系 所 別：資訊管理系　　　　　　　組　別：技術組
考科代碼：2322　　　　　　　　　　考 科：資料結構

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注意事項：
1、本科目得使用本校提供之電子計算器。
2、請於答案卷上規定之範圍作答，違者該題不予計分。

(一)(14%) Determine whether the following statements are correct or not:

(a) $n^2+n^3\log n =\Omega(n^3)$　　(b) $n^n = O(n!)$.

(二)(13%) Consider the following algorithm to compute the nth Fibonacci number.

(a) Compute 10th Fibonacci number. (b) Analyze the time and space requirements of this algorithm.

```
Fibo(n) {
    if n < 2 return n;
    else return Fibo(n-1)+Fibo(n-2);
}
```

(三)(14%) (a) Write the definition of a binary search tree. (Hint: you can assume all keys are distinct.) (b) Determine whether we can get increasing key sequences by traversing binary search trees in inorder.

(四)(9%) Figure 1 is a tree representation of disjoint sets. Finish the following array representation for these disjoint sets.

0	1	2	3	4	5	6	7	8	9
									-1

Figure 1

國立高雄第一科技大學圖書資訊館
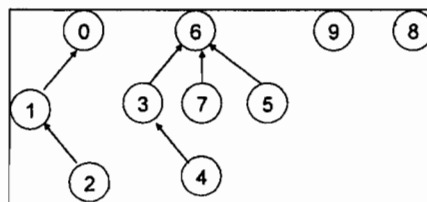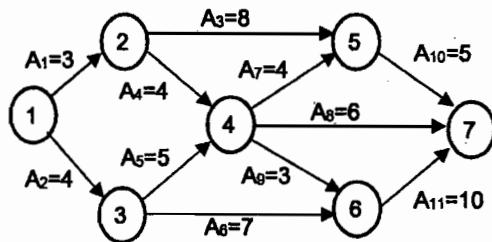
(五)For an AOE network with the time required to complete each activity is shown in the following figure. (e.g. $A_1=3$ means activity 1 takes 3 units of time to complete)

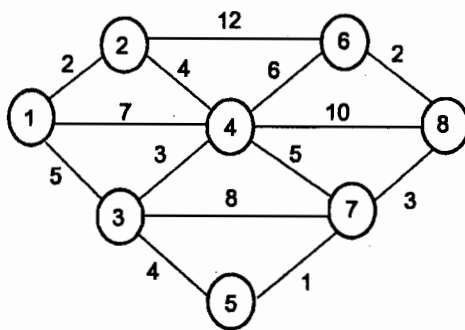(a) (4%) List the activities on the critical path(s) for the AOE network.

(b) (8%) Construct a table to show the earliest and latest start times for each activity.

(六) An undirected graph G is shown below.

(a)(4%) Draw the adjacent list for it.

(b)(8%) List the shortest path from **vertex 1** to **vertex 8** using **Dijkstra's algorithm**.

(七)資料 123, 208, 306, 893, 859, 984, 55, 59, 271, 33 利用下列不同方法排序

    (a)(6%)Bubble Sort(由右向左推，遞增排列)，第一回合輸出如下

        33,123, 208, 306, 893, 859, 984, 55, 59, 271

        請接續寫出後 2 個回合執行的結果。

    (b)(3%) LSD 基數排序 (LSD Radix sort)，基底為 10，寫出排序的過程。

    (c)(3%) MSD 基數排序(MSD Radix sort)，基底為 10，寫出排序的過程。

    (d)(4%) Quick Sort 以 123 當作 pivot，寫出執行第一回合後的結果。

(八)一棵 binary tree 共有 100 個節點，

    (a)(5%)此棵數第 7 level 的節點數最多有幾個？

    (b)(5%)假設此棵樹 leaf node 個數是 40，則 degree=1 的節點數為何？

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