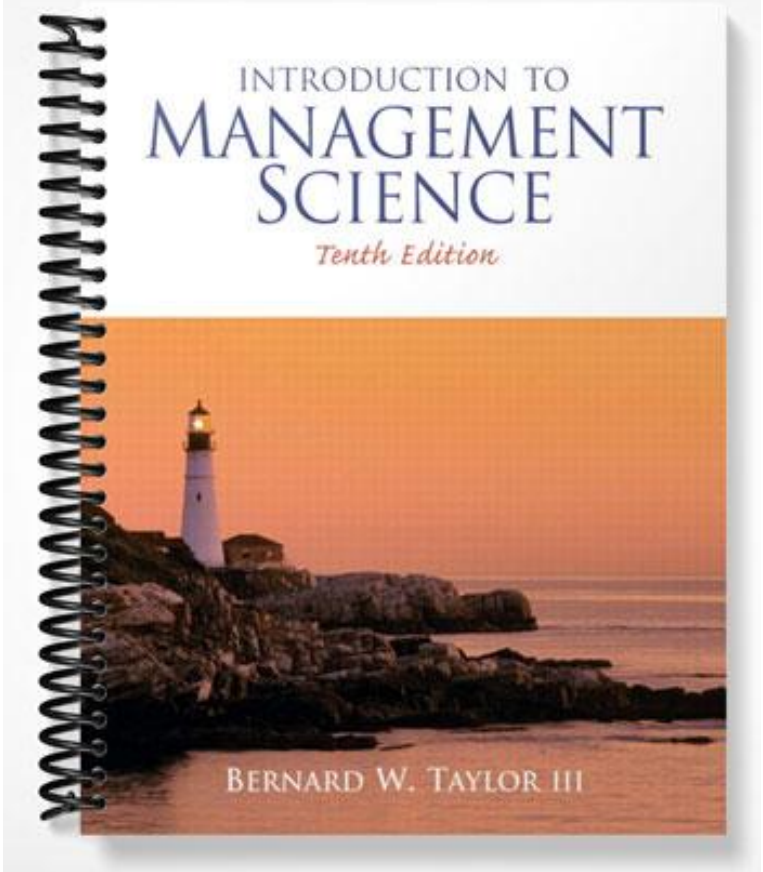
TEST BANK


INTRODUCTION TO
MANAGEMENT
SCIENCE
Tenth Edition
BERNARD W. TAYLOR III

Introduction to Management Science, 10e **(Taylor)**
Chapter 2 Linear Programming: Model Formulation and Graphical Solution

1) Linear programming is a model consisting of linear relationships representing a firm's decisions given an objective and resource constraints.
Answer: TRUE
Diff: 2 Page Ref: 30
Main Heading: Model Formulation
Key words: model formulation

2) The objective function is a linear relationship reflecting the objective of an operation.
Answer: TRUE
Diff: 1 Page Ref: 30
Main Heading: Model Formulation
Key words: model formulation

3) A constraint is a linear relationship representing a restriction on decision making.
Answer: TRUE
Diff: 1 Page Ref: 30
Main Heading: Model Formulation
Key words: model formulation

4) A linear programming model consists of only decision variables and constraints.
Answer: FALSE
Diff: 1 Page Ref: 55
Main Heading: Model Formulation
Key words: model formulation

5) A feasible solution violates at least one of the constraints.
Answer: FALSE
Diff: 2 Page Ref: 54
Main Heading: Model Formulation
Key words: model formulation

6) Proportionality means the slope of a constraint is proportional to the slope of the objective function.
Answer: FALSE
Diff: 2 Page Ref: 56
Main Heading: Properties of Linear Programming Models
Key words: properties of linear programming models, proportionality

7) The terms in the objective function or constraints are additive.
Answer: TRUE
Diff: 2 Page Ref: 56
Main Heading: Properties of Linear Programming Models
Key words: properties of linear programming models, additive

8) The terms in the objective function or constraints are multiplicative.
Answer: FALSE
Diff: 2 Page Ref: 56
Main Heading: Properties of Linear Programming Models
Key words: properties of linear programming models, additive

9) The values of decision variables are continuous or divisible.
Answer: TRUE
Diff: 2 Page Ref: 56
Main Heading: Properties of Linear Programming Models
Key words: properties of linear programming models, divisible

10) All model parameters are assumed to be known with certainty.
Answer: TRUE
Diff: 2 Page Ref: 30
Main Heading: Properties of Linear Programming Models
Key words: properties of linear programming models

11) In linear programming models , objective functions can only be maximized.
Answer: FALSE
Diff: 1 Page Ref: 30
Main Heading: Properties of Linear Programming Models
Key words: properties of linear programming models, objective function

12) All linear programming models exhibit a set of constraints.
Answer: TRUE
Diff: 1 Page Ref: 30
Main Heading: Properties of Linear Programming Models
Key words: properties of linear programming models, constraints

13) Linear programming models exhibit linearity among all constraint relationships and the objective function.
Answer: TRUE
Diff: 1 Page Ref: 55
Main Heading: Properties of Linear Programming Models
Key words: properties of linear prog models, linearity, proportionality

14) The equation $8xy = 32$ satisfies the proportionality property of linear programming.
Answer: FALSE
Diff: 2 Page Ref: 55
Main Heading: Properties of Linear Programming Models
Key words: graphical solution, proportionality

15) Objective functions in linear programs always minimize costs.
Answer: FALSE
Diff: 2 Page Ref: 30
Main Heading: Properties of Linear Programming Models
Key words: properties of linear programming models, objective function

16) The feasible solution area contains infinite solutions to the linear program.
Answer: TRUE
Diff: 1 Page Ref: 38
Main Heading: Properties of Linear Programming Models
Key words: properties of linear programming models, feasible solution area

17) There is exactly one optimal solution point to a linear program.
Answer: FALSE
Diff: 2 Page Ref: 53
Main Heading: Properties of Linear Programming Models
Key words: properties of linear programming models, optimal solution pt

18) The following equation represents a resource constraint for a maximization problem: $X + Y \geq 20$
Answer: FALSE
Diff: 2 Page Ref: 30-34
Main Heading: Properties of Linear Programming Models
Key words: properties of linear programming models, constraints

19) A minimization model of a linear program contains only surplus variables.
Answer: FALSE
Diff: 1 Page Ref: 47-53
Main Heading: Properties of Linear Programming Models
Key words: properties of linear programming models, surplus variables

20) In the graphical approach, simultaneous equations may be used to solve for the optimal solution point.
Answer: TRUE
Diff: 2 Page Ref: 34
Main Heading: Graphical Solutions of Linear Programming Models
Key words: graphical solution

21) Slack variables are only associated with maximization problems.
Answer: FALSE
Diff: 2 Page Ref: 44
Main Heading: Graphical Solutions of Linear Programming Models
Key words: graphical solution, slack variables

22) Surplus variables are only associated with minimization problems.
Answer: FALSE
Diff: 2 Page Ref: 52
Main Heading: Graphical Solutions of Linear Programming Models
Key words: graphical solution, surplus variable

23) If the objective function is parallel to a constraint, the constraint is infeasible.
Answer: FALSE
Diff: 2 Page Ref: 53
Main Heading: Graphical Solutions of Linear Programming Models
Key words: graphical solution

24) Multiple optimal solutions occur when constraints are parallel to each other.
Answer: FALSE
Diff: 2 Page Ref: 53
Main Heading: Graphical Solutions of Linear Programming Models
Key words: graphical solution

25) Graphical solutions to linear programming problems have an infinite number of possible objective function lines.
Answer: TRUE
Diff: 2 Page Ref: 34
Main Heading: Graphical Solutions of Linear Programming Models
Key words: graphical solution, objective function line

26) The first step in formulating a linear programming model is to define the objective function.
Answer: FALSE
Diff: 2 Page Ref: 32
Main Heading: Management Science Modeling Techniques
Key words: linear programming problems, formulation

27) _____ are mathematical symbols representing levels of activity.
Answer: Decision variables
Diff: 1 Page Ref: 30
Main Heading: Model Formulation
Key words: decision variables, model formulation

28) The _____ is a linear relationship reflecting the objective of an operation.
Answer: objective function
Diff: 1 Page Ref: 30
Main Heading: Model Formulation
Key words: objective function, model formulation

29) A _____ is a linear relationship representing a restriction on decision making.
Answer: constraint
Diff: 1 Page Ref: 30
Main Heading: Model Formulation
Key words: constraint, model formulation

30) If at least one constraint in a linear programming model is violated the solution is said to be _____.
Answer: infeasible
Diff: 1 Page Ref: 54
Main Heading: Model Formulation
Key words: constraint, infeasible solution

31) A graphical solution is limited to solving linear programming problems with _____ decision variables
Answer: two
Diff: 1 Page Ref: 34
Main Heading: Graphical Solutions of Linear Programming Models
Key words: graphical solution

32) The _____ solution area is an area bounded by the constraint equations.
Answer: feasible
Diff: 1 Page Ref: 38
Main Heading: Graphical Solutions of Linear Programming Models
Key words: graphical solution

33) Multiple optimal solutions can occur when the objective function line is _____ to a constraint line.
Answer: parallel
Diff: 2 Page Ref: 44
Main Heading: Graphical Solutions of Linear Programming Models
Key words: graphical solution, multiple optimal solutions

34) When a maximization problem is _____, the objective function can increase indefinitely without reaching a maximum value.
Answer: unbounded
Diff: 2 Page Ref: 55
Main Heading: Graphical Solutions of Linear Programming Models
Key words: graphical solution, unbounded problem

35) A linear programming problem that results in a solution that is _____ usually indicates that the linear program has been incorrectly formulated.
Answer: infeasible
Diff: 2 Page Ref: 54
Main Heading: Graphical Solutions of Linear Programming Models
Key words: graphical solution, infeasible solution

36) In a constraint the _____ variable represents unused resources.
Answer: slack
Diff: 1 Page Ref: 44
Main Heading: Graphical Solutions of Linear Programming Models
Key words: graphical solution, surplus variable

37) If the objective function is parallel to a constraint, the linear program could have _____.
Answer: multiple optimal solutions
Diff: 2 Page Ref: 44
Main Heading: Graphical Solutions of Linear Programming Models
Key words: graphical solutions, multiple optimal solutions

38) Corner points on the boundary of the feasible solution area are called _____ points.
Answer: extreme
Diff: 1 Page Ref: 41
Main Heading: Graphical Solutions of Linear Programming Models
Key words: feasibility, constraints

39) The _____ step in formulating a linear programming model is to define the decision variables.
Answer: first
Diff: 1 Page Ref: 32
Main Heading: Management Science Modeling Techniques
Key words: linear programming, formulation

40) The _____ property of linear programming models indicates that the values of all the model parameters are known and are assumed to be constant.
Answer: certainty
Diff: 2 Page Ref: 56
Main Heading: Characteristics of Linear Programming Problems
Key words: properties of linear programming models, certainty

41) The _____ property of linear programming models indicates that the rate of change or slope of the objective function or a constraint is constant.
Answer: proportionality or linearity
Diff: 2 Page Ref: 56
Main Heading: Characteristics of Linear Programming Problems
Key words: properties of linear programming models, certainty

42) The _____ property of linear programming models indicates that the decision variables cannot be restricted to integer values and can take on any fractional value.
Answer: divisibility
Diff: 2 Page Ref: 56
Main Heading: Characteristics of Linear Programming Problems
Key words: properties of linear programming models, divisibility

43) The constraint, 2X +XY violates the _____ property of linear programming.
Answer: proportionality or linear
Diff: 1 Page Ref: 56
Main Heading: Characteristics of Linear Programming Problems
Key words: properties of linear programming models

44) Consider the following minimization problem:

$$\begin{aligned} \text{Min } z = \quad & x_1 + 2x_2 \\ \text{s.t.} \quad & x_1 + x_2 \geq 300 \\ & 2x_1 + x_2 \geq 400 \\ & 2x_1 + 5x_2 \leq 750 \\ & x_1, x_2 \geq 0 \end{aligned}$$

What is the optimal solution?
Answer: x1 = 250, x2 = 50 and z = 350
Diff: 3 Page Ref: 47-53
Main Heading: Graphical Solutions of Linear Programming Models
Key words: graphical solution, simultaneous solution

45) Consider the following minimization problem:

Min z = $x_1 + 2x_2$

s.t. $x_1 + x_2 \geq 300$

$2x_1 + x_2 \geq 400$

$2x_1 + 5x_2 \leq 750$

$x_1, x_2 \geq 0$

Which constraints are binding at the optimal solution? (x_1 =250, x_2 = 50)

Answer: constraints 1 and 3

Diff: 1 Page Ref: 47-53

Main Heading: Graphical Solutions of Linear Programming Models

Key words: graphical solution, simultaneous solution

46) Solve the following graphically

Max z = $3x_1 + 4x_2$

s.t. $x_1 + 2x_2 \leq 16$

$2x_1 + 3x_2 \leq 18$

$x_1 \geq 2$

$x_2 \leq 10$

$x_1, x_2 \geq 0$

What are the optimal values of x_1, x_2, and z?

Answer: $x_1 = 9$, $x_2 = 0$, z = 27

Diff: 3 Page Ref: 34

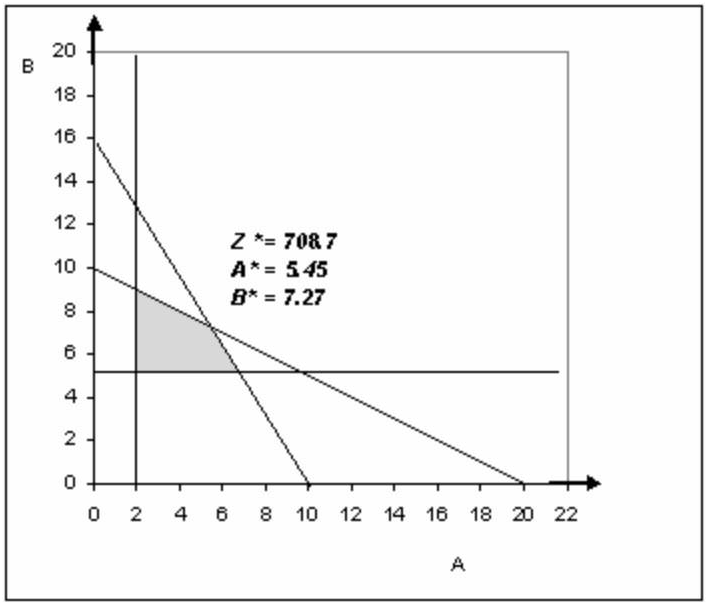
Main Heading: Graphical Solutions of Linear Programming Models

Key words: graphical solution, simultaneous solution

47) Consider the following linear program:

MAX $Z = 60A + 50B$
s.t. $10A + 20B \leq 200$
$8A + 5B \leq 80$
$A \geq 2$
$B \geq 5$

Solve this linear program graphically and determine the optimal quantities of A, B, and the value of Z.
Answer: Solution shown below.



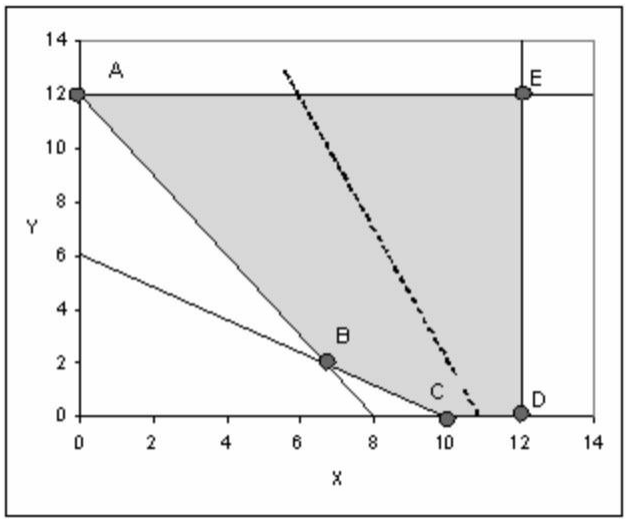
Diff: 2 Page Ref: 34
Main Heading: Graphical Solutions of Linear Programming Models
Key words: graphical linear programming

48) Consider the following linear program:

MIN $Z = 60A + 50B$
s.t. $10A + 20B \leq 200$
$8A + 5B \leq 80$
$A \geq 2$
$B \geq 5$

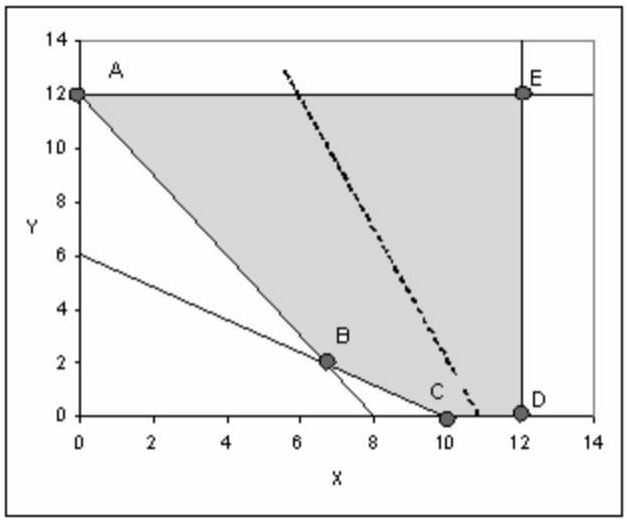
Solve this linear program graphically and determine the optimal quantities of A, B, and the value of Z.
Answer: A = 2, B = 5, Z = 370
Diff: 2 Page Ref: 47-53
Main Heading: Graphical Solutions of Linear Programming Models
Key words: graphical linear programming

49) A graphical representation of a linear program is shown below. The shaded area represents the feasible region, and the dashed line in the middle is the slope of the objective function.



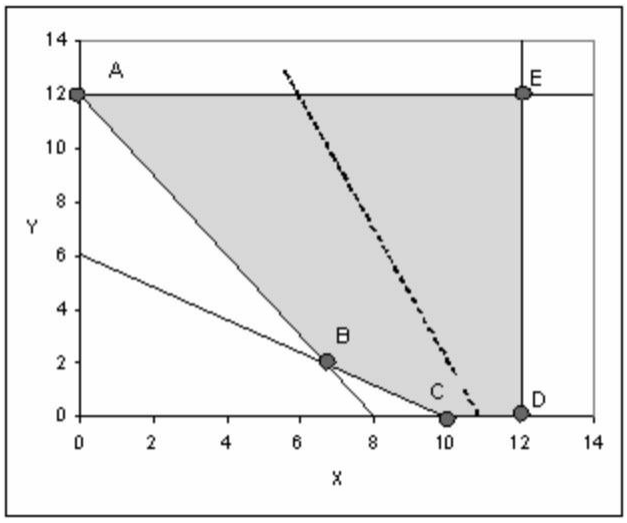
If this is a maximization, which extreme point is the optimal solution?
Answer: E
Diff: 1 Page Ref: 34
Main Heading: Graphical Solutions of Linear Programming Models
Key words: graphical solution, extreme points, feasible region

50) A graphical representation of a linear program is shown below. The shaded area represents the feasible region, and the dashed line in the middle is the slope of the objective function.



If this is a minimization, which extreme point is the optimal solution?
Answer: A
Diff: 2 Page Ref: 34
Main Heading: Graphical Solutions of Linear Programming Models
Key words: graphical solution, extreme points, feasible region

51) A graphical representation of a linear program is shown below. The shaded area represents the feasible region, and the dashed line in the middle is the slope of the objective function.



What would the be the new slope of the objective function if multiple optimal solutions occurred along line segment AB?
Answer: -3/2
Diff: 2 Page Ref: 44
Main Heading: Graphical Solutions of Linear Programming Models
Key words: graphical solution, multiple optimal solutions

52) Consider the following linear programming problem:
Max Z = $15x + $20y
Subject to: $8x + 5y \leq 40$
$0.4x + y \geq 4$
$x, y \geq 0$
Determine the values for x and y that will maximize revenue. Given this optimal revenue, what is the amount of slack associated with the first constraint?
Answer: x = 0, y = 8, revenue = $160, $s_1 = 0$
Diff: 2 Page Ref: 34
Main Heading: Slack Variables
Key words: graphical solution, slack variables

53) Max Z = $3x + $9y
Subject to: $20x + 32y \leq 1600$
$4x + 2y \leq 240$
$y \leq 40$
$x, y \geq 0$
Solve for the quantities of x and y which will maximize Z. What is the value of the slack variable associated with constraint 2?
Answer: x = 16, y = 40,z=$408 and slack (s2) = 96
Diff: 2 Page Ref: 34
Main Heading: Slack Variables
Key words: graphical solution, slack variables

54) Max Z = $5x_1 + 3x_2$
Subject to: $6x_1 + 2x_2 \leq 18$
$15x_1 + 20x_2 \leq 60$
$x_1 , x_2 \geq 0$
Find the optimal profit and the values of x_1 and x_2 at the optimal solution.
Answer: Z = 16.333 x_1 = 2.6667, x_2 = 1.0
Diff: 2 Page Ref: 34
Main Heading: Slack Variables
Key words: graphical solution

55) Max Z = $3x_1 + 3x_2$
Subject to: $10x_1 + 4x_2 \leq 60$
$25x_1 + 50x_2 \leq 200$
$x_1 , x_2 \geq 0$
Find the optimal profit and the values of x_1 and x_2 at the optimal solution.
Answer: Z = 20.25, x_1 = 5.5, x_2 = 1.25
Diff: 2 Page Ref: 34
Main Heading: Slack Variables
Key words: graphical solution

56) Consider the following linear programming problem:

MIN Z = $10x_1 + 20x_2$

Subject to: $x_1 + x_2 \geq 12$

$2x_1 + 5x_2 \geq 40$

$x_2 \geq 13$

$x_1 , x_2 \geq 0$

What is minimum cost and the value of x_1 and x_2 at the optimal solution?

Answer: Z = 173.333, x_1 = 6.667, x_2 = 5.333

Diff: 2 Page Ref: 47-53

Main Heading: A Minimization Model Example

Key words: graphical solution

57) Consider the following linear programming problem:

MIN Z = $10x_1 + 20x_2$

Subject to: $x_1 + x_2 \geq 12$

$2x_1 + 5x_2 \geq 40$

$x_2 \geq 13$

$x_1 , x_2 \geq 0$

At the optimal solution, what is the value of surplus and slack associated with constraint 1 and constraint 3 respectively?

Answer: constraint 1: (0 surplus), constraint 2: (7.667 slack)

Diff: 2 Page Ref: 47-53

Main Heading: A Minimization Model Example

Key words: graphical solution

58) Consider the following linear programming problem:

MIN Z = $2x_1 + 3x_2$

Subject to: $x_1 + 2x_2 \leq 20$

$5x_1 + x_2 \leq 40$

$4x1 + 6x_2 \leq 60$

$x_1 , x_2 \geq 0$

What is the optimal solution?

Answer: Multiple optimal solutions exist between the extreme point (0,10) and (6.92,5.38) along the line with a slope of - 2/3.

Diff: 2 Page Ref: 47-53

Main Heading: Linear Programming Models

Key words: graphical solution, multiple optimal solutions

59) A company producing a standard line and a deluxe line of dishwashers has the following time requirements (in minutes) in departments where either model can be processed.

	Standard	Deluxe
Stamping	3	6
Motor installation	10	10
Wiring	10	15

The standard models contribute $20 each and the deluxe $30 each to profits. Because the company produces other items that share resources used to make the dishwashers, the stamping machine is available only 30 minutes per hour, on average. The motor installation production line has 60 minutes available each hour. There are two lines for wiring, so the time availability is 90 minutes per hour.

Let x = number of standard dishwashers produced per hour
y = number of deluxe dishwashers produced per hour

Write the formulation for this linear program:
Answer: Max $20x + 30y$
s.t $3x + 6y \leq 30$
$10x + 10y \leq 60$
$10x + 15y \leq 90$
Diff: 2 Page Ref: 34
Main Heading: A Maximization Model Example
Key words: formulation, objective function, constraints

60) In a linear programming problem, the binding constraints for the optimal solution are:
$5x_1 + 3x_2 \leq 30$
$2x_1 + 5x_2 \leq 20$
As long as the slope of the objective function stays between _____ and _____, the current optimal solution point will remain optimal.
Answer: -5/3 and -2/5
Diff: 3 Page Ref: 44
Main Heading: Irregular Types of Linear Programming Problems
Key words: optimal solution, solution interpretation, slope

61) In a linear programming problem, the binding constraints for the optimal solution are:

$5x_1 + 3x_2 \leq 30$

$2x_1 + 5x_2 \leq 20$

Which of these objective functions will lead to the same optimal solution?

a. $2x_1 + 1x_2$

b. $7x_1 + 8x_2$

c. $80x_1 + 60x_2$

d. $25x_1 + 15x_2$

Answer: d
Diff: 3 Page Ref: 44
Main Heading: Irregular Types of Linear Programming Problems
Key words: optimal solution, solution interpretation, slope

62) Decision variables
A) measure the objective function
B) measure how much or how many items to produce, purchase, hire, etc.
C) always exist for each constraint
D) measure the values of each constraint
Answer: B
Diff: 2 Page Ref: 30
Main Heading: A Maximization Model Example
Key words: decision variables

63) In a linear programming problem, a valid objective function can be represented as
A) Max Z = 5xy
B) Max Z $5x^2 + 2y^2$
C) Max 3x + 3y + 1/3z
D) Min (x1 + x2) / x3
Answer: C
Diff: 3 Page Ref: 30
Main Heading: A Maximization Model Example
Key words: objective function

64) Which of the following could not be a linear programming problem constraint?
A) $1A + 2B \neq 3$
B) $1A + 2B = 3$
C) $1A + 2B \leq 3$
D) $1A + 2B \geq 3$
Answer: A
Diff: 2 Page Ref: 30
Main Heading: A Maximization Model Example
Key words: formulation, constraint

65) A linear programming model consists of
A) decision variables
B) an objective function
C) constraints
D) all of the above
Answer: D
Diff: 1 Page Ref: 30
Main Heading: A Maximization Model Example
Key words: components of linear programming

66) The minimization of cost or maximization of profit is the
A) objective of a business
B) constraint of operations management
C) goal of management science
D) objective of linear programming
E) both A and D
Answer: E
Diff: 1 Page Ref: 30
Main Heading: A Maximization Model Example
Key words: objective, cost minimization, profit maximization

67) Which of the following could be a linear programming objective function?
A) $Z = 1A + 2BC + 3D$
B) $Z = 1A + 2B + 3C + 4D$
C) $Z = 1A + 2B / C + 3D$
D) $Z = 1A + 2B^2 + 3D$
E) all of the above
Answer: B
Diff: 2 Page Ref: 56
Main Heading: A Maximization Model Example
Key words: objective function

68) The production manager for the Coory soft drink company is considering the production of 2 kinds of soft drinks: regular (R) and diet (D). Two of her limited resources are production time (8 hours = 480 minutes per day) and syrup (1 of her ingredients) limited to 675 gallons per day. To produce a regular case requires 2 minutes and 5 gallons of syrup, while a diet case needs 4 minutes and 3 gallons of syrup. Profits for regular soft drink are $3.00 per case and profits for diet soft drink are $2.00 per case. What is the objective function?
A) MAX $2R + $4D
B) MAX $3R + $2D
C) MAX $3D + $2R
D) MAX $4D + $2R
E) MAX $4R + $2D
Answer: B
Diff: 2 Page Ref: 30
Main Heading: A Maximization Model Example
Key words: formulation, objective function

69) The production manager for the Coory soft drink company is considering the production of 2 kinds of soft drinks: regular (R) and diet(D). Two of the limited resources are production time (8 hours = 480 minutes per day) and syrup limited to 675 gallons per day. To produce a regular case requires 2 minutes and 5 gallons of syrup, while a diet case needs 4 minutes and 3 gallons of syrup. Profits for regular soft drink are $3.00 per case and profits for diet soft drink are $2.00 per case. What is the time constraint?
A) $2R + 5D \leq 480$
B) $2D + 4R \leq 480$
C) $2R + 3D \leq 480$
D) $3R + 2D \leq 480$
E) $2R + 4D \leq 480$
Answer: E
Diff: 2 Page Ref: 32
Main Heading: A Maximization Model Example
Key words: formulation, constraint

70) Non-negativity constraints
A) restrict the decision variables to zero.
B) restrict the decision variables to positive values
C) restrict the decision variables to negative values
D) do not restrict the sign of the decision variable.
E) both A and B
Answer: E
Diff: 2 Page Ref: 33
Main Heading: A Maximization Model Example
Key words: constraints

71) Cully furniture buys 2 products for resale: big shelves (B) and medium shelves (M). Each big shelf costs $500 and requires 100 cubic feet of storage space, and each medium shelf costs $300 and requires 90 cubic feet of storage space. The company has $75000 to invest in shelves this week, and the warehouse has 18000 cubic feet available for storage. Profit for each big shelf is $300 and for each medium shelf is $150. What is the objective function?
A) MAX Z = $300B + $100 M
B) MAX Z = $300M + $150 B
C) MAX Z = $300B + $150 M
D) MAX Z = $300B + $500 M
E) MAX Z = $500B + $300 M
Answer: C
Diff: 2 Page Ref: 32
Main Heading: A Maximization Model Example
Key words: formulation, objective function

72) Cully furniture buys 2 products for resale: big shelves (B) and medium shelves (M). Each big shelf costs $500 and requires 100 cubic feet of storage space, and each medium shelf costs $300 and requires 90 cubic feet of storage space. The company has $75000 to invest in shelves this week, and the warehouse has 18000 cubic feet available for storage. Profit for each big shelf is $300 and for each medium shelf is $150. What is the storage space constraint?
A) $90B + 100M \geq 18000$
B) $90B + 100M \leq 18000$
C) $100B + 90M \leq 18000$
D) $500B + 300M \leq 18000$
E) $300B + 500M \leq 18000$
Answer: C
Diff: 2 Page Ref: 32
Main Heading: A Maximization Model Example
Key words: formulation, constraint

73) The _____ property of linear programming models indicates that the decision variables cannot be restricted to integer values and can take on any fractional value.
A) linearity
B) additive
C) divisibility
D) certainty
E) proportionality
Answer: C
Diff: 2 Page Ref: 56
Main Heading: Graphical Solutions of Linear Programming Models
Key words: properties of linear programming models

74) The _____ property of linear programming models indicates that the rate of change or slope of the objective function or a constraint is constant.
A) additive
B) divisibility
C) certainty
D) proportionality
E) feasibility
Answer: D
Diff: 2 Page Ref: 56
Main Heading: Graphical Solutions of Linear Programming Models
Key words: properties of linear programming models

75) The _____ property of linear programming models indicates that the values of all the model parameters are known and are assumed to be constant.
A) additive
B) divisibility
C) certainty
D) proportionality
Answer: D
Diff: 2 Page Ref: 56
Main Heading: Graphical Solutions of Linear Programming Models
Key words: properties of linear programming models

76) The region which satisfies all of the constraints in a graphical linear programming problem is called the
A) region of optimality
B) feasible solution space
C) region of non-negativity
D) optimal solution space
Answer: B
Diff: 1 Page Ref: 33
Main Heading: Graphical Solutions of Linear Programming Models
Key words: graphical solution, feasibility

77) Which of the following statements is not true?
A) An infeasible solution violates all constraints.
B) A feasible solution point does not have to lie on the boundary of the feasible solution.
C) A feasible solution satisfies all constraints.
D) An optimal solution satisfies all constraints.
Answer: A
Diff: 2 Page Ref: 54
Main Heading: Graphical Solutions of Linear Programming Models
Key words: graphical solution, feasibility

78) Except satisfying the non-negativity constraint, a solution that satisfies all the other constraints of a linear programming problem is called
A) feasible
B) infeasible
C) semi-feasible
D) optimal
Answer: B
Diff: 3 Page Ref: 54
Main Heading: Graphical Solutions of Linear Programming Models
Key words: graphical solution, feasibility

79) The production manager for the Coory soft drink company is considering the production of 2 kinds of soft drinks: regular and diet. Two of her limited resources are production time (8 hours = 480 minutes per day) and syrup (1 of her ingredients) limited to 675 gallons per day. To produce a regular case requires 2 minutes and 5 gallons of syrup, while a diet case needs 4 minutes and 3 gallons of syrup. Profits for regular soft drink are $3.00 per case and profits for diet soft drink are $2.00 per case. Which of the following is not a feasible production combination?
A) 90R and 75D
B) 135R and 0D
C) 0R and 120D
D) 75R and 90D
E) 40R and 100D
Answer: D
Diff: 3 Page Ref: 54
Main Heading: Graphical Solutions of Linear Programming Models
Key words: graphical solution, feasibility

80) The production manager for the Coory soft drink company is considering the production of 2 kinds of soft drinks: regular and diet. Two of her limited resources are production time (8 hours = 480 minutes per day) and syrup (1 of her ingredients) limited to 675 gallons per day. To produce a regular case requires 2 minutes and 5 gallons of syrup, while a diet case needs 4 minutes and 3 gallons of syrup. Profits for regular soft drink are $3.00 per case and profits for diet soft drink are $2.00 per case. What are the optimal daily production quantities of each product and the optimal daily profit?
A) R = 75, D = 90, Z = $405
B) R = 135, D = 0, Z = $405
C) R = 0, D= 120, Z = $360
D) R = 90, D = 75, Z = $420
E) R = 40, D= 100, Z = $320
Answer: D
Diff: 3 Page Ref: 34
Main Heading: Graphical Solutions of Linear Programming Models
Key words: graphical solution

81) _____ is used to analyze changes in model parameters.
A) Optimal solution
B) Feasible solution
C) Sensitivity analysis
D) none of the above
Answer: C
Diff: 2 Page Ref: 44
Main Heading: Graphical Solutions of Linear Programming Models
Key words: sensitivity analysis

82) Cully furniture buys 2 products for resale: big shelves (B)and medium shelves (M).Each big shelf costs $500 and requires 100 cubic feet of storage space, and each medium shelf costs $300 and requires 90 cubic feet of storage space. The company has $75000 to invest in shelves this week, and the warehouse has 18000 cubic feet available for storage. Profit for each big shelf is $300 and for each medium shelf is $150. Which of the following is not a feasible purchase combination?
A) 0 big shelves and 200 medium shelves
B) 100 big shelves and 82 medium shelves
C) 150 big shelves and 0 medium shelves
D) 100 big shelves and 100 medium shelves
E) 100 big shelves and 0 medium shelves
Answer: D
Diff: 3 Page Ref: 54
Main Heading: Graphical Solutions of Linear Programming Models
Key words: formulation, feasibility

83) Cully furniture buys 2 products for resale: big shelves (B) and medium shelves (M). Each big shelf costs $500 and requires 100 cubic feet of storage space, and each medium shelf costs $300 and requires 90 cubic feet of storage space. The company has $75000 to invest in shelves this week, and the warehouse has 18000 cubic feet available for storage. Profit for each big shelf is $300 and for each medium shelf is $150. What is the maximum profit?
A) $25000
B) $35000
C) $45000
D) $55000
E) $65000
Answer: C
Diff: 3 Page Ref: 34
Main Heading: Graphical Solutions of Linear Programming Models
Key words: graphical solution

84) Cully furniture buys 2 products for resale: big shelves (B) and medium shelves (M). Each big shelf costs $500 and requires 100 cubic feet of storage space, and each medium shelf costs $300 and requires 90 cubic feet of storage space. The company has $75000 to invest in shelves this week, and the warehouse has 18000 cubic feet available for storage. Profit for each big shelf is $300 and for each medium shelf is $150. In order to maximize profit, how many big shelves (B) and how many medium shelves (M) should be purchased?
A) B = 90, M = 75
B) B = 135, M = 15
C) B = 150, M = 0
D) B = 0, M = 200
E) B = 100, M = 100
Answer: C
Diff: 3 Page Ref: 34
Main Heading: Graphical Solutions of Linear Programming Models
Key words: graphical solution

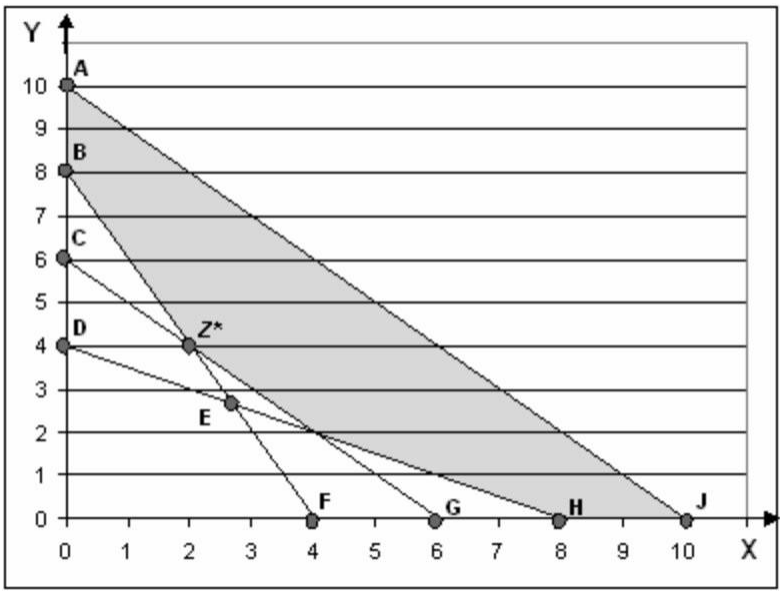
85) The theoretical limit on the number of constraints that can be handled by a linear programming problem is
A) 2
B) 3
C) 4
D) unlimited
Answer: D
Diff: 1 Page Ref: 30
Main Heading: Graphical Solutions of Linear Programming Models
Key words: constraints

86) Consider the following maximization problem.

$$\begin{aligned} \text{MAX } z &= x + 2y \\ \text{s.t.} \quad & 2x + 3y \leq 6 \\ & 5x + 6y \leq 30 \\ & y \geq 1 \end{aligned}$$

The optimal solution
A) cannot be determined
B) occurs where x = 4.67 and y = 1.11
C) occurs where x = 0 and y = 5
D) occurs where x = 6 and y = 0
E) results in an objective function value of 12
Answer: C
Diff: 1 Page Ref: 34
Main Heading: Graphical Solutions of Linear Programming Models
Key words: graphical solution, extreme points, feasible region

The following is a graph of a linear programming problem. The feasible solution space is shaded, and the optimal solution is at the point labeled *Z**.



87) This linear programming problem is a:
A) maximization problem
B) minimization problem
C) irregular problem
D) cannot tell from the information given
Answer: B
Diff: 1 Page Ref: 47
Main Heading: Graphical Solutions of Linear Programming Models
Key words: graphical solution

88) The equation for constraint DH is:
A) $4X + 8Y \geq 32$
B) $8X + 4Y \geq 32$
C) $X + 2Y \geq 8$
D) $2X + Y \geq 8$
E) None of the above
Answer: C
Diff: 3 Page Ref: 36
Main Heading: Graphical Solutions of Linear Programming Models
Key words: graphical solution, constraints

89) Which of the following points are not feasible?
A) A
B) J
C) H
D) G
E) B
Answer: D
Diff: 1 Page Ref: 54
Main Heading: Graphical Solutions of Linear Programming Models
Key words: graphical solution, feasible point

90) Which line is represented by the equation $2X + Y \geq 8$?
A) BF
B) CG
C) DH
D) AJ
Answer: A
Diff: 2 Page Ref: 36
Main Heading: Graphical Solutions of Linear Programming Models
Key words: graphical solution, constraints

91) Which of the following constraints has a surplus greater than 0?
A) BF
B) CG
C) DH
D) AJ
Answer: C
Diff: 2 Page Ref: 36
Main Heading: Graphical Solutions of Linear Programming Models
Key words: graphical solution, constraints

92) The constraint AJ
A) Is not a binding constraint.
B) Has no surplus
C) Does not contain feasible points
D) A and B
E) B and C
Answer: D
Diff: 3 Page Ref: 36
Main Heading: Graphical Solutions of Linear Programming Models
Key words: graphical solution, constraints

93) Multiple optimal solutions can occur when the objective function is _____ a constraint line.
A) unequal to
B) equal to
C) perpendicular to
D) parallel to
Answer: D
Diff: 2 Page Ref: 44
Main Heading: Irregular Types of Linear Programming Problems
Key words: irregular types of linear programming problems

94) A slack variable
A) is the amount by which the left side of a ≥ constraint is larger than the right side
B) is the amount by which the left side of a ≤ constraint is smaller than the right side
C) is the difference between the left and right side of a constraint
D) exists for each variable in a linear programming problem
Answer: B
Diff: 2 Page Ref: 44
Main Heading: Slack Variables
Key words: slack variables

95) The production manager for the Coory soft drink company is considering the production of 2 kinds of soft drinks: regular and diet. Two of her limited resources are production time (8 hours = 480 minutes per day) and syrup (1 of her ingredients) limited to 675 gallons per day. To produce a regular case requires 2 minutes and 5 gallons of syrup, while a diet case needs 4 minutes and 3 gallons of syrup. Profits for regular soft drink are $3.00 per case and profits for diet soft drink are $2.00 per case. For the production combination of 135 cases of regular and 0 cases of diet soft drink, which resources will not be completely used?
A) only time
B) only syrup
C) time and syrup
D) neither time nor syrup
Answer: A
Diff: 2 Page Ref: 36
Main Heading: Slack Variables
Key words: slack variables

96) Cully furniture buys 2 products for resale: big shelves (B) and medium shelves (M). Each big shelf costs $500 and requires 100 cubic feet of storage space, and each medium shelf costs $300 and requires 90 cubic feet of storage space. The company has $75000 to invest in shelves this week, and the warehouse has 18000 cubic feet available for storage. Profit for each big shelf is $300 and for each medium shelf is $150. If the furniture company purchases no big shelves and 200 medium shelves, which of the two resources will be completely used (at capacity)?
A) investment money only
B) storage space only
C) investment money and storage space
D) neither investment money nor storage space
Answer: B
Diff: 2 Page Ref: 36
Main Heading: Slack Variables
Key words: slack variables

97) Consider the following linear program:

MAX $z = 5x + 3y$
s.t. $x - y \leq -1$
$x \leq 1$
The optimal solution
A) is infeasible
B) occurs where $x = 1$ and $y = 0$
C) occurs where $x = 0$ and $y = 1$
D) results in an objective function value of 11
Answer: D
Diff: 2 Page Ref: 34
Main Heading: Slack Variables
Key words: slack variables

98) The first step in solving a graphical linear programming model is
A) plot the model constraints as equations on the graph and indicate the feasible solution area
B) plot the objective function and move this line out from the origin to locate the optimal solution point
C) solve simultaneous equations at each corner point to find the solution values at each point
D) determine which constraints are binding
Answer: A
Diff: 1 Page Ref: 32
Main Heading: Slack Variables
Key words: graphic solution, steps for solving a graphical linear prog model

99) The optimal solution of a minimization problem is at the extreme point _____ the origin.
A) farthest from
B) closest to
C) exactly at
D) parallel to
Answer: B
Diff: 2 Page Ref: 41
Main Heading: A Minimization Model Example
Key words: minimization problem

100) Multiple optimal solutions provide _____ flexibility to the decision maker.
A) greater
B) less
C) greater or equal
D) less or equal
Answer: A
Diff: 2 Page Ref: 44
Main Heading: Irregular Types of Linear Programming Problems
Key words: irregular types of linear programming problems

101) Which of the following special cases does not require reformulation of the problem in order to obtain a solution?
A) unboundedness
B) infeasibility
C) alternate optimality
D) each one of these cases requires reformulation
Answer: C
Diff: 3 Page Ref: 53
Main Heading: Irregular Types of Linear Programming Problems
Key words: irregular types of linear programming problems

102) If the feasible region for a linear programming problem is unbounded, then the solution to the corresponding linear programming problem is _____ unbounded.
A) always
B) sometimes
C) never
D) there is not enough information to complete this statement
Answer: B
Diff: 3 Page Ref: 55
Main Heading: Irregular Types of Linear Programming Problems
Key words: irregular types of linear programming problems, unboundedness