

國立中央大學八十九學年度碩士班研究生入學試題卷

190 所別: 工業管理研究所 乙組 科目: 作業研究 共 2 頁 第 / 頁

Score Distribution												
I. Multiple Choice	II. Analytical Problems											
	1			2			3			4		
2*9 = 18	(1) 6	(2) 10	(3) 6	(4) 5	(1) 5	(2) 10	(1) 5	(2) 5	(3) 5	(4) 5	(1) 10	(2) 10

I. Choose the most appropriate answer

1. Which of the following is the order of the scientific method?

1. Model construction 2. Observation 3. Model validation 4. Problem definition 5. Implementation 6. Problem solution

a. 1-3-2-4-6-5

b. 2-4-1-3-6-5

c. 4-2-1-3-5-6

d. 2-4-6-1-3-5

2. Which of the following is a linear equation? (A, B, C are constants and X, Y, Z are variables.)

a. $AX^2 + BY^2 = C$

b. $A^2X - B^2Y = C^2$

c. $AX + BY + CXY = D$

d. $AX - BY/Z = C$

3. What does "constrained optimization" mean?

a. The values of the decision variables are subject to limitations.

b. The maximization value of the objective function is not as large as it should be.

c. The minimization value of the objective function is not as small as it should be.

d. The value of the objective function is subject to limitations.

4. When is the simplex algorithm for maximization finished?

a. When the $C_j - Z_j$ row consists of zeros and negative numbers.

b. When the $C_j - Z_j$ row consists of zeros and positive numbers.

c. At the third iteration.

5. How many variables will there be in the simplex solution to an LP problem?

a. The number of variables will equal the number of decision variables.

b. The number of variables will equal the number of iterations.

c. The number of variables will equal the number of constraints.

d. The number of variables will equal the number of extreme points of the feasible region.

6. Which of the following is a proper mathematical operation on a row of a simplex tableau?

a. Multiply every element by a constant.

b. Add one row to another row.

c. Add a multiple of one row to another row.

d. All of the above.

7. Which of the following does NOT change when working through the simplex algorithm?

a. The coefficients of the objective function.

b. The coefficients of the constraints.

c. The right-hand sides of the constraints.

d. The variables in the basis column.

8. The use of large M in an objective function occurs when this type of variable is involved:

a. slack

b. surplus

c. decision

d. artificial

9. An assignment problem involves 3 workers and 4 jobs. The minimum number of crossing lines over zeros needed for an optimal solution is

a. 3

b. 4

c. 7

d. 12

參考用

注. 背面有試題

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II. Analytical Problems

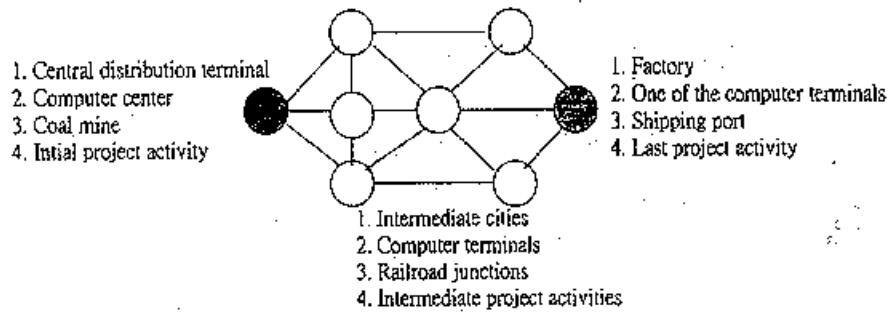
1. Given the problem: Maximize $Z = 5X_1 + 2X_2$
 Subject to
 $X_1 + X_2 \leq 50$
 $3X_1 + X_2 \geq 90$
 $X_2 = 10$
 $X_1, X_2 \geq 0$

- (1) Transform into standard form with slack, surplus, and artificial variables.
- (2) Find the optimal solution by using simplex method.
- (3) Is there "degeneracy" in the solution process? Why or why not?
- (4) Formulate the dual of the given primal model.

2. Given the problem: Minimize $Z = 5X_{11} + 6X_{12} + 7X_{13} + 8X_{21} + 8X_{22} + 9X_{23}$
 Subject to
 $X_{11} + X_{12} + X_{13} = 1$
 $X_{21} + X_{22} + X_{23} = 1$
 $X_{11} + X_{21} \leq 1$
 $X_{12} + X_{22} \leq 1$
 $X_{13} + X_{23} \leq 1$
 $X_{ij} \geq 0$

- (1) By observing the given model, which type of special-purpose problem would you consider it is?
- (2) Instead of using simplex method, use the appropriate algorithm to solve the problem.

3. In corresponding to each of 4 different scenarios (refer to the below figure), which network model would you consider to apply for solving the problem?



參考用

- (1) A trucking firm must make a delivery from its central distribution terminal to a factory in another city. In the network (formed by the terminal, factory, and several intermediate cities), there are various routes that the truck can take.
- (2) A manufacturing plant desires to connect computer terminals at several locations across the plant site to the server at its computing center with coaxial cable.
- (3) A coal company desires to transport coal from its mine to an shipping port via a network of rail lines which link the mine, port, and several railroad junctions.
- (4) A bank wishes to install a new computerized check-processing system and there are a number of activities required to complete this project.

4. There are three movie theaters in Chungli. Students of NCU go to the movies once a week. The following transition matrix contains the probabilities of the theaters that the students will visit.

Week n	Week $n+1$		
	Theater A	Theater B	Theater C
Theater A	.5	.3	.2
Theater B	.1	.7	.2
Theater C	.1	.1	.8

- (1) Determine the steady-state probabilities for each theater.
- (2) During a year (52 weeks), how many weeks will the students be visiting Theater A?