國立中正大學106學年度碩士班招生考試試題

系所別：電機工程學系-計算機工程組　　　　科目：資料結構

第2節

1. Consider the following program and answer the questions below.

(a) (10 pts.) What is the name of this algorithm? Describe what it does.

(b) (10 pts.) Analyze the function for its time complexity. Show the detail calculation and derive the complexity in the Big-O notation.

(c) (15 pts.) Use the C programming language to rewrite the program in the iteration form (loops).

```
void do_something (int a[], int b, int c, int d)
{
   int e = (d-c+1)/2+c;

   if (a[e] == b)
     printf("Yes!\n");
   else if (c >= d)
     printf("No!\n");
   else if (a[e] < b)
     do_something (a, b, e+1, d);
   else do_something (a, b, c, e-1);
}
```

2. Consider a binary search tree (BST). Answer the following questions.

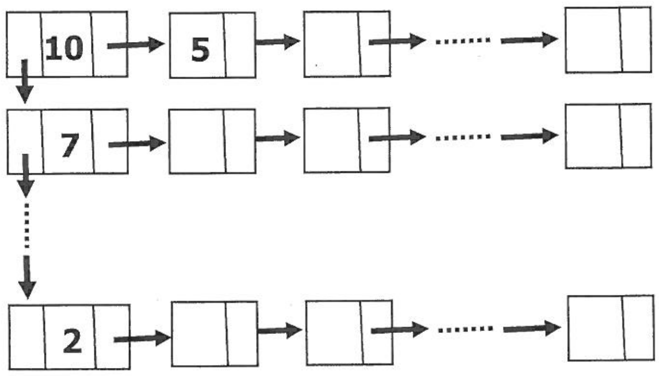
(a) (5 pts.) Give the definition to a BST.

(b) (10 pts.) Use the C programming language or pseudocode to define the data structure of a node in a BST.

(c) (10 pts.) Use the above data structure in defining the insertion function of a BST. Write the code in C.

(d) (10 pts.) Analyze the time complexity of the insertion algorithm, show the detail calculation, and derive its complexity in the Big-O notation.

3. Consider a square matrix of integers below. Answer the questions using the C programming language or pseudocode.



(a) (10 pts.) Define the structures used in the matrix.

(b) (10 pts.) Write a function to print such square matrix. The matrix and its size are given as parameters.

(c) (10 pts.) Write a function to add two such matrixes and store the result in a new matrix in such structure. The matrixes and their size are given as parameters.