

系所組別：醫學資訊研究所

考試科目：程式設計

考試日期：0226，節次：2

## 一、Data Structures (50%)

## 1. (30%)

For the AOE (Activity on Edge) network described by the table, (a) what is the earliest time the project can finish? (15%) (b) Please list all critical paths. Note that state 1 is the starting state and state 10 is the goal state. (15%)

Activity	From state	To state	Time
a <sub>1</sub>	1	2	5
a <sub>2</sub>	1	3	5
a <sub>3</sub>	2	4	3
a <sub>4</sub>	3	4	6
a <sub>5</sub>	3	5	3
a <sub>6</sub>	4	6	4
a <sub>7</sub>	4	7	4
a <sub>8</sub>	4	5	3
a <sub>9</sub>	5	7	1
a <sub>10</sub>	5	8	4
a <sub>11</sub>	6	10	4
a <sub>12</sub>	7	9	5
a <sub>13</sub>	8	9	2
a <sub>14</sub>	9	10	2

2. (20%) Given the postorder sequence and the inorder sequence of a binary character tree is ELGQPXRM and EGLMPQRX, (a) is the tree uniquely defined? (10%) (b) Please draw an example binary tree satisfying the above two sequence. (10%)

(背面仍有題目,請繼續作答)

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## 二、Algorithms (50%)

3. (20%) Solving the recurrence  $T(n) = 8T(n/2) + \Theta(n^2)$  using  $\Theta$  notation.

4. (20%) Show how to sort  $n$  integers in the range 0 to  $n^3 - 1$  in  $O(n)$  time.

5. (10%) The Fibonacci numbers are defined by recurrence

$$F_0 = 0,$$

$$F_1 = 1,$$

$$F_i = F_{i-1} + F_{i-2} \text{ for } i \geq 2.$$

Give an  $O(n)$ -time dynamic-programming algorithm to compute the  $n$ th Fibonacci number.