淡江大學八十八學年度碩士班招生考試試題

系別：資訊工程學系　　科目：計算機概論　　本試題共 1 頁

1. In the following algorithm, S is a sequence of n integers and k is an integer between 1 and n.

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Procedure FIND (k, S)
    If |S| = 1 then return the single element in S
    else {
        choose an element a randomly from S;
        let S1, S2, and S3 be the sequences of elements in S less than,
        equal to, and greater than a, respectively;
          If |S1| ≥ k then return FIND(k, S1)
          else
              If |S1| + |S2|  k then return a
              else return FIND(k' − |S1| − |S2|, S3)
        }
```

Note: |S| stands for cardinality of S.

(a) (5%) Explain what FIND does?

(b) (20%) Develop the recurrence relation the expresses the time complexity of FIND

(c) (10%) Specify the condition (on the selection of *a*) under which the recurrence reaches it worst-case and determine the worst case time complexity of FIND.

2. (10%) Given two algorithms, for the same problem, with time complexities of n^2 and 2^n, would you always prefer one over the other? Explain?

3. Answer the following questions about the grammar below which defines the syntax of expressions involving identifiers of length 1, numbers, and operations +, −, *, /, **.

E ::= A| A + E| A − E
A ::= B| B * A| B / A
B ::= B ** C| C
C ::= D| −D
D ::= a| b| ... | z| 0| 1| ... |9

(a)(10%) Is the string a ** b + c − d defined by this grammar? If yes, draw the parse tree.

(b) (10%) What is the operator precedence, highest to lowest?

(c) (15%) Do operators of equal precedence associate from left to right or from right to left? In particular, is a − b − c = a − (b − c)?

4. (a) (10%) Consider a transaction as the basic unit of work. What is the responsibility of the reliability DBMS concerning the execution of a transaction?

(b) (10%) Why it is impractical to use precedence graph to test serializability of a schedule?