所別：生物資訊與系統生物研究所碩士班 一般生 科目：計概與資料結構
學位在職生

1. Given two subprograms:

Procedure *sub_p1*(*a*, *b*)
begin;
a := 3 * *a* + b;
end.

And another called-by-address subprogram is:
Procedure *sub_p2*(*a*, *b*)
begin;
b := *a* – 2 * *b*;
end.

What is the result of the following program if *sub_p1*(*a*, *b*), *sub_p1*(*a*, *b*) are called-by-value subprogram? (5%)
What is the result of the following program if *sub_p1*(*a*, *b*), *sub_p1*(*a*, *b*) are called-by-address subprogram? (5%)

a = 3;
b = 4;
sub_p1(*a*, *b*)
print *a* + *b*;
sub_p2(*a*, *b*)
print *a* + *b*;

2. For a binary tree, if the node number is 400, what's the minimum and maximum depth of the tree? (5%)
For a general tree of degree 5, if the node number is 400, what's the minimum and maximum depth of the tree? (5%)

3. For the following problems, pick the problems that belong to the class NP? (10%)
a. All-pairs Shortest Paths;
b. Clique Problem;
c. 3-Coloring of a Graph;
d. Euler's Tour;
e. Hamiltonian Cycle;
f. Longest Common Subsequence;
g. Tower of Hanoi Problem;
h. Fast-Fourier Transform;
i. Traveling-Salesman Problem.

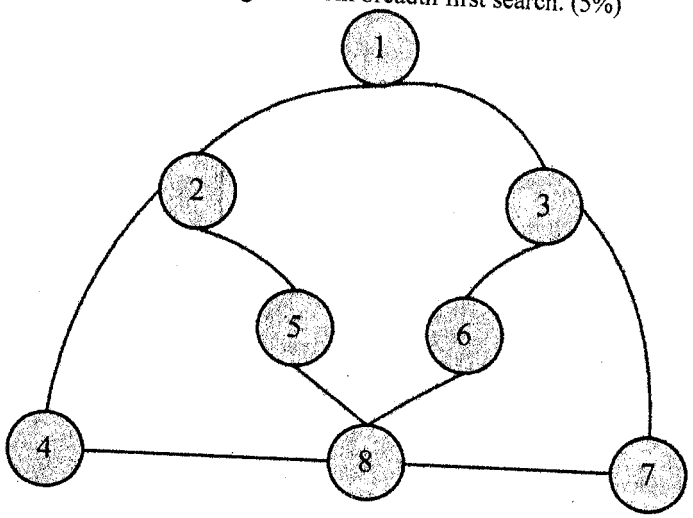
4. Construct a binary tree from its inorder sequence BCAEDGHFI, preorder sequence ABCDEFGHI. (10%)

5. Given an array of *n* numbers and a number *s*, determine whether the array contains 4 elements whose sum is s. Write an algorithm with complexity less the $O(n^4)$ to solve above question and analyze the time efficiency of your algorithm. (20%)

注意：背面有試題

所別：生物資訊與系統生物研究所碩士班 一般生 科目：計概與資料結構
學位在職生

6. (1) Transfer the given graph into an adjacency matrix and adjacency list. (5%)
(2) According to the adjacency list, find the depth first search from node 1. (5%)
(3) According to the adjacency list, find the breadth first search from node 1. (5%)
(4) Write the spanning tree from depth first search. (5%)
(5) Write the spanning tree from breadth first search. (5%)



7.Please draw step by step of the creation of a heap of size 8 from 25, 57,45,35,13,88,76,30. (15%)