

淡江大學 100 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

本試題共 1 頁，6 大題

1. (10%)

(1) Sorting is not possible by using which of the following methods?

- (a) Insertion (b) Selection (c) Exchange (d) Deletion

(2) (Yes or no) Does the minimum spanning tree of a graph give the shortest distance between any 2 specified nodes?

2. (10%) Determine the time complexity of $T(n)$ when $T(n) = 7 \cdot T(n/3) + n^2$.

3. (20%) The pre-order and post-order traversal of a binary tree is given as below; obtain the binary tree with those traversal properties.

Pre-order: A B C D J H E I F K G

Post-order: D J C H B I K G F E A

Write the algorithm you used to construct the binary tree from its pre-order and post-order traversals.

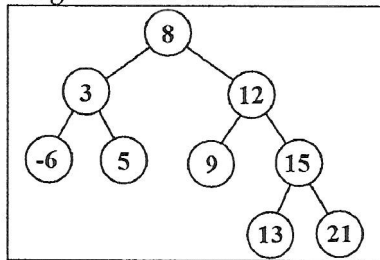
4. (20%) Order the following functions by their growth rates starting with the slowest.

- (a) $3n + 20 \log(n)^2$ (b) 2^{200} (c) $4n \log(n) + \sqrt{n}$ (d) $n \log(n)$
 (e) $2^{\log(n^2)}$ (f) $\log(n^5)$

5. (20%) State the algorithm of how to delete a node in a binary search tree. Let x be the node that has to be deleted from a binary search tree T . To delete the node x , we have three cases:

1. x has no children. 2. x has one child. 3. x has two children.

Draw the resulting binary search after deleting the node with value 12 in the following binary search tree.



6. (20%)

(1) Draw the graph G from the adjacency matrix shown below.

(2) In what order are the vertices visited using DFS starting from vertex A? Where a choice exists, use alphabetical order.

(3) In what order are the vertices visited using BFS starting from vertex A?

(4) What data structure is used to implement the depth-first search and what data structure is used in breadth-first search?

(5) In what order are edges added to the minimum spanning tree by Kruskal's algorithm? List the edges by giving their endpoints.

	A	B	C	D	E	F	G	H	I
A	0	8	4	0	0	0	0	0	0
B	8	0	0	13	0	0	0	0	0
C	4	0	0	10	18	0	10	0	0
D	0	13	10	0	0	0	0	0	15
E	0	0	18	0	0	0	0	0	0
F	0	0	0	0	0	0	16	0	0
G	0	0	10	0	0	16	0	2	12
H	0	0	0	0	0	0	2	0	6
I	0	0	0	15	0	0	12	6	0

Graph G 's adjacency matrix

注意：1、考試求公平及公正，請同學務必自律，維護學校與學生之榮譽。

2、考試時不得交談、攜卷出場、窺視、傳遞、代考、夾帶等違規行為，違者將受嚴重議處。