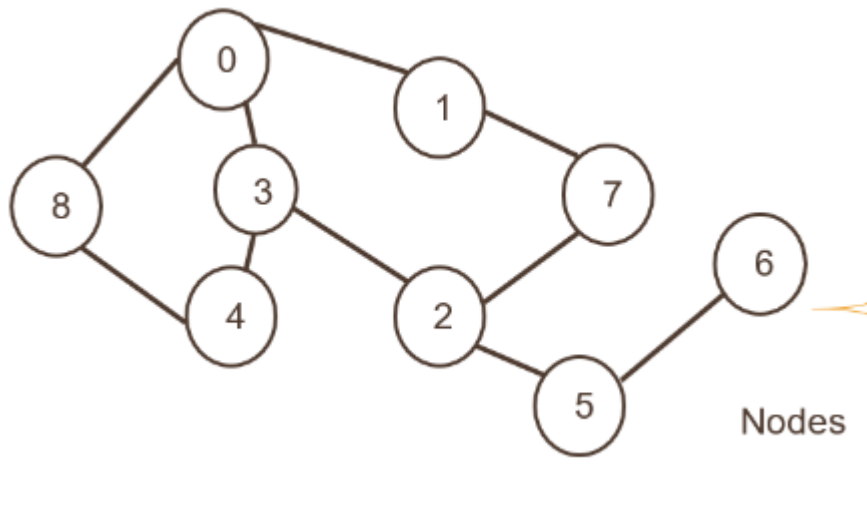


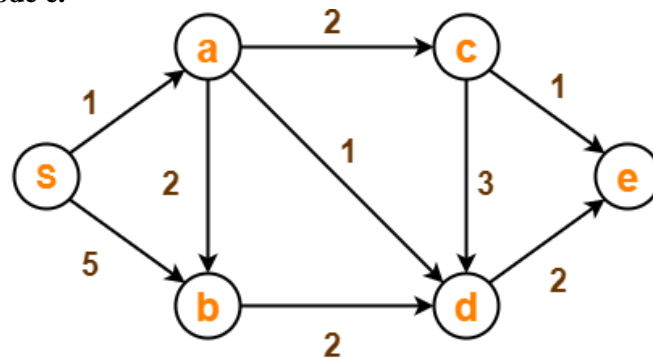
Exercise Lab 12

Tasks

1. Consider the below graph implement it using adjacent list method and then apply BFS and DFS traversal on the Graph.



2. Implement the below graph using the shortest path algorithm start with the node S and traverse to the node e.



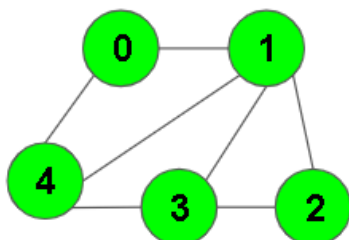
3. Given an undirected graph with **V** nodes and **E** edges, create and return an [adjacency list](#) of the graph. **0-based indexing** is followed everywhere.

Example 1:

Input:

$V = 5, E = 7$

edges = $\{(0,1),(0,4),(4,1),(4,3),(1,3),(1,2),(3,2)\}$



Output:

$\{\{1,4\},$
 $\{0,2,3,4\},$
 $\{1,3\},$
 $\{1,2,4\},$
 $\{0,1,3\}\}$

Explanation:

Node 0 is connected to 1 and 4.

Node 1 is connected to 0,2,3 and 4.

Node 2 is connected to 1 and 3.

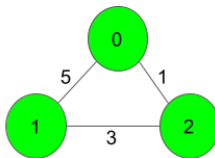
Node 3 is connected to 1,2 and 4.

Node 4 is connected to 0,1 and 3.

4. Given a weighted, undirected and connected graph of V vertices and E edges. The task is to find the sum of weights of the edges of the Minimum Spanning Tree. Given adjacency list adj as input parameters . Here adj[i] contains LinkedList of Edge Class of size 2, where the first integer in that edge class denotes the end of the edge and the second integer denotes the edge weight.

Input:

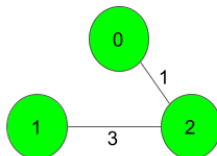
```
3 3
0 1 5
1 2 3
0 2 1
```



Output:

4

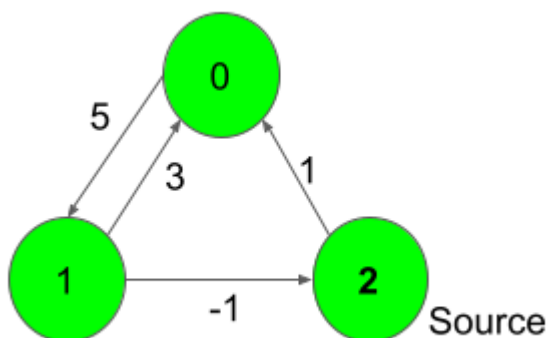
Explanation:



The Spanning Tree resulting in a weight of 4 is shown above.

5. Given a weighted, directed and connected graph of V vertices and E edges, Find the shortest distance of all the vertex's from the source vertex S. If a vertices can't be reach from the S then mark the distance as 10^8 . Note: If the Graph contains a negative cycle then return an array consisting of only -1.

Input:



$E = [[0,1,5],[1,0,3],[1,2,-1],[2,0,1]]$

$S = 2$

Output:

1 6 0

Explanation:

For nodes 2 to 0, we can follow the path-2-0. This has a distance of 1.

For nodes 2 to 1, we can follow the path-2-0-1, which has a distance of $1+5 = 6$,

6. Given a grid of size $n*m$ (n is the number of rows and m is the number of columns in the grid) consisting of '0's (Water) and '1's (Land). Find the number of islands.

Note: An island is either surrounded by water or boundary of grid and is formed by connecting adjacent lands horizontally or vertically or diagonally i.e., in all 8 directions.

Example 1:

Input:

grid = {{0,1},{1,0},{1,1},{1,0}}

Output:

1

Explanation:

The grid is-

0 1

1 0

1 1

1 0

All lands are connected.