

國立高雄第一科技大學 100 學年度 碩士班 招生考試 試題紙

系所別：系統資訊與控制研究所

組別：資訊組

考科代碼：2142

考科：資料結構

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。

1. Try to trace the following algorithm, where array a[] stores an original data set, item x is a target for search, left and right are first and the last index of a[].

```
int Search(int a[], int x, int left, int right)
{
    int mid;
    if (left > right) return -1;
    else {
        mid = (right + left) / 2;
        if (x == a[mid]) return mid;
        else if (x < a[mid]) return Search(a,x,left, mid-1);
        else return Search(a,x,mid+, right);
    }
}
```

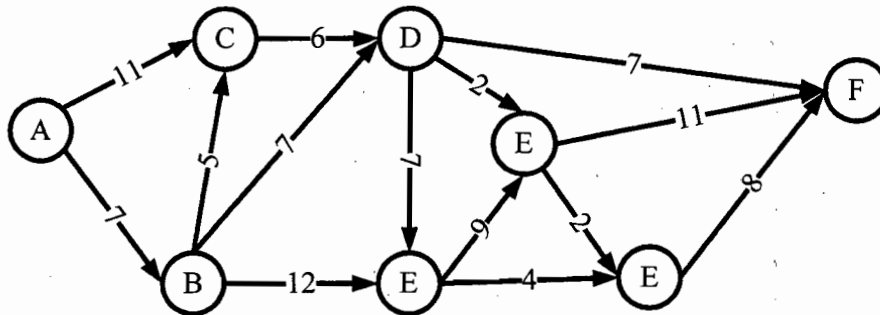
- a) What is the purpose of the algorithm? Can you give a sample to explain the result? (15 分)
- b) What is the time complexity in Big O? (5 分)

2. Find the times in the following loops. (各 8 分)

a) For (i = 1; i < n; i++)
{ j = i;
 Do{
 j = (int)j / 3;
 }while j >= 2
}

b) For (i = 1; i < n; i++)
 For (j = i; j < n; i++)
 For (k = j; k < n; i++)
 x ++;

3. Write a program in recursive procedure, which can transfer decimal to binary, octal, and hex. Try input a number 200, and output the results after using this program. (14 分)
4. To store an input set = {325, 34, 712, 543, 813, 427, 181} by using hash function $h_1(x) = x \bmod 8$. Please answer the following questions.
 - (a) Show the open addressing hash table of the input set when a linear probing method and $h_1(x)$ is applied. (7 分)
 - (b) What is the open addressing hash table? If the second hash function $h_2(x) = 8 - (x \bmod 8)$ is also used, (8 分)
5. Please use AVL tree to construct a sequence set = {5, 3, 12, 9, 91, 34, 28} into a data structure without initial key. (15 分)
6. Given a project chart, there are eight nodes represent tasks in a project, where value between nodes represents time for finish. Please find the earliest time of the project. (10 分)



7. Let $A[i, j]$ be a two-dimensional array. If the address of $A[3, 9]$ is 76, and $A[5, 7]$ is 124. Please answer the following questions:
 - a) What is the address of $A[8, 9]$? (5 分)
 - b) How many sizes of each element of $A[]$ needs? (5 分)