NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

SC1007 Data Structures and Algorithms **2022/23 Semester 2**

Lab 7: Graph Traversal and Backtracking

School of Computer Science and Engineering *Nanyang Technological University*

Q1 Write a function DFS_I() to do a depth search from a input vertex v. The labels of v are from 1 to $|V|$. The algorithm will visit the neighbor nodes in ascending order. The function prototype is given as follows:

```
void DFS_I (Graph g, int v);
```

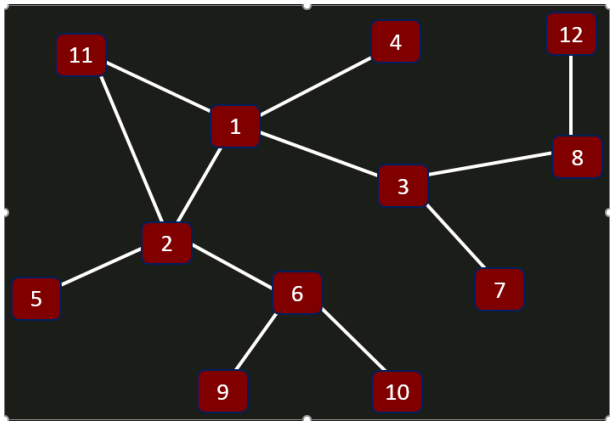
The structure of a graph is given below.

```
typedef struct _listnode
{
    int vertex;
  struct _listnode *next;
} ListNode;
typedef ListNode StackNode;

typedef struct _graph{
    int V;
    int E;
    int **matrix;
}Graph;

typedef struct _linkedlist
{
  int size;
  ListNode *head;
} Stack;
```

A test sample graph and its expected output are given below: The start vertex for DFS is vertex 11.



The expected output: 5 9 10 6 2 7 12 8 3 4 1 11

Q2 Rewrite a depth search algorithm in a recursive approach. The function prototype is given as follows:

```
void DFS_R (Graph_DFS g, int v);
```

Q3 Write a function, nQueens(), to print out all the possible solutions of the N-queen problem.

```
int nQueens(int** board, int N, int col);
```

The number of possible solutions to different n are:

n	number of possible solutions
4	2
5	10
6	4
7	40
8	92
10	724
12	14200

There is no known formula for the exact number of solutions but the grown rate is extremely high.