Problem D
2-rainbow Domination

Input File: *testdata.in*
Time Limit: 10 seconds

Problem Description

Let $G = (V, E)$ be a finite, simple, and undirected graph, where $V(G)$ and $E(G)$ are the vertex and edge sets of G, respectively. Let f be a function that assigns each vertex at most two colors from the color set $\{\text{red}, \text{green}\}$ ($\{\text{r}, \text{g}\}$ for short). If $\bigcup_{u \in N(v)} f(u) = \{\text{r}, \text{g}\}$ for each vertex $v \in V$ with $f(v) = \emptyset$, then f is called a 2-*rainbow dominating function* (2RDF for short) of G where $N(v) = \{u \in V | uv \in E\}$. The *weight* of a function f, denoted by $w(f)$, is defined as $w(f) = \sum_{v \in V} |f(v)|$. Given a graph G, the minimum weight among all weights of 2RDFs, denoted by $\gamma_{\text{r}2}(G)$, is called the 2-*rainbow domination number* of G.

For example, see the graph as shown in Figure 1 in which $f(v_5) = \{\text{r}\}$, $f(v_6) = \{\text{g}\}$, $f(v_8) = \{\text{r}, \text{g}\}$, $f(v_9) = \{\text{g}\}$, and $f(x) = \emptyset$ for all other vertices $x \in V$. It is easy to verify that f is a 2-rainbow dominating function with $w(f) = 5$. Actually, $\gamma_{r2}(G)$ is also equal to 5 in this example.

Technical Specifications

The number of vertices is smaller than or equal to 16.

Input Format

The first line contains an integer indicating the number of test cases. For each test case, the first line contains an integer n indicating the number of vertices. The following n lines contain an $n \times n$ adjacent matrix of the graph.

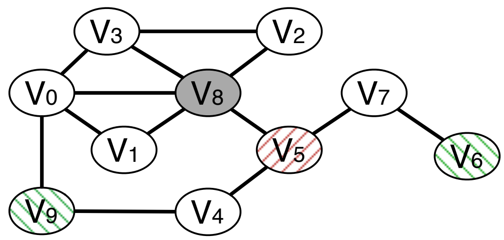

Figure 1: The vertex with red color is filled with slashes, and the vertex with green color is filled with backslashes. The vertex with both red and green colors is represented by a gray vertex.

Output Format

For each test case, output its 2-rainbow domination number in a line.

Sample Input

```
2
3
0 1 1
1 0 1
1 1 0
10
0 1 0 1 0 0 0 0 1 1
1 0 0 0 0 0 0 0 1 0
0 0 0 1 0 0 0 0 1 0
1 0 1 0 0 0 0 0 1 0
0 0 0 0 0 1 0 0 0 1
0 0 0 0 1 0 0 1 1 0
0 0 0 0 0 0 0 1 0 0
0 0 0 0 0 1 1 0 0 0
1 1 1 1 0 1 0 0 0 0
1 0 0 0 1 0 0 0 0 0
```

Sample Output

```
2
5
```