

國立中央大學98學年度碩士班考試入學試題卷

所別：資訊管理學系碩士班 丙組 科目：資料結構 共 2 頁 第 1 頁

*請在試卷答案卷(卡)內作答

1. (10%) A complex-valued matrix X is represented by a pair of matrices $\langle a, b \rangle$, where a and b contain real values. For a function that computes the product of two complex-valued matrix $\langle a, b \rangle$ and $\langle d, e \rangle$, where $\langle a, b \rangle * \langle d, e \rangle = (a+ib)*(d+ie) = (ad-be) + i(ae+bd)$. Please determine the number of additions and multiplications if the matrices are all $n*n$.
2. (10%) Stacks and Queues can be implemented as Static (Array-Based) or as Dynamic (Reference-Based) in a given programming language. Explain the differences, advantages and disadvantages between the two implementations.
3. (15%) Give the tightest asymptotic running times (i.e. as n gets large) you can for each of the following snippets of code:
 - a)

```
int FancyFib(int n) {
    if (n==0 || n==1) return 100;
    else return 2*Fib(n-1) + 3*Fib(n-2);
}
```
 - b)

```
int Count (int n) {
    if (n==n/2) return 0;
    else return 2*Count(n/2);
}
```
 - c)

```
void Repeater (int n) {
    if (n==0) return 1;
    for (int ii=0; ii<n; ii++)

```
4. (10%) What are the benefits of hashing method compared with binary search? Please also give the reasons for your answer.
5. (10%) What are the key points for designing a good hashing function? You are supposed to provide answer and explanation.
6. (10%) Suppose that the root is at level 1 and the external nodes are at level $h+1$.
 - a) What are the possible numbers of elements in a 2-3 tree with height h ?
 - b) What is the time complexity of inserting an element into a 2-3 tree with n elements? Explain your answer as possible as you can.

參考用

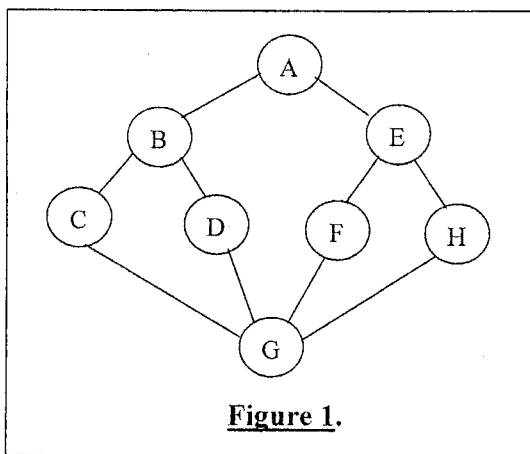
注意：背面有試題

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7. (12%) If a binary tree is traversed using the inorder transversal method, then the result of $U+V*W-X+Y/Z$ is obtained. Find the binary tree with explanation.
8. Given the graph as shown in **Figure 1**:
- a) Obtain the adjacency list representation for the graph, starting at vertex A. (10%)
- b) Obtain the depth first spanning tree. Explain your answer. (13%)



參考用

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