

逢甲大學101學年度碩士班招生考試試題 編號：010 科目代碼：

|    |      |      |               |    |        |
|----|------|------|---------------|----|--------|
| 科目 | 作業研究 | 適用系所 | 工業工程與系統管理學系B組 | 時間 | 100 分鐘 |
|----|------|------|---------------|----|--------|

※請務必在答案卷作答區內作答。 共 2 頁第 1 頁

1. (25%) Please solve the following NP problem.

$$\text{Maximize } Z = 49x_1^2 + 42x_1x_2 + 9x_2^2$$

subject to

$$\frac{3x_2 + 4}{x_1 - 8} \leq 2$$

$$x_1^2 + x_2^2 \leq 49$$

$$x_1 \leq 6$$

$$x_1, x_2 \geq 0$$

2. (25%) Yield is the percentage of non-defective (good) finished products, and will gradually improve. If you are to predict yield, what should you take into consideration? Please describe the procedure or method that you will use to predict yield.

3. (25%) Consider the following transportation problem:

|          |   | Destination |    |    |        |
|----------|---|-------------|----|----|--------|
|          |   | 1           | 2  | 3  | Supply |
| Resource | 1 | 50          | 90 | 80 | 60     |
|          | 2 | M           | 60 | 50 | 40     |
|          | 3 | M           | 30 | 40 | 30     |
| Demand   |   | 20          | 10 | 30 |        |

- (a) Use the northwest corner rule to obtain an initial BF solution for this problem.  
 (b) After several iterations of the transportation simplex method, a BF solution is obtained that has the following basic variables:  $x_{11}=20$ ,  $x_{13}=30$ ,  $x_{14}=10$ ,  $x_{24}=40$ ,  $x_{32}=10$ ,  $x_{34}=20$ . Continue the transportation simplex method for **two more iterations** by hand. After two iterations, **state whether the solution is optimal, if so, why.**

4. (25%) A college student has 7 days remaining before final examinations begin in her four courses, and she wants to allocate this study time as effectively as possible. She needs at least 1 day on each course, and she likes to concentrate on just one course each day, so she wants to allocate 1, 2, 3, or 4 days to each course. Having recently taken an OR course, she decides to use dynamic programming to make these allocations to maximize the total grade points to be obtained from the four courses. She estimates that the alternative allocations for each course would yield the number of grade points shown in the following table:

| Study days | Estimate grade points |   |   |   |
|------------|-----------------------|---|---|---|
|            | Course                |   |   |   |
|            | 1                     | 2 | 3 | 4 |
| 1          | 3                     | 4 | 5 | 1 |
| 2          | 3                     | 5 | 6 | 6 |
| 3          | 5                     | 5 | 7 | 8 |
| 4          | 7                     | 8 | 8 | 9 |

Solving this problem by dynamic programming.