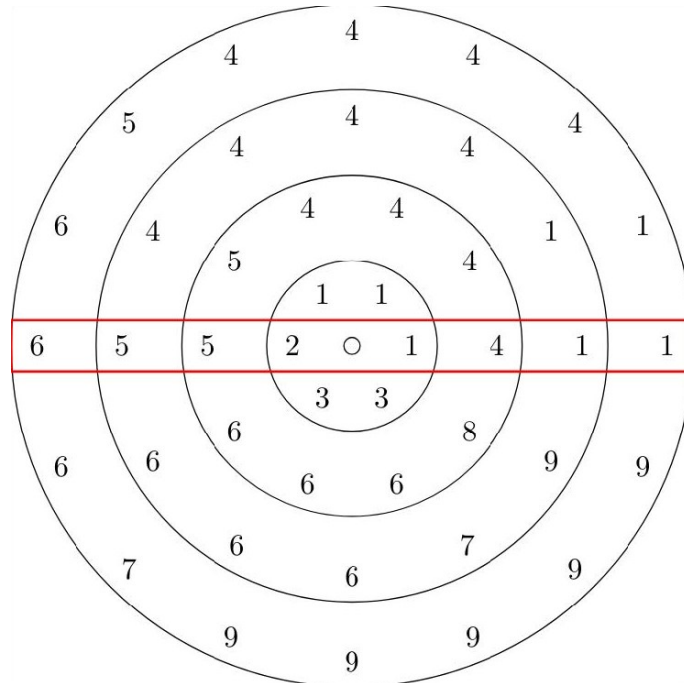# Target Rotation

> **Time limit: 1.5 seconds**   **Memory limit: 256 MB**

In the city of **Djelfa**, players **Ahmad Karawita** and **Hamoud Habibi Hamoud** love playing with a unique puzzle consisting of **concentric circular discs**. There are n discs, named $d_1, d_2, \ldots, d_n$, where d_i represents the disc of radius i. Each disc d_i contains digits $0, 1, \ldots, 9$ sorted and written in **counterclockwise order**, starting from the rightmost point of the disc. The number of occurrences of each digit j on disc d_i is given by $a_{j,i}$, and the total number of digits on any disc is guaranteed to be even.

The discs are stacked concentrically, with d_1 on top and d_n on the bottom. Players can rotate each disc independently by one position in either the **clockwise** or **counterclockwise** direction any number of times.

The **goal** is to align the digits on the middle horizontal line, as shown in the figure. The middle horizontal line consists of exactly $2n$ digits: one digit from each disc on the left and right side.

Task

Given q target strings $x_1, x_2, \ldots, x_q$, each of length $2n$, determine the **minimum number of rotations** required to align the middle horizontal line to exactly match each target string. If aligning a target string is **impossible**, output -1. The queries are independent from each other, in other words, for each query we start from the same initial configuration described in the first paragraph.

1. An integer n $(1 \leq n \leq 10^5)$: the number of discs.
2. A $10 \times n$ grid of integers, where the entry $a_{j,i} \leq 10^9$ $(0 \leq j \leq 9, 1 \leq i \leq n)$ specifies the number of times digit j appears on disc d_i. it is guaranteed that each disc has an even number of digits.
3. An integer q $(1 \leq q \leq 2 \times 10^6)$: the number of target strings.
4. q strings $x_1, x_2, \ldots, x_q$, each of length $2n$: the target strings.
It is guaranteed that $nq \leq 7 \times 10^6$

Output

For each target string x_k $(1 \leq k \leq q)$, output:
- On the first line, output POSSIBLE if one can align the middle line to x_k.
- On the second line, the **minimum number of rotations** required to align the middle line to x_k, or -1 if it is impossible.
If the first line of output is correct while the second is not, half of the mark is given

Constraints

- $1 \leq n \leq 10^5$
- $0 \leq a_{j,i} \leq 10^9$
- $1 \leq q \leq 2 \times 10^6$
- $nq \leq 7 \times 10^6$

Subtasks

Subtask	Score	Constraints
1	6	$n = q = 1$
2	6	Each disk has only one number on it
3	10	For all i, $\sum_{j=0}^{9} a_{j,i} \leq 2$
4	8	$n = 1$
5	20	For all $i, j, x, y : a_{i,j} = a_{x,y}$
6	30	$nq \leq 10^5$
7	20	No further conditions

Examples
Input

```
4
0 3 1 2 0 0 0 0 0 0
0 0 0 0 4 2 3 0 1 0
0 2 0 0 4 1 3 1 0 1
0 2 0 0 4 1 3 1 0 5
4
65521411
65521419
75521414
75521410
```

Note : This is is the example shown in the figure of the 1st page.

Output

```
POSSIBLE
0
POSSIBLE
1
POSSIBLE
2
IMPOSSIBLE
-1
```

Input

```
1
4 3 2 3 1 1 4 3 9 2
1
71
```

Output

```
POSSIBLE
4
```