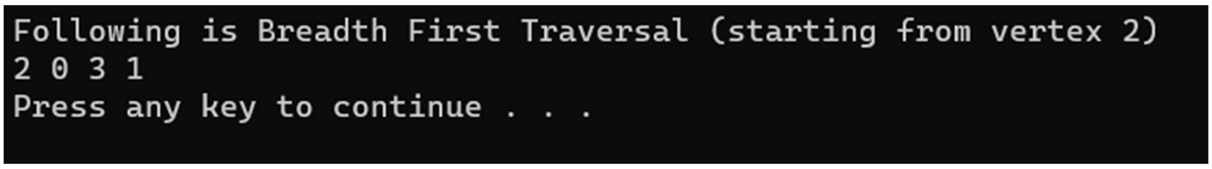
Lab -7   1BM22CS242

2. 9a) Write a program to traverse a graph using BFS method.

```
#include <stdbool.h>

#include <stdio.h>

#include <stdlib.h>

#define MAX_VERTICES 50

typedef struct Graph_t

{

  int V;

  bool adj[MAX_VERTICES][MAX_VERTICES];

} Graph;

Graph* Graph_create(int V)

{

  Graph* g = malloc(sizeof(Graph));

  g->V = V;


  for (int i = 0; i < V; i++)

  {

    for (int j = 0; j < V; j++)

    {

      g->adj[i][j] = false;

    }

  }
```

```
    return g;

}

void Graph_destroy(Graph* g)

{

    free(g);

}


void Graph_addEdge(Graph* g, int v, int w)

{

    g->adj[v][w] = true;

}


void Graph_BFS(Graph* g, int s)

{

    bool visited[MAX_VERTICES];

    for (int i = 0; i < g->V; i++)

    {

        visited[i] = false;

    }




    int queue[MAX_VERTICES];

    int front = 0, rear = 0;
    visited[s] = true;

    queue[rear++] = s;


    while (front != rear)

    {


        s = queue[front++];

        printf("%d ", s);


        for (int adjacent = 0; adjacent < g->V;

             adjacent++)

        {

            if (g->adj[s][adjacent] && !visited[adjacent])

            {

                visited[adjacent] = true;

                queue[rear++] = adjacent;

            }

        }

    }

}


int main()

{
    Graph* g = Graph_create(4);

    Graph_addEdge(g, 0, 1);

    Graph_addEdge(g, 0, 2);

    Graph_addEdge(g, 1, 2);

    Graph_addEdge(g, 2, 0);

    Graph_addEdge(g, 2, 3);

    Graph_addEdge(g, 3, 3);

    printf("Following is Breadth First Traversal (starting from vertex 2) \n");

    Graph_BFS(g, 2);

    Graph_destroy(g);

    return 0;

}
```

OUTPUT:



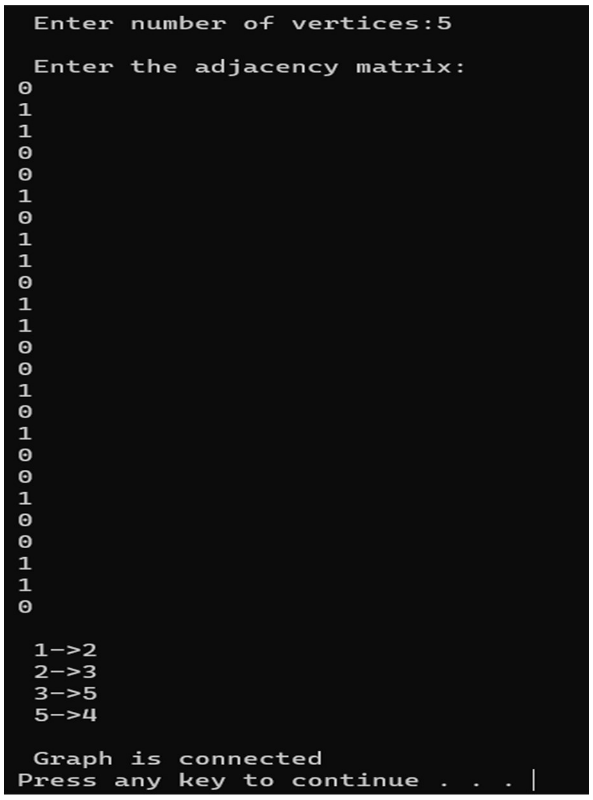
```
Following is Breadth First Traversal (starting from vertex 2)
2 0 3 1
Press any key to continue . . .
```

9b) Write a program to check whether given graph is connected or not using DFS method.

```
#include<stdio.h>

int a[20][20], reach[20], n;

void dfs(int v) {

   int i;

   reach[v] = 1;

   for (i = 1; i <= n; i++)

      if (a[v][i] && !reach[i]) {

         printf("\n %d->%d", v, i);

         dfs(i);

      }

}

int main() {

   int i, j, count = 0;

   printf("\n Enter number of vertices:");

   scanf("%d", &n);

   for (i = 1; i <= n; i++) {

      reach[i] = 0;

      for (j = 1; j <= n; j++)

         a[i][j] = 0;

   }

   printf("\n Enter the adjacency matrix:\n");

   for (i = 1; i <= n; i++)

      for (j = 1; j <= n; j++)
```

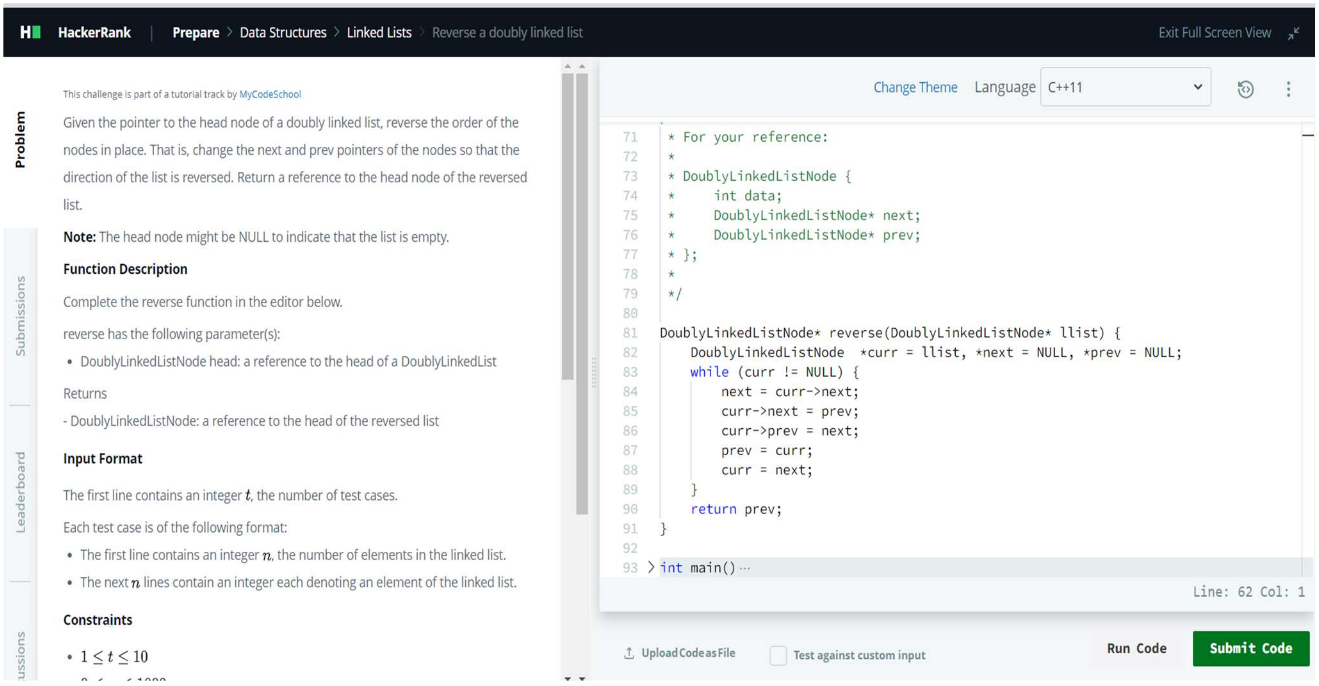
```
            scanf("%d", &a[i][j]);

    dfs(1);

    printf("\n");

    for (i = 1; i <= n; i++) {

        if (reach[i])

            count++;

    }

    if (count == n)

        printf("\n Graph is connected");

    else

        printf("\n Graph is not connected");

    return 0;

}
```

OUTPUT:



```
 Enter number of vertices:5

 Enter the adjacency matrix:
0
1
1
0
0
1
0
1
1
0
1
1
0
0
1
0
1
0
0
1
0
0
1
1
0

 1->2
 2->3
 3->5
 5->4

 Graph is connected
Press any key to continue . . . |
```

HackerRank : Reverse Doubly Linked List



This challenge is part of a tutorial track by MyCodeSchool

Given the pointer to the head node of a doubly linked list, reverse the order of the nodes in place. That is, change the next and prev pointers of the nodes so that the direction of the list is reversed. Return a reference to the head node of the reversed list.

Note: The head node might be NULL to indicate that the list is empty.

Function Description

Complete the reverse function in the editor below.

reverse has the following parameter(s):

- DoublyLinkedListNode head: a reference to the head of a DoublyLinkedList

Returns

- DoublyLinkedListNode: a reference to the head of the reversed list

Input Format

The first line contains an integer t, the number of test cases.

Each test case is of the following format:

- The first line contains an integer n, the number of elements in the linked list.
- The next n lines contain an integer each denoting an element of the linked list.

Constraints

- $1 \leq t \leq 10$

```
 * For your reference:
 *
 * DoublyLinkedListNode {
 *     int data;
 *     DoublyLinkedListNode* next;
 *     DoublyLinkedListNode* prev;
 * };
 *
 */

DoublyLinkedListNode* reverse(DoublyLinkedListNode* llist) {
    DoublyLinkedListNode  *curr = llist, *next = NULL, *prev = NULL;
    while (curr != NULL) {
        next = curr->next;
        curr->next = prev;
        curr->prev = next;
        prev = curr;
        curr = next;
    }
    return prev;
}

> int main() ···
```