

大同大學 97 學年度轉學入學考試試題

考試科目：資料結構

所別：資訊工程學系

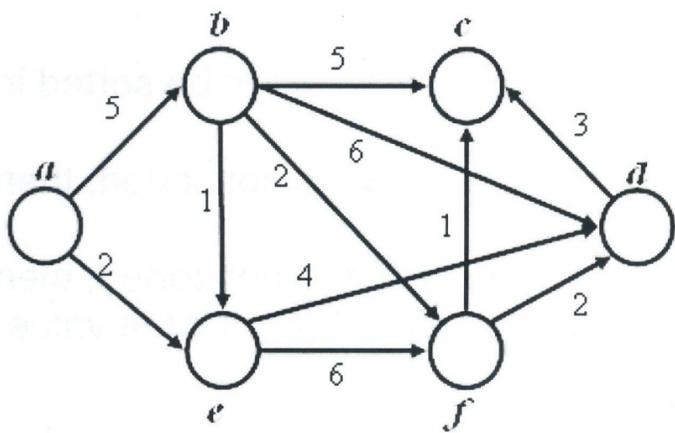
第1/2頁

註：本次考試 不可以參考自己的書籍及筆記；不可以使用字典；不可以使用計算器。

每題各佔10%，請在答案紙上註明題號。

1. Brief explain what sorting algorithm is the most efficient in the worst-case.
2. Brief explain what data structure is used in designing the algorithm for constructing the Huffman Codes.
3. Brief explain what data structure is used in designing the algorithm for the breadth-first search (BFS) of a graph.
4. Brief explain what data structure is used in designing the algorithm for the depth-first search (DFS) of a graph.
5. Consider the recursive algorithm for computing the function $F(n)$ as follows:

```
int F(int n) {  
    if (n <= 1) return(1);  
    else return F(n-1) + n*n; }  
What's the returned value of the function call  $F(6)$ ?
```
6. For the following weighted, directed graph $G(V, E)$ with vertex set V and edge set E , use the Dijkstra's algorithm to find the single-source shortest paths for the graph. Dijkstra's algorithm maintains a set S of vertices and adds vertices in order to the set. In what order are the vertices added to the set if the source vertex is the vertex a ? Please show sufficient details.



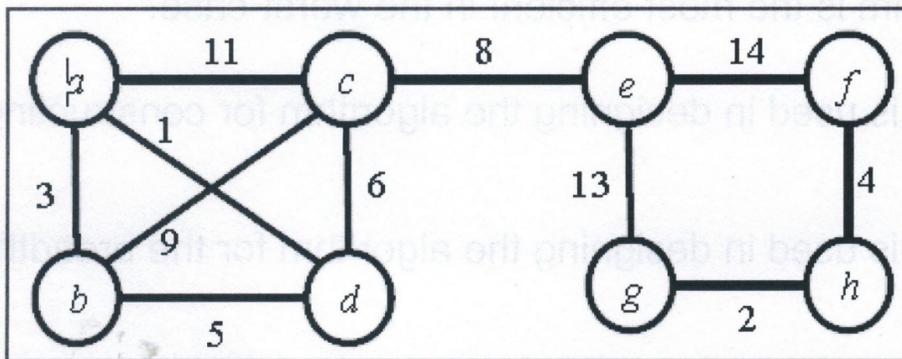
大同大學 97 學年度轉學入學考試試題

考試科目：資料結構

所別：資訊工程學系

第2/2頁

7. Given the (above right) undirected graph, a. Find the Breadth-First Search (BFS) sequences (starting from the vertex *a*). b. Find the Depth-First Search (DFS) sequences (starting from the vertex *a*). (Note: At any moment, if more than one vertex can be visited next, always select the one in alphabetic order.).



8. Write a pseudo code for the problem of Tower of Hanoi. Suppose there are n disks and three poles, namely (1) source, (2) destination, and (3) spare, respectively, the objective is to transfer the disks originally stacked on the source pole to the destination pole.
9. A binary tree T has 9 nodes. The inorder and preorder traversals of T yield the following sequences of nodes:

Inorder: E A C K F H D B G

Preorder: F A E K C D H G B

regenerate the tree T based on the two sequences.

10. Answer the following TRUE/ALSE questions:
- (1) When using "binary search" to search an array, the array must always be sorted in increasing order.
 - (2) When using "binary search" to search an array, and the arrays is not sorted, then the program will crash.
 - (3) When using "binary search" to search an array, and the arrays is not sorted, then sometimes the search will be successful, but sometimes it will fail even if the value does exist in the array.
 - (4) A tree is an example of a list.
 - (5) A list is an example of a tree.