Assignment 5 - Coding Questions

Deadline: 17 November 2020, 11:55 PM IST

Instructions:
• Please submit the zip file containing code in CPP and response in pdf format. Also, mention the name and roll number of all group members, and only one submission is required per group.
• For those who have opted for individual submission, you need to mention your name, roll number, and group number.
The first two questions are of 4 marks each. The rest are for practice.

1. There is a 2D maze which consists of zombies, robots, and humans. Due to the unavailability of energy source robots are unable to move. The zombies also lack movements, but they are able to spread their virus to a unit block distance (in the top, bottom, left, and right directions)in one minute. All human beings are caught up in the traps and hence they are unable to move. If the zombie virus completely reaches the block containing humans, the humans will be converted into zombies.
Will there be anyone left alive? If yes print -1.
If not, then how much time does it take for zombies to convert every human being? (in minutes only)
Constraints:

1. 1 <= maze.length <= 10
2. 1 <= maze[0].length <= 10
3. maze[i][j] is only 0, 1, or 2.
   Where 0 stands for robots, 1 stands for human beings, 2 stands for zombies.

Input format:

First-line contains the number of rows (m) and column(n) respectively.

The next m line contains n elements of the array. [The jth element in the ith line represents the maze [i][j] block.

Sample Input :

3 3

2 0 2

1 1 0

0 1 1
Output:

4

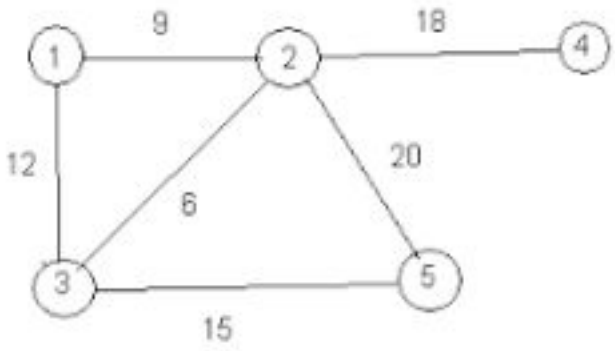
2. There are N cities in India and they are connected by M bidirectional roads. Each road is associated with some cost. Cost of roads are **distinct**. A Path is defined as a sequence of cities {c1, c2, c3 -- ck} such that every pair of adjacent cities in it is connected by a road. **Cost to travel a path is defined as the maximum cost among all the roads in that path.** You are given two cities (A & B) and some amount C. You need to find if it is possible to travel from city A to city B by using not more than C rupees. If it is possible then print the path from city A to city B whose cost is less than or equal to C.
Note: There exists a path between every pair of cities. Cities are numbered from 1 to N.

Input format :
First line contains three space-separated integers (values of N, M). Each of the next M lines contains three space-separated integers u, v, and c ($1 \leq u, v \leq N, u \neq v$, $1 \leq c \leq 10^9$) denoting that there is a road between city u and city v with cost c.
Next line contains three space-separated integers (values of A, B, C).

Output format :
Print “NOT POSSIBLE” if it is not possible to travel from city A to city B by using not more than C rupees, otherwise print “POSSIBLE” and in the next line print the required path from city A to city B. If there are multiple valid paths, print one of them.

Limits :-
2 <= N, M, T <= 5,000
1 <= u, v, A, B <= N
1 <= c, C <= 1,000,000,000

Sample 1:-
Input :-
5 6
1 2 9
2 4 18
1 3 12
2 3 6
2 5 20
3 5 15
1 5 15



Output :
POSSIBLE
1 3 5

Explanation :
It is possible to travel from 1 to 5 with at most 15 rupees (consider the path 1->3->5 with cost 15).
Another valid path can be 1->2->3->5.

Sample 2:-
Input :-
5 6
1 2 9
2 4 18
1 3 12
2 3 6
2 5 20
3 5 15
1 4 15

Output :
NOT POSSIBLE

Explanation :
It is not possible to travel from 1 to 4 with at most 15 rupees (you need at least 18 rupees to reach 4).

3. Rick and Morty are in a Maze. A Maze is a grid of NxM squares. The square at the i -throw from the top and the jth column from the left can be denoted by the square(i, j). square(i, j) is '#' if it is a wall and '&' if it is empty. Rick is in a square(ri, rj). Morty is trapped in a square(mi, mj) and cannot move. square(ri, rj) and square(mi, mj) are empty squares. Rick is on a mission to save Morty.
Rick can do the following two moves:-

1. Move to a horizontally or vertically adjacent empty square.
2. Use his portal gun to teleport himself to an empty square in the 5 × 5 area centered at the square he is currently in. In this case, he will have to pay T galactic credits to the galactic federation.

Find the minimum galactic credits Rick must have in order to save Morty.

Limits :-
2 <= N, M, T <= 5,000

1 <= ri, mi <= N
1 <= rj, mj <= M
square(ri, rj) and square(mi, mj) are different.

Input Format:-
First line contains three space-separated integers (values of N, M and T). Second line contains two space-separated integers (ri and rj).
Third line contains two space-separated integers (mi and mj).
Each of the next N lines contains a string of length M.
The j'th character of i’th string denotes square(i, j).

Output:-
print one integer (minimum galactic credits Rick must have in order to save Morty).

Sample:-
Input:-
5 5 2
1 1
5 5
+###+
+#+##
##+#+
+###+
+++++

Output:-
4

Explanation:-
In every possible path from square(1, 1) to (5, 5), Rick needs to use his portal gun at least two times. So Rick must pay 2 credits at least two times.