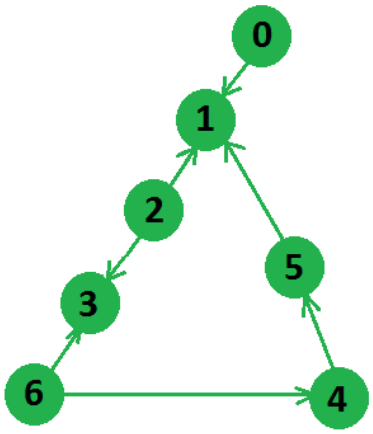
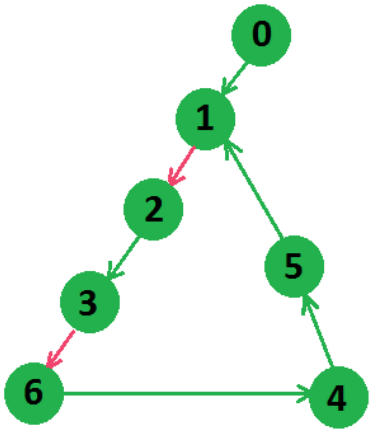
Question - 1

Given a directed, unweighted graph with n nodes and m edges, find the minimum number of edges to reverse so that there is a path from a source node (s) to a destination node (d).



Graph :
Source 0 Destination 6



Edge reversed: 1-2 and 3-6
to make path from 0 to 6

Question - 2

The Burning Question !!

Priyank accidently let it slip that Abhimanyu is simulataneously meeting multiple girls in his colony. Angered by this, Abhimanyu decided to take revenge and drastically decided to crash an aircraft into Priyank's building and set it on fire!!!
Today's date is 9+11=20 is this a coincidence??

Do not worry, this is not 9/11. Learning from that incident, the architect Priyank ensured that there are multiple fire exits located on each floor of the building in case of emergency (This situation qualifies),some of which are secret tunnels that are not neccessarily located on edges of the room. However, people cannot walk directly from their position to an exit out because the fire has caused some portions of the floor to be blocked by fallen obstacles. The head of the fire engine department, Chintan has sent a group of fire engines to douse the flames and evacute the building. The onsite officer Adarsh has obtained a floorwise map of the building, described as follows:
1. The building consists of F floors each of dimension N*M
2. Each cell (i,j) is either a person (marked by 'P'), an obstacle (marked as 'O'), an exit (marked by 'E') or empty (marked by '.')

The evacuation procedure is as follows:
1. A person "P" can move from (i,j) to (i+1,j),(i-1,j),(i,j+1),(i,j-1) in 1s
2. The person must leave the building only from a designated exit "E"
3. Multiple people can occupy the same cell during evacuation because of the crowd present and the number of lives at stake.

Help Adarsh plan an evacution that takes minimum amount of time so that he can impress his chief. You need to report the minimum time needed to evacute all people from each floor of the building. It may be possible that some people are stuck and cannot be evacuated from the building at all. In such a case, report "-1" stating operation failure.

Input Format

1. First line contains a single integer F, the number of floors in the building
2. Second line contains two integers N,M respectively the rows and columns to represent a floor map
3. Each floor is then described by N lines each containing M characters

Constraints

1<=F<=100
1<=N,M<=1000
N*M<=10^4

Output Format

For each floor, print the minimum evacuation time required and print -1 if it is not possible

Sample Input 0

```
1
4 5
POEOP
..P..
.EO..
..OP.
```

Sample Output 0

```
4
```

Explanation 0

P at (0,0) will leave from exit at (2,1) in 3s
P at (0,4) will leave from exit at (0,2) in 4s
P at (1,2) will leave from exit at (0,2) in 1s
P at (3,3) will leave from exit at (0,2) in 4s

This optimal plan will take 4s to execute.

Sample Input 1

```
1
4 4
PO.E
.OP.
.OEP
.O..
```

Sample Output 1

```
-1
```

Explanation 1

P at (0,0) cannot reach any exit so mission fails. Hence -1

Question - 3

Given an undirected, unweighted graph with n nodes and m edges, find all the nodes which fall on some shortest path from a source node (s) to destination node (d). Now, try the same question for a directed, unweighted graph.

Question - 4

Rick – The Explorer !!

Rick needs to travel from city U to city V. Being quite an explorer, he wanted to travel exactly once by roadways as well as by railways. Rick should start from city U and go to some city Z by roadways only. He can traverse one or more than one edges between U and Z by road. From city Z, he must go to city V by railways only. He can use railways one or more than one times between city Z and city V. Or, he can also go from city U to city Z by railways only and then from city Z to city V by roadways only. The distance of all cities was known to him, since he had a map that showed not only the paths connecting all cities with roadways, but it also showed all paths connecting all cities with railways. Since Rick is now old and slow at calculation, help him find the minimum total distance he must travel, so that he goes from city U to city V, and travels by both - roadways as well as railways, exactly once.

Input Format

First line contains a single integer N - the number of cities

N lines follow, each containing N space-separated natural numbers.

These N lines represent the roadways distance-matrix of size N x N. Aij represents the length of the road from city i to city j.

N more lines follow, each containing N space-separated natural numbers.

These N lines represent the railways distance-matrix of size N x N. Bij represents the length of the railway from city i to city j.

The last line contains 2 space-separated integers - U and V - the starting and ending points respectively.

Constraints

$3 \leq N \leq 1250$

$0 \leq Aij, Bij \leq 100$

$1 \leq U, V \leq N$

$U \neq V$

Output Format

Print a single natural number - the minimum distance Rick must travel to satisfy the above-mentioned criteria.

Sample Input 0

```
3
0 1 2
3 0 4
5 6 0
0 6 5
1 0 4
3 2 0
1 2
```

Sample Output 0

```
4
```

Explanation 0

Explanation Rick can go from 1 to 3 by roadway, and 3 to 2 by railway.

Distance between 1 and 3 by roadway = 2

Distance between 3 and 2 by railway = 2

Total distance travelled = 4

Question - 5

Given an undirected, weighted graph, a source and a destination node find the shortest path between them such that the path contains alternating even and odd edges.

Question – 6

You are given an undirected weighted graph **G(V, E)** with **N** vertices and **M** edges.

Here **V** refers to the set of vertices and **E** refers to the set of edges.

The vertices are numbered as follow: **0, 1, ..., N - 1**.

You are also given two sets **A** and **B**, both of which are a subset of **V**.

You are taking part in a relay race. The race requires a team of three people.

The race begins at the vertex **0**, where you are standing. You can go to any one of the vertices from set **A** where your teammate is waiting. He then goes to any one of the vertices from set **B** where the third teammate is waiting. The third teammate then has to go to the finish point, vertex **N - 1**.

Being a dijkstra problem, you have to, of course, find the shortest path such that it satisfies the conditions of this race.

Once again, the path starts from the vertex **0**. Then goes to at least one vertex from set **A**. Followed by at least one vertex from set **B**. And then finally goes to node **N - 1**.

You need to print the length of the shortest path.

The graph is guarranteed to be connected. The intersection of **A** and **B** is the empty set, meaning no vertex is in both **A** and **B**. Also, neither **0** nor **N - 1** are a part of either **A** or **B**.

Input Format

First line contains four space seperated integers, **N**, **M**, **A**, **B**, the number of nodes, the number of edges, the number of elements in set A and the number of elements in set B respectively.
The next line contains **A** space seperated integers, the elements of set A.
The next line contains **B** space seperated integers, the elements of set B.
Next **M** lines contain three space seperated integers, **u, v, w**, indicating that there is an edge between vertices u and v with weight w.

Constraints

5 <= N <= 100000
5 <= M <= 200000
1 <= |A| <= 100000
1 <= |B| <= 100000
1 <= elements in set A and B <= N - 2
1 <= edge weights <= 1000

Output Format

Output a single integer, the required shortest path.

Sample Input

6 8 1 2
3
1 2
0 1 2
0 2 3
0 3 6
1 3 3
2 3 4
2 4 3
3 5 5
4 5 2

Sample Output

14

Explanation

0 -> 1 -> **3** -> **2** -> 4 -> 5