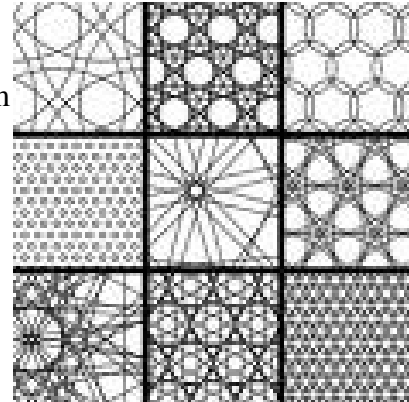


Problem E: Grid Successors

Consider a 3×3 grid of numbers g where each cell contains either a 0 or a 1. We define a function f that transforms such a grid: each cell of the grid $f(g)$ is the sum (modulo 2) of its adjacent cells in g (two cells are considered adjacent if and only if they share a common side).

Furthermore, we define $f^{(i)}(g)$ recursively as $f^{(0)}(g) = g$ and $f^{(i+1)}(g) = f(f^{(i)}(g))$ (where $i \geq 0$). Finally, for any grid h , let $k_g(h)$ be the number of indices i such that $h = f^{(i)}(g)$ (we may have $k_g(h) = \infty$). Given a grid g , your task is to compute the greatest index i such that $k_g(f^{(i)}(g))$ is finite.



Input begins with the number of test cases on its own line. Each case consists of a blank line followed by three lines of three characters, each either 1 or 0. The j 'th character of the i 'th row of the test case is the value in the j 'th cell of the i 'th row of the grid g .

For each test case, output the greatest index i such that $k_g(f^{(i)}(g))$ is finite. If there is no such index, output -1.

Sample input

```
3

111
100
001

101
000
101

000
000
000
```

Sample output

```
3
0
-1
```