

淡江大學 101 學年度碩士班招生考試試題

系別：資訊工程學系資訊網路與通訊碩士班 科目：資料結構

考試日期：2月26日(星期日) 第2節

本試題共 04 大題，01 頁

1. Let $A=a_1a_2\dots a_n$ and $B=b_1b_2\dots b_m$ be two strings of characters. We would like to change **string A** character by character such that it becomes **string B**. There are three types of operations, namely **insert**, **delete** and **replace** one character. Our goal is to **minimize** the number of single-character changes. Denote by $C(i, j)$ the minimum cost of changing $a_1a_2\dots a_i$ to $b_1b_2\dots b_j$.

(25%) Find the recurrence relation $C(n, m)=???$

2. Given the adjacency matrix of an undirected connected weighted graph G below, find a spanning tree T of G of minimum cost (MCST).

	a	b	c	d	e	f	g	h	i
a	0	0	2	0	0	0	8	0	1
b	0	0	0	0	3	0	0	0	6
c	2	0	0	4	0	10	0	0	0
d	0	0	4	0	7	0	12	0	9
e	0	3	0	7	0	0	0	5	0
f	0	0	10	0	0	0	13	0	0
g	8	0	0	12	0	13	0	11	0
h	0	0	0	0	5	0	11	0	0
i	1	6	0	9	0	0	0	0	0

- (a) (15%) in each step, show how the Prim's algorithm finds the edge of MCST.
 (b) (15%) in each step, show how the Kruskal's algorithm finds the edge of MCST.

3. A heap is a binary tree whose key of every node is greater than or equal to the key of any of its children. Let $A[1..16]$ be an array of elements in an arbitrary order,
 (25%) **rearrange** the elements so that the array satisfies the heap property.

Note that you need to circle the numbers that have been exchanged on each step.

i:	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
$A[i]:$ step0	7	2	8	5	10	9	12	11	15	6	3	13	4	1	16	14
step1																
step2																
step?																

4. (20%) Illustrate an example of **amortized complexity analysis**.