Lesson 08 Linear Programming

27. The linear optimization technique for allocating constrained resources among different products is:
   A. linear regression analysis
   B. linear disaggregation
   C. linear decomposition
   D. linear programming
   E. linear tracking analysis

28. Which of the following is not a component of the structure of a linear programming model?
   A. Constraints
   B. Decision variables
   C. Parameters
   D. A goal or objective
   E. Environment of certainty

29. Coordinates of all corner points are substituted into the objective function when we use the approach called:
   A. Least Squares
   B. Regression
   C. Enumeration
   D. Graphical Linear Programming
   E. Constraint Assignment

30. Which of the following could not be a linear programming problem constraint?
   A. $1A + 2B \leq 3$
   B. $1A + 2B \geq 3$
   C. $1A + 2B = 3$
   D. $1A + 2B + 3C + 4D \leq 5$
   E. $1A + 2B$

31. For the products A, B, C and D, which of the following could be a linear programming objective function?
   A. $Z = 1A + 2B + 3C + 4D$
   B. $Z = 1A + 2BC + 3D$
   C. $Z = 1A + 2AB + 3ABC + 4ABCD$
   D. $Z = 1A + 2B/C + 3D$
   E. all of the above

32. The logical approach, from beginning to end, for assembling a linear programming model begins with:
   A. identifying the decision variables
   B. identifying the objective function
   C. specifying the objective function parameters
   D. identifying the constraints
   E. specifying the constraint parameters

33. The region which satisfies all of the constraints in graphical linear programming is called the:
   A. optimum solution space
   B. region of optimality
   C. lower left hand quadrant
   D. region of non-negativity
   E. feasible solution space

34. In graphical linear programming the objective function is:
   A. linear
   B. a family of parallel lines
   C. a family of iso-profit lines
   D. all of the above
   E. none of the above
35. Which objective function has the same slope as this one: $4x + 2y = 20$?
   A. $4x + 2y = 10$
   B. $2x + 4y = 20$
   C. $2x - 4y = 20$
   D. $4x - 2y = 20$
   E. $8x + 8y = 20$

36. For the constraints given below, which point is in the feasible solution space of this maximization problem?
   (1) $14x + 6y \leq 42$
   (2) $x - y \leq 3$
   A. $x = 1, y = 5$
   B. $x = -1, y = 1$
   C. $x = 4, y = 4$
   D. $x = 2, y = 1$
   E. $x = 2, y = 8$

37. Which of the choices below constitutes a simultaneous solution to these equations?
   (1) $3x + 4y = 10$ and,
   (2) $5x + 4y = 14$
   A. $x = 2, y = .5$
   B. $x = 4, y = -.5$
   C. $x = 2, y = 1$
   D. $x = y$
   E. $y = 2x$

38. Which of the choices below constitutes a simultaneous solution to these equations?
   (1) $3x + 2y = 6$ and
   (2) $6x + 3y = 12$
   A. $x = 1, y = 1.5$
   B. $x = .5, y = 2$
   C. $x = 0, y = 3$
   D. $x = 2, y = 0$
   E. $x = 0, y = 0$

39. What combination of $x$ and $y$ will yield the optimum for this problem? Maximize $Z = 3x + 15y$ Subject to:
   (1) $2x + 4y \leq 12$
   (2) $5x + 2y \leq 10$
   A. $x = 2, y = 0$
   B. $x = 0, y = 0$
   C. $x = 0, y = 3$
   D. $x = 1, y = 5$
   E. none of the above

40. In graphical linear programming, when the objective function is parallel to one of the constraints, then:
   A. the solution is sub-optimal
   B. multiple optimal solutions exist
   C. a single corner point solution exists
   D. no feasible solution exists
   E. the constraint must be changed or eliminated

41. For the constraints given below, which point is in the feasible solution space of this minimization problem?
   (1) $14x + 6y \geq 42$
   (2) $x + 3y \geq 6$
   A. $x = 0.5, y = 5.0$
   B. $x = 0.0, y = 4.0$
   C. $x = 2.0, y = 5.0$
   D. $x = 1.0, y = 2.0$
   E. $x = 2.0, y = 1.0$
42. What combination of x and y will provide a minimum for this problem? Minimize \( Z = 3x + 15y \)
   (1) \( 2x + 4y \geq 12 \)
   (2) \( 5x + 2y \geq 10 \)
A. \( x = 0, y = 0 \)
B. \( x = 0, y = 3 \)
C. \( x = 0, y = 5 \)
D. \( x = 1, y = 2.5 \)
E. \( x = 6, y = 0 \)

43. The theoretical limit on the number of decision variables that can be handled by the simplex method in a single problem is:
A. 1
B. 2
C. 3
D. 4
E. unlimited

44. The theoretical limit on the number of constraints that can be handled by the simplex method in a single problem is:
A. 1
B. 2
C. 3
D. 4
E. unlimited

45. A shadow price reflects which of the following in a maximization problem?
A. marginal cost of adding additional resources
B. marginal gain in the objective that would be realized by adding one unit of a resource
C. net gain in the objective that would be realized by adding one unit of a resource
D. marginal gain in the objective that would be realized by subtracting one unit of a resource
E. expected value of perfect information

46. In linear programming, a non-zero reduced cost is associated with a:
A. decision variable in the solution
B. decision variable not in the solution
C. constraint for which there is slack
D. constraint for which there is surplus
E. constraint for which there is no slack or surplus

47. A constraint that does not form a unique boundary of the feasible solution space is a:
A. redundant constraint
B. binding constraint
C. non-binding constraint
D. feasible solution constraint
E. constraint that equals zero

48. In linear programming, sensitivity analysis is associated with:
   (I) objective function coefficient
   (II) right-hand side values of constraints
   (III) constraint coefficient
A. I and II
B. II and III
C. I, II and III
D. I and III
E. none of the above