The Hu Tao Fractal

Time limit: 1.5s **Memory limit:** 256M
Java (latest): 2.0s
Python: 5.0s

In the universe, there exists a magical land full of nerds called DMOJistan. The Nerds of DMOJistan are massive fans of the game "Genshin Impact". Nerds specifically enjoy playing with one character: Hu-Tao. Nerds enjoy playing Hu-Tao so much, that in the name of Hu-Tao, the Nerds decided to create a fractal in her name: the so-called *Hu-Tao Fractal*.

> "*A fractal is defined as a never-ending pattern, which continually repeats itself*"

The smallest *Hu-Tao Fractal* looks like the pattern below.

```
1 1 1
1 0 1
1 1 1
```

A bigger *Hu-Tao Fractal* would be *3* times larger, and where there is currently a `1` in the base fractal, that section will have a copy of a *Hu-Tao Fractal* that's 1/3rd the size of the one we're trying to make. The spot that has a `0` will be filled with `0`'s.

Therefore, the next *Hu-Tao Fractal* would look like the following:

```
1 1 1 1 1 1 1 1 1
1 0 1 1 0 1 1 0 1
1 1 1 1 1 1 1 1 1
1 1 1 0 0 0 1 1 1
1 0 1 0 0 0 1 0 1
1 1 1 0 0 0 1 1 1
1 1 1 1 1 1 1 1 1
1 0 1 1 0 1 1 0 1
1 1 1 1 1 1 1 1 1
```

This pattern can of course continue repeating forever, and ever. But the fractal will always be of a size that is a power of 3 ($3^k, k \geq 1$).

Now we can also look for a *Hu-Tao Fractal* the other way around. First we can look for an area which has a width that is equal to a power of 3. Then we can divide that area into 9 sections, with 3 cuts to each side. All of the areas on the outside should be valid *Hu-Tao Fractals*, and should repeat themselves at ever smaller scales until the next fractal would be of size `0`. The section at the center should be filled with `0`'s.

Now let's look at a valid *Hu-Tao Fractal*:

```
1 1 1 1 1 1 1 1 1
1 0 1 1 0 1 1 0 1
1 1 1 1 1 1 1 1 1
1 1 1 0 0 0 1 1 1
1 0 1 0 0 0 1 0 1
1 1 1 0 0 0 1 1 1
1 1 1 1 1 1 1 1 1
1 0 1 1 0 1 1 0 1
1 1 1 1 1 1 1 1 1
```

This area has a side length of `9`, which is a power of three. Now let's divide it up.

```
1 1 1 | 1 1 1 | 1 1 1
1 0 1 | 1 0 1 | 1 0 1
1 1 1 | 1 1 1 | 1 1 1
------+-------+------
1 1 1 | 0 0 0 | 1 1 1
1 0 1 | 0 0 0 | 1 0 1
1 1 1 | 0 0 0 | 1 1 1
------+-------+------
1 1 1 | 1 1 1 | 1 1 1
1 0 1 | 1 0 1 | 1 0 1
1 1 1 | 1 1 1 | 1 1 1
```

All the sections on the sides look like this;

```
1 1 1
1 0 1
1 1 1
```

Which is the smallest *Hu-Tao Fractal* which is possible. That means that the sections on the outside are good.

Now let's look at the section in the center;

```
0 0 0
0 0 0
0 0 0
```

It's all zeros! Which means that this is a valid *Hu-Tao Fractal* that is `9` units wide!

Knowing this, the Nerds wonder about the following problem:

> "Given A, an N by N square grid with all $A_{i,j}$ being either 0 or 1, what is the size of the greatest *Hu-Tao Fractal* that we can identify?"

Being a nerd yourself, you decide to help them in solving the problem.

Constraints

$1 \leq N \leq 2 \times 10^3$

$A_{i,j} \in \{0, 1\}$

Subtask 1 [10%]

$N = 3$

Subtask 2 [30%]

$1 \leq N \leq 100$

Subtask 3 [60%]

No additional constraints.

Input Specification

The first line will contain one integer, N, the length and width of the square grid.

The next N lines will contain N space-seperated integers, consisting of only 0's and 1's.

Output Specification

Output one integer, the side length of the largest identifiable *Hu-Tao Fractal*.

Sample Input 1

```
3
1 1 1
1 0 1
1 1 1
```

Sample Output 1

```
3
```

Sample Input 2

```
9
1 1 1 1 1 1 1 1 1
1 0 1 1 0 1 1 0 1
1 1 1 1 1 1 1 1 1
1 1 1 0 0 0 1 1 1
1 0 1 0 0 0 1 0 1
1 1 1 0 0 0 1 1 1
1 1 1 1 1 1 1 1 1
1 0 1 1 0 1 1 0 1
1 1 1 1 1 1 1 1 1
```

Sample Output 2

```
9
```

Sample Input 3

```
4
1 1 1 1
1 0 1 1
1 1 1 1
1 1 1 1
```

Sample Output 3

```
3
```

Sample Input 4

```
3
0 0 0
0 0 1
0 0 0
```

Sample Output 4

```
0
```