2-D ARRAY
1)Valid Initial Configuration

Nurikabe logical game (sometimes called Islands in the Stream) is a binary determination puzzle. The puzzle is played on a typically rectangular grid of cells, some of which contain numbers. You must decide for each cell if it is white or black (by clicking on them) according to the following rules:

- All of the black cells must be connected.
- Each numbered cell must be part of a white island of connected white cells.
- Each island must have the same number of white cells as the number it contains (including the numbered cell).
- Two islands may not be connected.
- There cannot be any 2x2 blocks of black cells.

Unnumbered cells start out grey and cycle through white and black when clicked. Initially numbered cells are white in color.

Problem Statement:
Write a program to check whether the given board configuration is a valid initial configuration. Below figure is the sample valid initial configuration.

Input Format:
First line of the input is an integer N that gives the number of rows and columns of the grid. Next N lines will have the board configuration with N*N cells. Assume that the maximum number in a cell can be 10. Grey colored cells are represented by the integer 20 in the matrix representation of the input configuration.

Output Format:
Output "Yes" (without quotes) if the given configuration is a valid initial configuration. Print "No" otherwise (without quotes).
Refer sample input and output for formatting specifications.

Sample Input 1:
5
20 20 1 20 3
20 20 20 20 20
20 20 20 20 20
20 20 20 20 20
6 20 3 20 20

Sample Output 1:
Yes

Sample Input 2:
5
20 20 1 20 3
20 20 20 20 20
20 20 12 20 20
20 20 20 20 20
6 20 3 20 20

Sample Output 2:
No

2)Count of Numbered Cells

Nurikabe logical game (sometimes called Islands in the Stream) is a binary determination puzzle. The puzzle is played on a typically rectangular grid of cells, some of which contain numbers. You must decide for each cell if it is white or black (by clicking on them) according to the following rules:

- All of the black cells must be connected.
- Each numbered cell must be part of a white island of connected white cells.
- Each island must have the same number of white cells as the number it contains (including the numbered cell).
- Two islands may not be connected.
- There cannot be any 2x2 blocks of black cells.

Unnumbered cells start out grey and cycle through white and black when clicked. Initially numbered cells are white in color.

Problem Statement:
Write a program to find the count of numbered cells, given a valid initial board configuration. Below figure is the sample valid initial configuration.

Input Format:
First line of the input is an integer N that gives the number of rows and columns of the grid. Next N lines will have a valid initial board configuration with N*N cells. Assume that the maximum number in a cell can be 10. Grey colored cells are represented by the integer 20 in the matrix representation of the input configuration.

Output Format:
Output should display an integer that gives the count of numbered cells, given a valid initial board configuration.
Refer sample input and output for formatting specifications.

Sample Input 1:
5
20 20 1 20 3
20 20 20 20 20
20 20 20 20 20
20 20 20 20 20
6 20 3 20 20

Sample Output 1:
4

Sample Input 2:
9
20 5 20 20 3 20 20 20 20
20 20 8 20 20 20 20 5 20
20 20 20 20 20 20 2 20 20
20 20 20 20 20 20 20 20 20
20 20 20 20 20 20 20 20 20
20 20 20 20 20 20 20 20 20
20 20 3 20 20 20 20 20 20
20 3 20 20 20 20 3 20 20
20 20 20 20 1 20 20 6 20

3)Number of White Cells

Nurikabe logical game (sometimes called Islands in the Stream) is a binary determination puzzle. The puzzle is played on a typically rectangular grid of cells, some of which contain numbers. You must decide for each cell if it is white or black (by clicking on them) according to the following rules:

- All of the black cells must be connected.
- Each numbered cell must be part of a white island of connected white cells.
- Each island must have the same number of white cells as the number it contains (including the numbered cell).
- Two islands may not be connected.
- There cannot be any 2x2 blocks of black cells.

Unnumbered cells start out grey and cycle through white and black when clicked. Initially numbered cells are white in color.

Problem Statement:
Write a program to find the number of white cells in the final configuration of the board, given a valid initial configuration. Below figure is the sample valid initial configuration.

Input Format:
First line of the input is an integer N that gives the number of rows and columns of the grid. Next N lines will have a valid initial board configuration with N*N cells. Assume that the maximum number in a cell can be 10. Grey colored cells are represented by the integer 20 in the matrix representation of the input configuration.

Output Format:
Output should display an integer that the number of white cells in the final configuration of the board.
Refer sample input and output for formatting specifications.

Sample Input 1:
5
20 20 1 20 3
20 20 20 20 20
20 20 20 20 20
20 20 20 20 20
6 20 3 20 20

Sample Output 1:
13

Sample Input 2:
5
20 20 20 20 20
3 20 20 6 20
20 20 20 20 20
20 2 20 20 1
20 20 20 20 20

Sample Output 2:
12

4)Highest Valued Number

Nurikabe logical game (sometimes called Islands in the Stream) is a binary determination puzzle. The puzzle is played on a typically rectangular grid of cells, some of which contain numbers. You must decide for each cell if it is white or black (by clicking on them) according to the following rules:

- All of the black cells must be connected.
- Each numbered cell must be part of a white island of connected white cells.
- Each island must have the same number of white cells as the number it contains (including the numbered cell).
- Two islands may not be connected.
- There cannot be any 2x2 blocks of black cells.

Unnumbered cells start out grey and cycle through white and black when clicked. Initially numbered cells are white in color.

Problem Statement:

Write a program to find the highest valued number in the numbered cells, given a valid initial board configuration. Below figure is the sample valid initial configuration.

Input Format:
First line of the input is an integer N that gives the number of rows and columns of the grid. Next N lines will have a valid initial board configuration with N*N cells. Assume that the maximum number in a cell can be 10. Grey colored cells are represented by the integer 20 in the matrix representation of the input configuration.

Output Format:
Output should display the highest valued number in the numbered cells.
Refer sample input and output for formatting specifications.

Sample Input 1:
5
20 20 1 20 3
20 20 20 20 20
20 20 20 20 20
20 20 20 20 20
6 20 3 20 20

Sample Output 1:
6

Sample Input 2:
5
20 20 20 20 4
1 20 20 20 20
20 20 20 20 20
20 2 20 20 20
20 20 20 20 20

5)Full Islands

Nurikabe logical game (sometimes called Islands in the Stream) is a binary determination puzzle. The puzzle is played on a typically rectangular grid of cells, some of which contain numbers. You must decide for each cell if it is white or black (by clicking on them) according to the following rules:

- All of the black cells must be connected.
- Each numbered cell must be part of a white island of connected white cells.
- Each island must have the same number of white cells as the number it contains (including the numbered cell).
- Two islands may not be connected.
- There cannot be any 2x2 blocks of black cells.

Unnumbered cells start out grey and cycle through white and black when clicked. Initially numbered cells are white in color.

Problem Statement:

The step 1 of solving the puzzle is identifying "Full islands".
An island is full if it contains as many white cells as the number in the region. Any 1s are trivially full regions. When you encounter a full region, any cells that boarder it must be black. Here we show the cells that must be black due to a single celled white island.

Initial Board Configuration → Step 1 → Identified Full Island
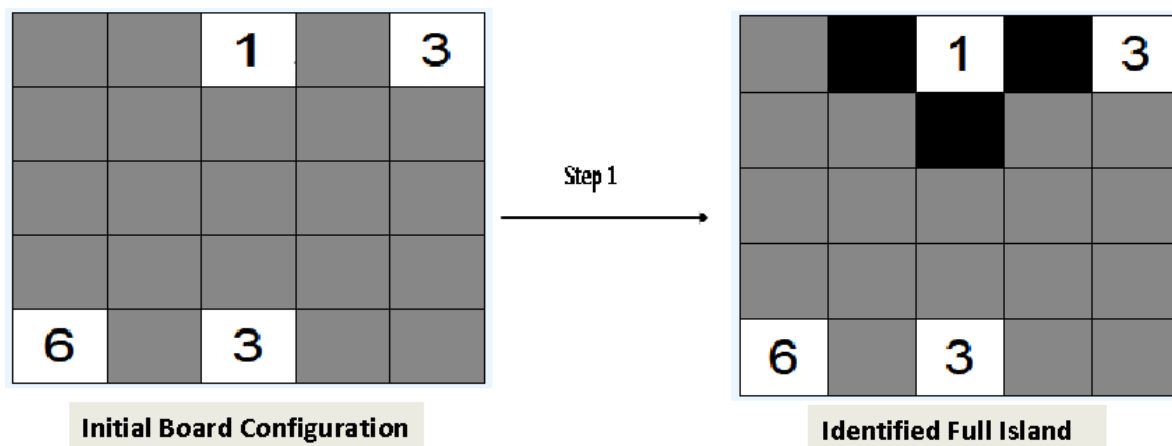
Write a program that when given the initial board configuration will identify the full islands.

Input Format:

First line of the input is an integer N that gives the number of rows and columns of the grid.
Next N lines will have a valid initial board configuration with N*N cells. Assume that the maximum number in a cell can be 10. Grey colored cells are represented by the integer 20 in the matrix representation of the input configuration.

Output Format:

Output should display the board configuration with N*N cells after applying step 1. Grey colored cells are represented by the integer 20, numbered cells are represented by the same number given in the input and black cells are represented by 0.
Refer sample input and output for formatting specifications.

Sample Input 1:
5
20 20 1 20 3
20 20 20 20 20
20 20 20 20 20
20 20 20 20 20
6 20 3 20 20

Sample Output 1:
20 0 1 0 3
20 20 0 20 20
20 20 20 20 20
20 20 20 20 20
6 20 3 20 20

Sample Input 2:
5
20 20 20 20 20
3 20 20 6 20
20 20 20 20 20
20 2 20 20 1
20 20 20 20 20

Sample Output 2:
20 20 20 20 20
3 20 20 6 20
20 20 20 20 0
20 2 20 0 1
20 20 20 20 0

6)Identify Neighbor Numbers

Nurikabe logical game (sometimes called Islands in the Stream) is a binary determination puzzle. The puzzle is played on a typically rectangular grid of cells, some of which contain numbers. You must decide for each cell if it is white or black (by clicking on them) according to the following rules:

- All of the black cells must be connected.
- Each numbered cell must be part of a white island of connected white cells.
- Each island must have the same number of white cells as the number it contains (including the numbered cell).
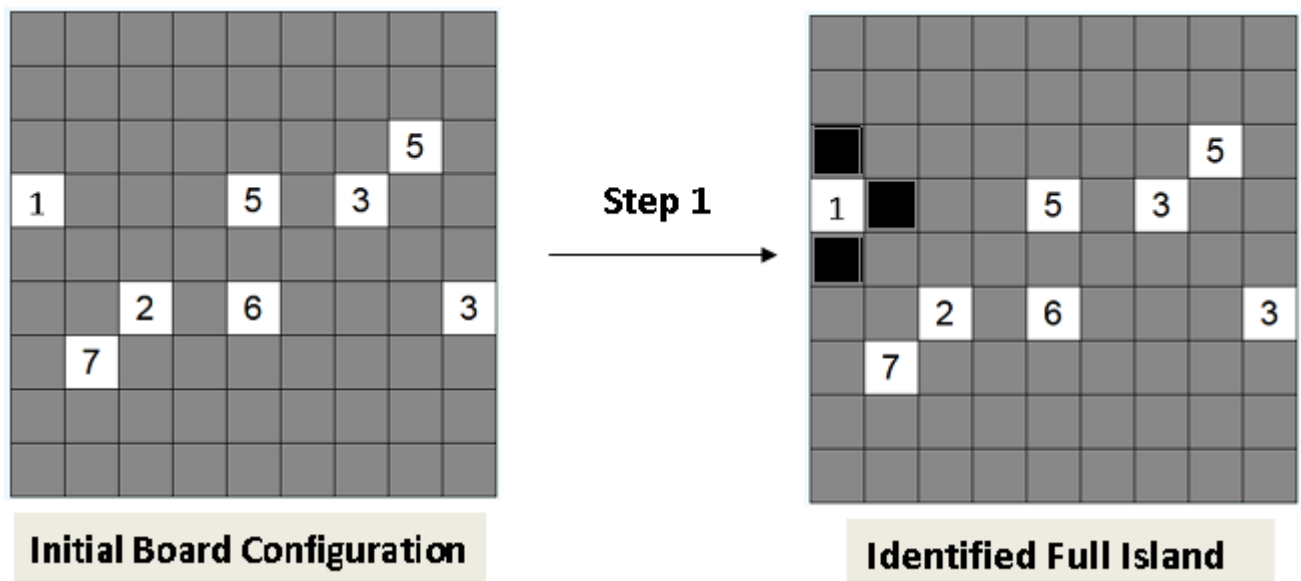
- Two islands may not be connected.
- There cannot be any 2x2 blocks of black cells.

Unnumbered cells start out grey and cycle through white and black when clicked. Initially numbered cells are white in color.
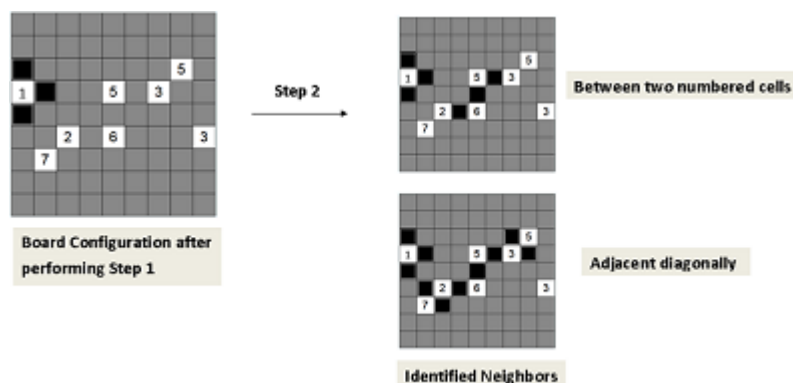
Problem Statement:
The step 1 of solving the puzzle is identifying "Full islands".
Below figure is the one after identifying full islands.

Initial Board Configuration   Step 1   Identified Full Island

The step 2 of solving the puzzle is to identify the neighbors.
Since two numbers in a nurikabe puzzle cannot be part of the same island, any cell that has two numbered neighbors must be black. The two cases are when a cell is between two numbered cells, or (as in the image) when two numbered cells in the nurikabe are adjacent diagonally.

Board Configuration after
performing Step 1   Step 2   Between two numbered cells

Adjacent diagonally

Identified Neighbors

Given the board configuration after performing step 1. Write a program to find the board configuration after the step 2.

Input Format:

First line of the input is an integer N that gives the number of rows and columns of the grid. Next N lines will have a board configuration with N*N cells after performing step1. Assume that the maximum number in a cell can be 10. Grey colored cells are represented by the integer 20 in the matrix representation of the input configuration.

Output Format:

Output should display the board configuration with N*N cells after applying step 2. Grey colored cells are represented by the integer 20, numbered cells are represented by the same number given in the input and black cells are represented by 0.
Refer sample input and output for formatting specifications.

Sample Input 1:

9
20 20 20 20 20 20 20 20 20
20 20 20 20 20 20 20 20 20
0 20 20 20 20 20 20 5 20
1 0 20 20 5 20 3 20 20
0 20 20 20 20 20 20 20 20
20 20 2 20 6 20 20 20 3
20 7 20 20 20 20 20 20 20
20 20 20 20 20 20 20 20 20
20 20 20 20 20 20 20 20 20

Sample Output 1:

20 20 20 20 20 20 20 20 20
20 20 20 20 20 20 20 20 20
0 20 20 20 20 20 0 5 20
1 0 20 20 5 0 3 0 20
0 20 20 20 0 20 20 20 20
20 0 2 0 6 20 20 20 3
20 7 0 20 20 20 20 20
20 20 20 20 20 20 20 20 20
20 20 20 20 20 20 20 20 20

Sample Input 2:

5
20 2 20 20 20
3 20 20 6 20
20 20 20 20 0
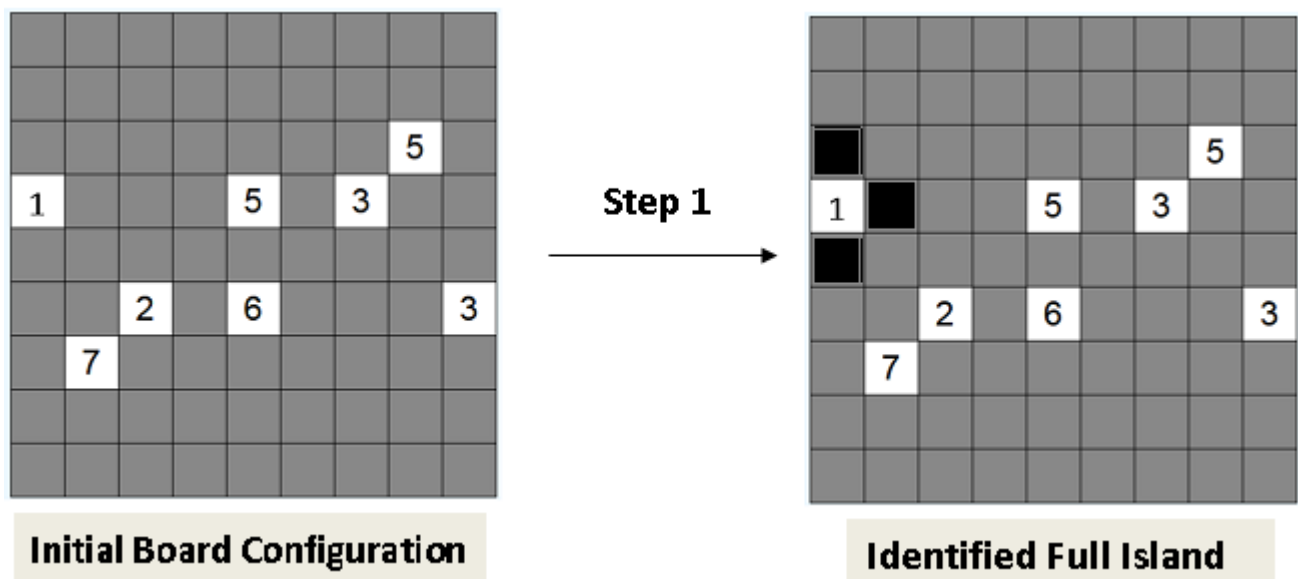20 2 20 0 1
20 20 20 20 0

7)Valid Configuration

Nurikabe logical game (sometimes called Islands in the Stream) is a binary determination puzzle. The puzzle is played on a typically rectangular grid of cells, some of which contain numbers. You must decide for each cell if it is white or black (by clicking on them) according to the following rules:

- All of the black cells must be connected.
- Each numbered cell must be part of a white island of connected white cells.
- Each island must have the same number of white cells as the number it contains (including the numbered cell).
- Two islands may not be connected.
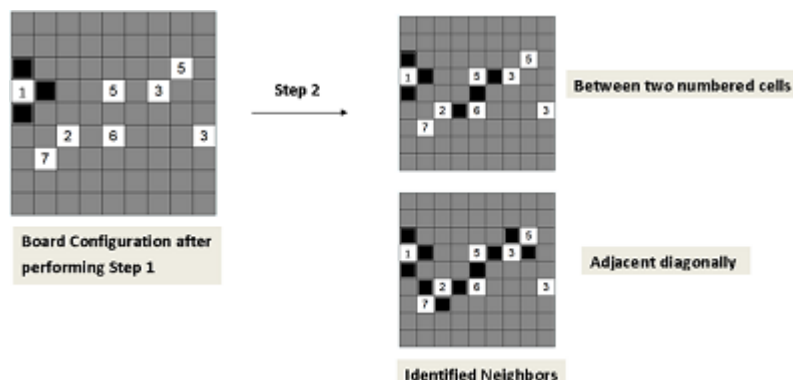- There cannot be any 2x2 blocks of black cells.

Unnumbered cells start out grey and cycle through white and black when clicked. Initially numbered cells are white in color.

Problem Statement:
The step 1 of solving the puzzle is identifying "Full islands".
Below figure is the one after identifying full islands.

Initial Board Configuration   Identified Full Island

The step 2 of solving the puzzle is to identify the neighbors.
Since two numbers in a nurikabe puzzle cannot be part of the same island, any cell that has two numbered neighbors must be black. The two cases are when a cell is between two numbered cells, or (as in the image) when two numbered cells in the nurikabe are adjacent diagonally.

Board Configuration after performing Step 1

Step 2

Between two numbered cells

Adjacent diagonally

Identified Neighbors

Given a board configuration in which empty white cells are represented by -1, black cells are represented by 0 and grey cells are represented by 20. Write a program to find whether it is a valid configuration assuming it to be obtained after performing step 1 and 2.

Input Format:
First and only line of input is an integer N that gives the number of rows and columns of the grid.
Next N lines will have a board configuration with N*N cells assuming it to be obtained after performing step 1 and step 2. Assume that the maximum number in a cell can be 10. Grey colored cells are represented by 20, empty white cells are represented by -1 and black cells are represented by 0 in the matrix representation of the input configuration.

Output Format:
Output should display "Yes" (without quotes) if the given configuration is a valid one obtained after performing step 1 and 2 of the nurikabe puzzle. Print "No" otherwise.
Refer sample input and output for formatting specifications.
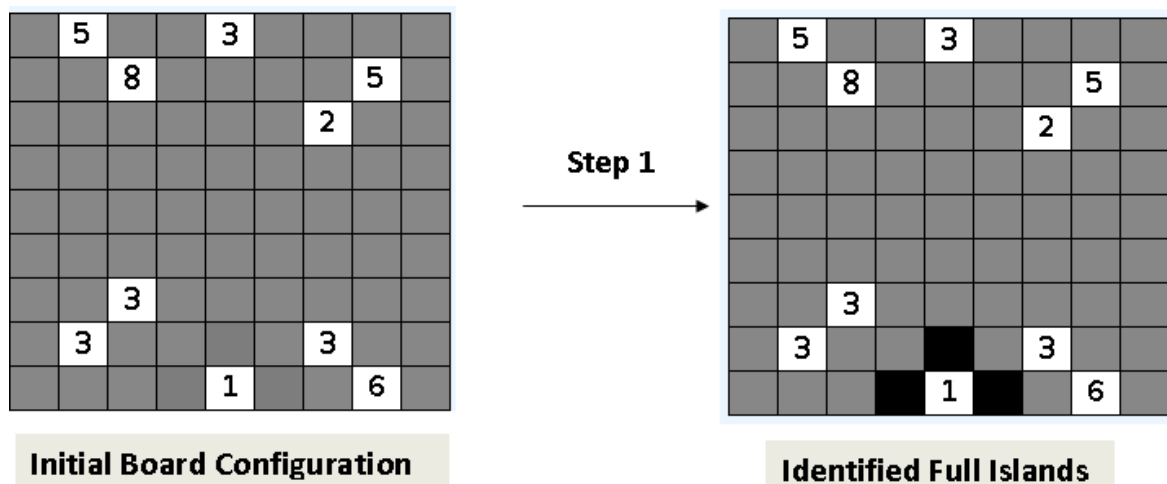
8)Single Expansion Route

Nurikabe logical game (sometimes called Islands in the Stream) is a binary determination puzzle. The puzzle is played on a typically rectangular grid of cells, some of which contain numbers. You must decide for each cell if it is white or black (by clicking on them) according to the following rules:

- All of the black cells must be connected.
- Each numbered cell must be part of a white island of connected white cells.
- Each island must have the same number of white cells as the number it contains (including the numbered cell).
- Two islands may not be connected.
- There cannot be any 2x2 blocks of black cells.

Unnumbered cells start out grey and cycle through white and black when clicked. Initially numbered cells are white in color.

Problem Statement:
The step 1 of solving the puzzle is identifying "Full islands".
Below figure is the one after identifying full islands.

Initial Board Configuration

Identified Full Islands

The step 2 of solving the puzzle is to identify the neighbors.
Since two numbers in a nurikabe puzzle cannot be part of the same island, any cell that has two numbered neighbors must be black. The two cases are when a cell is between two numbered cells, or (as in the image) when two numbered cells in the nurikabe are adjacent diagonally.

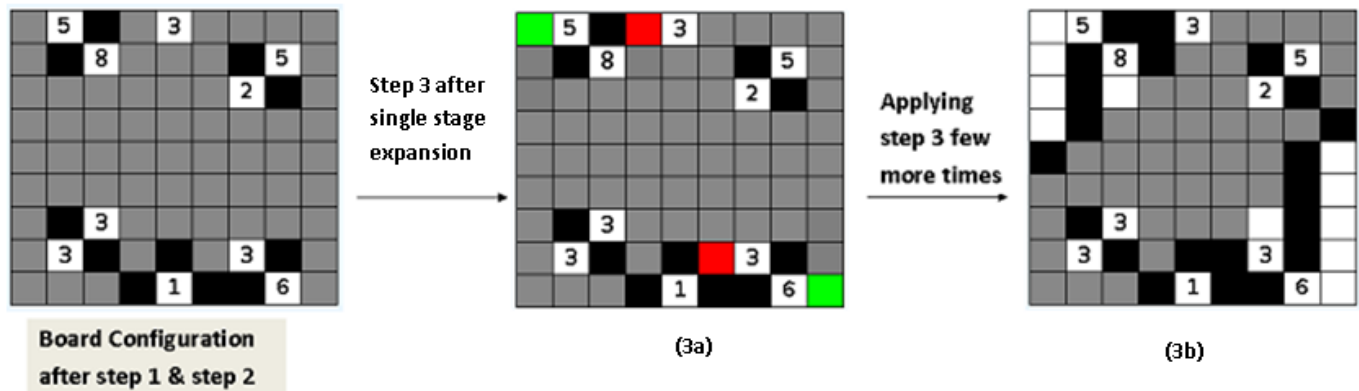**Board Configuration after step 1**

Identified Neighbors
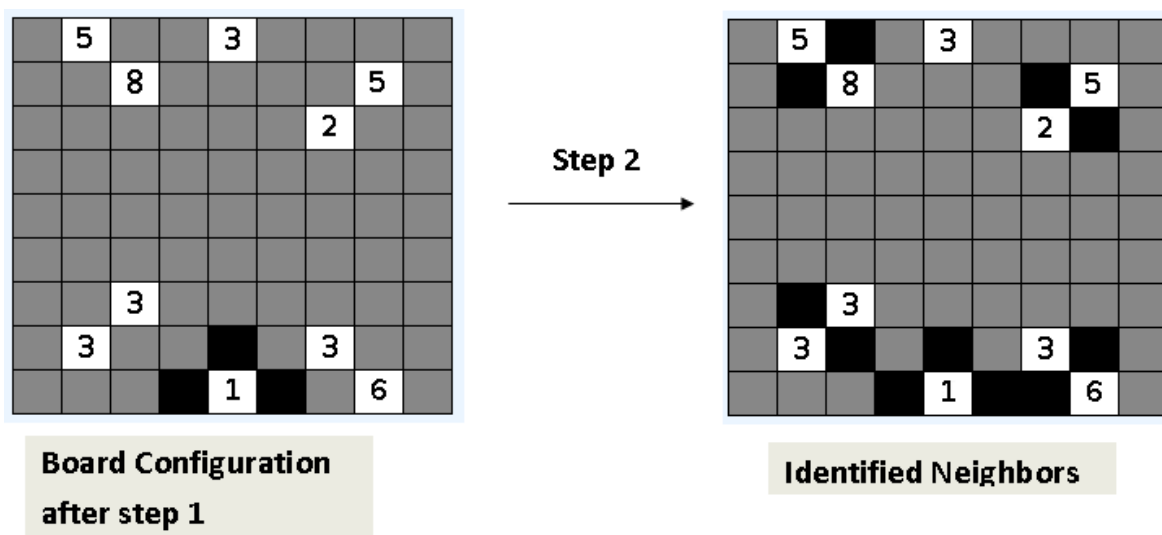
After performing step 1 and step 2 as given in the previous problem descriptions, the step 3 in solving the nurikabe puzzle is the single expansion path.
If an island in the nurikabe doesn't yet have its target number of cells, and there is only one cell bordering it that is not the opposite color, that cell must be part of the region. Note that this applies to black regions within the nurikabe, too, and to white regions that don't yet have a number. Here we show in red black cells into which black regions of the nurikabe must expand, and in green cells into which white regions must expand.

For example,
Consider the below figure, among all the numbered cells only the numbered cells 5 and 6 has single expansion path to attain its target number of cells.

The image (3a) depicts step 3 after single stage of expansion of white and black

cells i.e, Green coloured cell refers to the first stage of single expansion path of numbered cells 5 and 6 and Red coloured cell refers to the first stage of single expansion path of black cell.

The image (3b) depicts the final stage of board after applying step 3.

Board Configuration after step 1 & step 2

(3a)

(3b)

In this problem, write a program to find the coordinates of the numbered cells for which only single expansion route is present after single stage expansion, given a valid board configuration obtained after performing step 1 and step 2.

Input Format:
First and only line of input is an integer N that gives the number of rows and columns of the grid.
Next N lines will have a board configuration with N*N cells that is assumed to be obtained after performing step 1 and step 2. Assume that the maximum number in a cell can be 10. Grey colored cells are represented by 20 and black cells are represented by 0 in the matrix representation of the input configuration.

Output Format:
Output should display the coordinates of the numbered cells which has single expansion path. If no numbered cells has single expansion path, then display -1.
Assume that the cell coordinates starts from (1,1) till (N,N).
Refer sample input and output for formatting specifications.

Sample Input 1:
5
0 2 20 20 20
3 0 20 6 20
20 20 20 20 0
20 2 20 0 1
20 20 20 20 0

Sample Output 1:
1 2
2 1

Sample Input 2:

```
5
20 20 20 20 20
3 20 20 6 20
20 20 20 20 0
20 2 20 0 1
20 20 20 20 0
```

Sample Output 2:
-1

9)Collisions of Events

Lucarnos Film Festival is an annual film festival and is also known for being a prestigious platform for art house films. This year at the Lucarnos Film festival there are many movies to be screened, each of different genre ranging from drama movies to comedy ones and teen movies to horror ones. The festival is a long-running event this time as the organizers are planning to screen only one movie per day. The organizers have populated their schedule in the form of a matrix where 'i' is the movie number and 'j' is the day number. E_{ij} is the movie preference dates.

You are given a matrix **E** of **N** rows and **M** columns where E_{ij} is **1** if the **i-th** movie is to be screened on **j-th** day, otherwise it will be 0. Note that it is not necessary that if a movie **x** will be screened on day **y**, then day **y** should screen only movie **x**.

You know that if there are two different movies **x** and **y**, which are to be screened on the same day **z**, and then there will be a collision. Can you calculate the number of different collisions at this movie festival? Note that order of movies in the collision doesn't matter.

Input Format:
The first line of the input contains two space separated integers **N**, **M** denoting the number of movies and days, respectively.
Each of the following **N** lines contain **M** characters, each of them is either **'0'** or **'1'**.

Output Format:
Output a single line containing an integer corresponding to the number of collisions at the film festival.
Refer sample input and output for formatting specifications.

Sample Input 1:
```
4 3
111
100
110
000
```

Sample Output 1:
4

10)Robot at the Fair

Winter is back and is end of season's sale all over. The City's biggest Housewares and Home Appliances Fair is inaugurated at the Mathura Trade Centre and the show hosted numerous retailers, wholesalers, distributors to promote domestic economy. Public participated in large groups and the Event coordinators have designed a Robot at the Event ground to give instructions to the public in which directions to move.

The Event ground is a rectangular grid with R rows and C columns, with R*C cells in the grid. There are many obstacles in the event ground, so the Robot is set initially in the cell such that it is facing north, south, east or west. The initial position of the Robot (X,Y) is known. It can take a series of *m* moves through the ground. Each move is one of:

- F - moves forward one cell in the direction that he is facing, or
- L - turns 90 degrees counter-clockwise, remaining on the same cell, or
- R - turns 90 degrees clockwise, remaining on the same cell.

After making these moves, the Robot would stand at some final position where the guests wanted to drop. The coordinators wanted you to figure out where the Robot is standing. You will help them by writing a program to determine the final position of the Robot. You may also assume that the Robot is always facing a direction that is parallel to the sides of the event ground (north, south, east, or west).

Input Format:
The input begins with R and C (1 ≤ R ≤ 50; 1 ≤ C ≤ 80), each on a separate line. Next R lines consists of C characters describing the event ground: a period character denotes a cell the Robot may walk through; a capital X character denotes a cell with an obstacle.
Next line of the input consists of two integers X and Y (1 ≤ X ≤ R; 1 ≤ Y ≤ C), which corresponds to the initial position of the Robot.
Below the grid is the number *m* (0 ≤ *m* ≤ 30000) followed by *m* lines describing Robot's moves. Each line has a single character: F, L, or R.

Output Format:
Output in separate line each of the co-ordinates(separated by a space) of the final

position of the Robot in the event ground.
Refer sample input and output for formatting specifications.

Sample Input 1:
2 4

. . . .
. X X .
0 2
1
F

Sample Output 1:
0 1
0 3

Sample Input 2:
2
4

. . . .
. X X .
0 2
3
F
R
F

Sample Output 2:
1 3