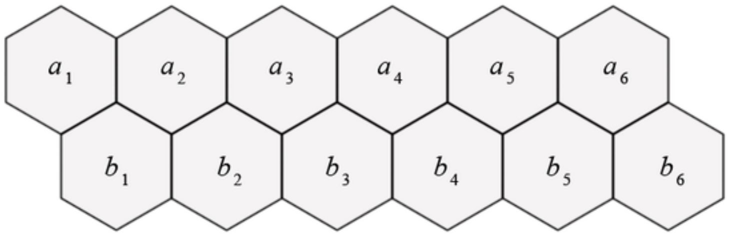
Hexagonal Grid

by Seyaua

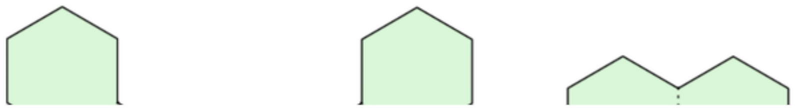
You are given a hexagonal grid consisting of two rows, each row consisting of n cells. The cells of the first row are labelled $a_1, a_2, \ldots a_n$ and the cells of the second row are labelled $b_1, b_2, \ldots, b_n$.

For example, for $n = 6$:



(Note that the b_i is connected with a_{i+1}.)

Your task is to tile this grid with 2×1 *tiles* that look like the following:

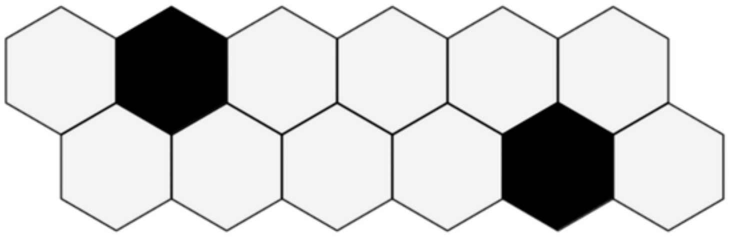


As you can see above, there are three possible orientations in which a tile can be placed.

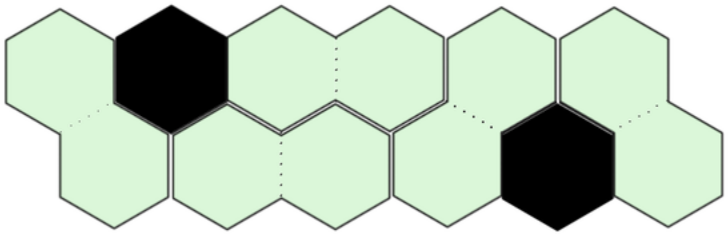
Your goal is to tile the whole grid such that every cell is covered by a tile, and no two tiles occupy the same cell. To add to the woes, certain cells of the hexagonal grid are *blackened*. No tile must occupy a blackened cell.

Is it possible to tile the grid?

Here's an example. Suppose we want to tile this grid:



Then we can do the tiling as follows:



Input Format

The first line contains a single integer t, the number of test cases.

The first line of each test case contains a single integer n denoting the length of the grid.
The second line contains a binary string of length n. The i^{th} character describes whether cell a_i is blackened.
The third line contains a binary string of length n. The i^{th} character describes whether cell b_i is blackened.
A `0` corresponds to an empty cell and a `1` corresponds to blackened cell.

Constraints

- $1 \leq t \leq 100$
- $1 \leq n \leq 10$

Output Format

For each test case, print `YES` if there exists at least one way to tile the grid, and `NO` otherwise.

Sample Input 0

```
6
6
010000
000010
2
00
00
2
00
10
2
00
01
2
00
11
2
10
00
```

Sample Output 0

```
YES
YES
NO
NO
YES
NO
```

Explanation 0

The first test case in the sample input describes the example given in the problem statement above.
For the second test case, there are two ways to fill it: either place two diagonal tiles side-by-side or place two horizontal tiles.

Submissions: 1800
Max Score: 70
Difficulty: Hard

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☆☆☆☆☆

More

Current Buffer (saved locally, editable)

Java 8

```java
import java.io.*;
import java.util.*;

public class Solution {

    public static void main(String[] args) {

        Scanner scan = new Scanner(System.in);
        int tst = scan.nextInt();

        for(int i = 0 ; i < tst ; i++){

            int N = scan.nextInt();

            String row1 = scan.next();
            char[] num1 = row1.toCharArray();

            int[] arr1 = new int[N];

            for(int j = 0 ; j < N ; j++){
                arr1[j] = num1[j] - '0';
            }

            String row2 = scan.next();
            num1 = row2.toCharArray();

            int[] arr2 = new int[N];

            String str = "";

            for(int j = 0 ; j < N ; j++){
                arr2[j] = num1[j] - '0';
                str  = str + "1";
            }

            int[][] arr = new int[2][N];

            arr[0] = arr1;
            arr[1] = arr2;

            boolean isPossible = dp(arr,str,new HashMap<String,Boolean>());

            if(isPossible){
                System.out.println("YES");
            }
            else{
                System.out.println("NO");
            }

        }
    }

    public static boolean dp(int[][] arr, String str, HashMap<String,Boolean> map){

        int len = str.length();

        if(Arrays.toString(arr[0]).replace("[","").replace("]","").replace(",","").replace(" ","").equals(str) && Arrays.toString(arr[1]).replace("[","").replace("]","").replace(",","").replace(" ","").equals(str)){
            return true;
        }

        if(map.containsKey(Arrays.toString(arr[0]) + "-" + Arrays.toString(arr[1]))){
            return map.get(Arrays.toString(arr[0]) + "-" + Arrays.toString(arr[1]));
        }

        for(int i = 0 ; i < 2 ; i++){

            for(int j = 0 ; j < len ; j++){

                if(arr[i][j] == 1){
                    continue;
                }

                if(i == 0 && arr[1][j] == 0){
                    arr[i][j] = 1;
                    arr[i + 1][j] = 1;
                    boolean isComplete = dp(arr,str,map);

                    if(isComplete){
                        return true;
                    }
                    arr[i][j] = 0;
                    arr[i + 1][j] = 0;
                }

                if(i == 1 && j < len - 1 && arr[i - 1][j + 1] == 0){
                    arr[i][j] = 1;
                    arr[i - 1][j + 1] = 1;
                    boolean isComplete = dp(arr,str,map);

                    if(isComplete){
                        return true;
                    }
                    arr[i][j] = 0;
                    arr[i - 1][j + 1] = 0;
                }

                if(j < len - 1 && arr[i][j+1] == 0){
                    arr[i][j] = 1;
                    arr[i][j + 1] = 1;
                    boolean isComplete = dp(arr,str,map);

                    if(isComplete){
                        return true;
                    }
                    arr[i][j] = 0;
                    arr[i][j + 1] = 0;
                }
            }
        }

        map.put(Arrays.toString(arr[0]) + "-" + Arrays.toString(arr[1]),false);

        return false;
    }

}
```

Line: 1 Col: 1

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