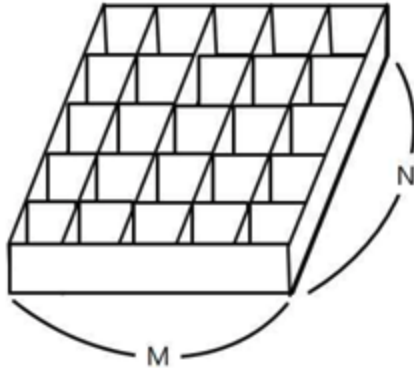# Tomato Farm

Tom has a large tomato farm back in Vietnam. His tomatoes are placed in a box as shown in the picture below.

Some of the tomatoes stored in his warehouse are ripe, but some may still be green(unripe). Each day, unripe tomatoes adjacent to ripe tomatoes ripen under the influence of ripe tomatoes. (adjacent = left, right, front, back) Tom wants to know if the tomatoes stored in the warehouse are ready to be cooked in a few days.

Given the size of the grid-shaped boxes and the information about ripe tomatoes and unripe tomatoes, write a program to calculate how many days it takes for all the tomatoes to ripen.

Input Specification
First line: M N (M: width, N: height where 2 <= M, N <= 1000)
Next N lines: 0s and 1s where 0(unripe tomatoes), 1(ripe tomatoes), -1(no tomatoes)

Output Specification
The minimum days. (O if already ripe, -1 if there's no way to get all ripe tomatoes)

Sample Input1
6 4
0 0 0 0 0 0
0 0 0 0 0 0
0 0 0 0 0 0
0 0 0 0 0 1

Sample Output1
8

Sample Input2
6 4
0 -1 0 0 0 0
-1 0 0 0 0 0
0 0 0 0 0 0
0 0 0 0 0 1

Sample Output2
-1

Sample Input3
6 4
1 -1 0 0 0 0
0 -1 0 0 0 0
0 0 0 0 -1 0
0 0 0 0 -1 1

Sample Output3
6

Sample Input4
5 5
-1 1 0 0 0
0 -1 -1 -1 0
0 -1 -1 -1 0
0 -1 -1 -1 0
0 0 0 0 0

Sample Output4
14

Sample Input5

```
2 2
1 -1
-1 1
```

Sample Output5

```
0
```

Bridges

There's a country made up of several islands. The president of this country promised people that he would build bridges to connect the islands. However, after he got re-elected he started thinking that it would be a waste to build all the bridges. One day he came to the conclusion that he can get away by building only one bridge (shortest). This country can be represented by N x N grid as below (There are 3 islands). Gray square = land, White square = ocean
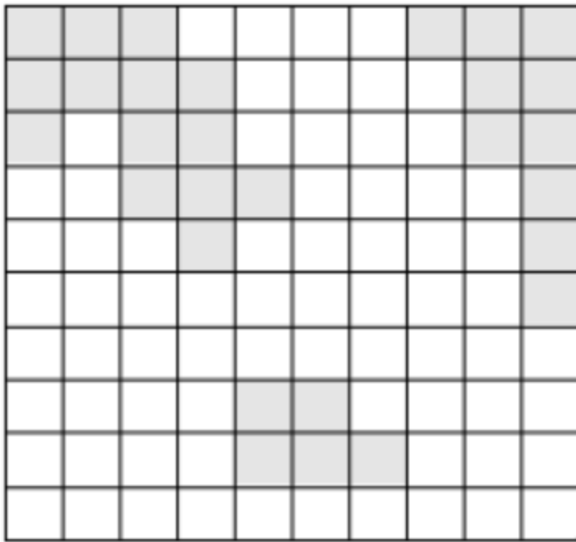
In order to build the shortest bridge, here's one way.
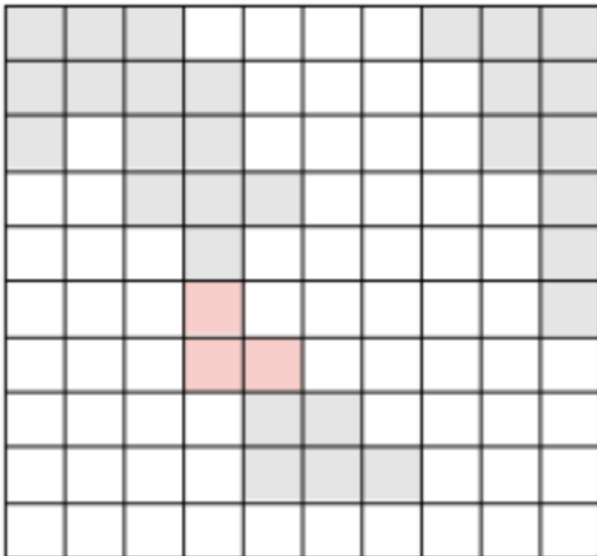
(There are several different ways to build a bridge that has a length of 3)

Given a N x N grid map, write a program to get the length of the shortest bridge.

Input Specification
First line: N (size of the map, 1 <= N <= 100)
Next N lines of data.

Output Specification
The shortest length

Sample Input1
10
1 1 1 0 0 0 0 1 1 1
1 1 1 1 0 0 0 0 1 1
1 0 1 1 0 0 0 0 1 1
0 0 1 1 1 0 0 0 0 1
0 0 0 1 0 0 0 0 0 1
0 0 0 0 0 0 0 0 0 1
0 0 0 0 0 0 0 0 0 0
0 0 0 0 1 1 0 0 0 0
0 0 0 0 1 1 1 0 0 0
0 0 0 0 0 0 0 0 0 0

Sample Output1
3

Sample Input2

```
10
1 1 1 0 0 0 0 1 1 1
1 1 1 1 0 0 0 0 1 1
1 0 1 1 0 0 0 0 1 1
0 0 1 1 1 0 0 0 0 1
0 0 0 1 0 0 0 0 0 1
0 0 0 0 0 0 1 0 0 1
0 0 0 0 0 0 1 0 0 0
0 0 0 0 1 1 1 0 0 0
0 0 0 0 1 1 1 0 0 0
0 0 0 0 0 0 0 0 0 0
```

Sample Output2

```
2
```