

Theory Mid Term (Batch 02)

Marks

Problem-1

- a) Write down the advantages of bfs and dfs (At least 2)?
- b) Write down the disadvantages of bfs and dfs (At least 1)?

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Problem-2

What are the different ways to represent a graph? Describe With Example.

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Problem-3

Write down a c++ program to detect cycle in an **undirected** graph.

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Sample Input-	Sample Output-
<div>4 3 1 2 2 3 1 3</div> <hr/> <div>Explanation: Here, Number of node is 4 Number of edge is 3</div>	Cycle Exist
<div>3 2 1 2 2 3</div> <hr/> <div>Explanation: Here, Number of node is 3 Number of edge is 2</div>	No Cycle

Problem-4

You are given a positive integer n. The next line will contain n positive integers .Now calculate the total sum of the array.
Implement it using recursion.

Constraints-

$1 \leq n \leq 100$, $1 \leq A[i] \leq 1000$

****Write a C++ program for this problem****

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Sample Input -	Sample Output -
4 26 3 17 5	51

Problem-5

Bangladesh has n cities, and m roads between them.You can go from one city to another if there exists a path between those two cities.

The goal is to reach from city 1 to n.

Input -

The first input line has two integers n and m the number of cities and roads. The cities are numbered 1,2,...,n .After that, there are m lines describing the roads. Each line has two integers a and b. There is a road between those cities.A road always connects two different cities, and there is at most one road between any two cities.

Output - Print "YES" if your goal is possible, and "NO" otherwise.

Constraints-

$2 \leq n \leq 10^5$, $1 \leq m \leq 2 \cdot 10^5$, $1 \leq a, b \leq n$

****Write a C++ program for this problem****

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Sample Input-	Sample Output-
10 8	YES

1 3 3 4 3 6 4 6 2 5 1 7 3 10 9 8	
8 6 7 4 7 6 4 6 2 5 1 3 7 8	NO

Problem-6

You and some monsters are in a labyrinth. Your goal is to reach from cell A to one of the safe boundary cell. You can walk left, right, up and down. But you can't go to those cells, if there is a monster in that cell or the cell contains a wall. You can only go to the safe(.) cell.

Input -

The first input line has two integers n and m the height and width of the map. After this there are n lines of m characters describing the map. Each character is .(safe cell), # (wall), A (start), or M (monster). There is exactly one A in the input.

Output -

First print "YES" if your goal is possible, and "NO" otherwise.

If your goal is possible, also print any valid path (the length of the path and its description using characters D, U, L, and R).

Constraints-

$1 \leq n, m \leq 1000$

****Write a C++ program for this problem****

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Sample Input -	Sample Output -
5 8	YES

<pre> ..##### #M...A...# #.#.M#.# #M#...#... ..##### </pre>	5 RRDDR
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Explanation -

For the above map , the following are the boundary cells

(1,1),(1,2),(1,3),(1,4),(1,5),(1,6), (1,7), (1,8)

(1,1),(2,1),(3,1),(4,1),(5,1)

(1,8),(2,8),(3,8),(4,8),(5,8)

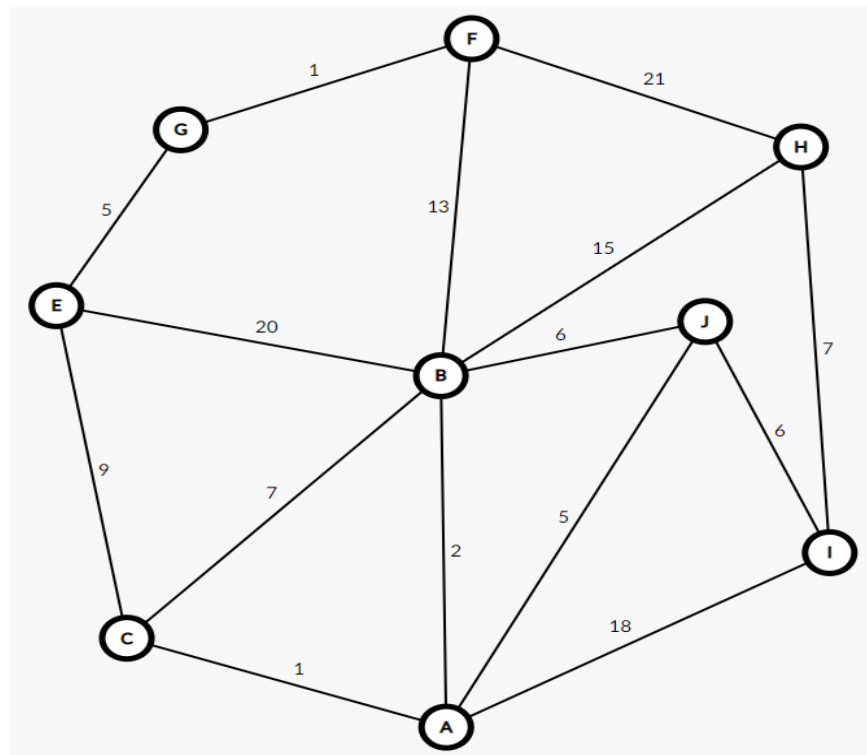
(5,1),(5,2),(5,3),(5,4),(5,5),(5,6),(5,7),(5,8)

and,

safe boundary cells are (1,1) ,(1,2),(5,1),(5,2),(5,4),(4,8)

Problem-7

Write the shortest distance from node E to every other node using the Dijkstra algorithm (the optimized version) for the following graph .You need to write all the steps. **15**



Problem-8

What is the recursive case in a recursive function and how does it relate to the base case? Explain it.

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