97 成功大學 程式設計

一、Data Structure

1.

(a)

(i) Initial()

```
{
    for( i=0; i≦n; i++ )
        a[i] = 0;
    factor = 1;
}
```

(ii) WRITE(k, m)

```
{
    a[k] = m;
}
```

(iii) READ(k)

```
{
    return a[k]*factor;
}
```

(iv) MULTIPLEALL(n)

```
{
    factor = n
}
```

(b) ZEROALL()

```
{
    factor = 0;
}
```

2.

(a) F (b) F (c) F (d) T

3. ?

二、Algorithm

4.

Substitution Method

We guess T(n) = O(lgn*lglgn)

claim : T(n) ≦ C* (lgn*lglgn)

令 T(n) ≦ C*($\lg\sqrt{n} * \lg\lg\sqrt{n}$)

consider

T(n) = 2T $(\lfloor\sqrt{n}\rfloor) + \lg n$

≦2(C*($\lg\sqrt{n} * \lg\lg\sqrt{n}$)) + lgn

= C*lgn*lg($\frac{1}{2}$lgn) +lgn

= C*lgn *[lglgn – lg2] + lgn

= lgn *[Clglgn – C + 1]

≦ C*lgn*lglgn

所以 T(n) = O(lgn *lglgn)

5.

(a) we can use Dijsktra algorithm to solve it

(b) it is a NP-complete problem

6. No solution(By using Johnson's algorithm, chapter 25.3, Cormen)

7.

n 筆 data 作 sort 有 n!種結果

將其以 Decision tree 表示，使其 tree 具 n!個 leaf

又 Decision tree 為一 Complete Binary Tree

所以 the height of this tree is $\lfloor\log(n!)\rfloor+1$

其比較次數 = height – 1 = $\lceil\log(n!)\rceil$

因為 n! ≧ $(n/2)^{n/2}$

所以 log n! ≧ n/2 log(n/2)

= n/2(logn - 1)

= Ω(nlogn)

8. n