BOI 2026 Practice

Language: en

task	type	time limit	memory limit
A BOIancy	standard	1.00 s	512 MB
B Eggs	interactive	2.00 s	512 MB
C Candies	standard	1.00 s	512 MB

A BOIancy

The *BOIancy* of a string s is the number of ways one can choose indices i, j and k such that $s_i s_j s_k$ is "BOI" and $i < j < k$. Your task is to compute the BOIancy of a given string s.

Input

The first line contains an integer n: the length of the string s.

The second line contains s. The string consists of letters A–Z.

Output

Print the BOIancy of the string. Since the answer may be large, print it modulo $10^9 + 7$.

Constraints

- $3 \leq n \leq 10^6$

Example

Input:
```
6
BAOBOI
```

Output:
```
3
```

Explanation: You can take the last three characters, the characters at indices 1, 3 and 6, or the characters at indices 1, 5 and 6.

Scoring

Subtask	Constraints	Points
1	$n \leq 100$	33
2	The string contains exactly one character "O"	28
3	No additional constraints	39

B Eggs

You have n eggs which you can drop from a building with k floors. The eggs always survive falling from some unknown floor h or lower. Any higher than that and they break.

Can you determine h by dropping some of the eggs as few times as possible? An egg that survives the fall can be dropped again.

Interaction

This is an interactive problem. Start by reading two integers n and k: the number of eggs available and the height of the building.

To drop an egg, print "`?` x", where x is the floor you wish to drop the egg from $(1 \leq x \leq k)$. The grader responds with "`Intact`" if the egg did not break or "`Broken`" if it broke and cannot be used again.

Once you have determined the answer, print "`!` h", where h is the highest floor that the eggs can be dropped from without breaking.

A testing script can be downloaded here. The beginning of the script contains instructions on how to use it.

Constraints

- $1 \leq n \leq 20$
- $1 \leq h \leq k \leq 10^5$

Example interaction

```
2 5
? 2
Intact
? 4
Broken
? 3
Intact
! 3
```

Scoring

For a given number of eggs n and the highest point k, we say that the *optimal strategy* drops eggs at most d times regardless of h. If you drop eggs more than d times, the verdict is WRONG ANSWER.

Subtask	Constraints	Points
1	$n = 1$	7
2	$n = 2$	21
3	$n = 20$	12
4	$k \leq 50$	19
5	$k \leq 500$	15
6	No additional constraints	26

C Candies

An even number of children are sitting at a round table. Each child has some number of candies. However, the candies may be distributed unfairly: in a fair distribution, each child has the same number of candies as the child sitting at the opposite side of the table.

Your task is to find the minimum number of moves which are required to reach a fair distribution. In one move, one child can give one of their candies to an adjacent child. For $1 \leq i \leq n-1$, children numbered i and $i+1$ are adjacent, and children n and 1 are also adjacent. For $1 \leq i \leq \frac{n}{2}$, children numbered i and $i+\frac{n}{2}$ sit at opposite sides of the table.

Input

The first line contains an even integer n: the number of children around the table.

The second line contains n integers, $c_1, c_2, \ldots, c_n$: the number of candies each child starts with.

Output

Print the minimum number of moves. If it is impossible to reach a fair distribution, print "`IMPOSSIBLE`".

Constraints

- $2 \leq n \leq 10^5$
- $0 \leq c_k \leq 10^9$

Example 1

Input:
```
8
4 5 1 7 0 0 3 4
```

Output:
```
12
```

Explanation: Child 2 gives four candies to child 3 and one candy to child 1. Then, child 1 gives all five of their candies to child 8, and child 3 gives two candies to child 4. After the moves, the distribution of candies is `0 0 3 9 0 0 3 9`.

Example 2

Input:
```
6
1 2 3 1 1 1
```

Output:
```
IMPOSSIBLE
```

Scoring

Subtask	Constraints	Points
1	$n \leq 4$, $c_1 + c_2 + \cdots + c_n \leq 4$	21
2	All children except child 1 have zero candies	41
3	No additional constraints	38