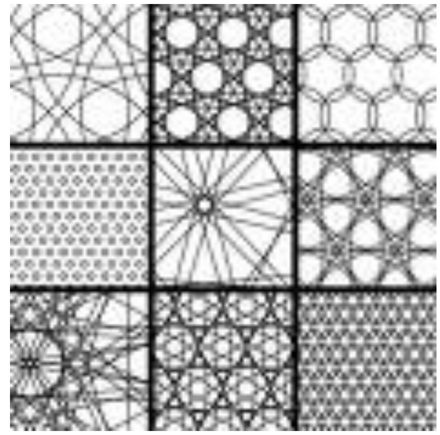
Problem E: Grid Successors



Consider a 3 x 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
```

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