Clicky Virus

Assignment 2
Data Structures
Algorithms
Due date: 13 March, 2020

Problem Statement: There is a virus affecting the Hydrabit. Dr. AN and RK have been assigned by the government. Both of them decided to use divide and conquer method which they learned from their Teaching Assistants. Dr. AN being very lazy, decides to measure the effectiveness of the cure which he developed, whereas Dr. RK goes out in the field to contaminate the virus.
The city of Hydrabit is in the from of 2-D grid of size NxM. From each cell, one can move up, down, left or right as long as one remains in the city grid. Dr. RK is only theoretician, and thus Dr. RK takes the help of Mr. K, who has the powers of the flash(who can slow the time such that Mr. K can see the light travelling as well). Dr. RK asks Mr. K to contamine the virus and take it to the only city Hospital, Aarogya located at (N, M). There are D dead virus and L live virus in Hydrabit. Live virus has property of multiplying whereas dead virus doesn't have property of multiplying. Mr. K can contain live virus, but will die if Mr. K touches the dead virus. The task of Mr. K is to capture all the live virus, avoid the dead virus and reach the city Hospital Aarogya. Mr. K is spawned at (1, 1) and the task of Mr. K is to capture all the live virus and reach the hospital ALIVE in the minimum number of steps.

Note
To capture a live virus, Mr. K has to visit the cell containing the live virus. If Mr. K visits one cell, Mr. K captures all the viruses present in that cell in one go(live as well as the dead). Mr. K can visit a cell any number of time. There can be multiple virus in a cell, however, even a single dead cell is sufficient to kill Mr. K(just like a single wrong test case is sufficient to mess with the TAs). A cell **can** contain both live and dead virus. The dead and the live virus can also be present at the initial position and at the Aarogya. Also the time is frozen, so the live virus doesn't multiply.

Input
First line contains four space separated integers: N M D L.
The next D lines contains two space separated integers U V, indicating the location of dead virus.
The next L lines contain two space separated integers X Y, indicating the location of live virus.
Output
Print a single output, the minimum number of step in which Mr. K can capture all virus and reach the city Hospital, Aarogya ALIVE. Output -1 if it is not possible for Mr. K to achieve the task.

Constraints
$1 \leq N * M \leq 400$
$1 \leq N, M \leq 400$
$0 \leq L \leq 10$
$0 \leq D \leq N * M - L$
$1 \leq U, X \leq N$
$1 \leq V, Y \leq M$

Time Limit: 5 sec

Memory Limit: 256 MB

Sample Test Case

Input	Output
4 4 0 2 1 4 4 1	12
4 4 4 2 1 3 2 2 2 4 3 3 2 3 4 1	-1