A - Addition and Subtraction Easy

Time Limit: 2 sec / Memory Limit: 256 MiB

Score : 100 points

Problem Statement

Joisino wants to evaluate the formula "$A\ op\ B$". Here, A and B are integers, and the binary operator op is either + or -. Your task is to evaluate the formula instead of her.

Constraints

- $1 \leqq A, B \leqq 10^9$
- op is either + or -.

Input

The input is given from Standard Input in the following format:

A op B

Output

Evaluate the formula and print the result.

Sample Input 1

```
1 + 2
```

Sample Output 1

```
3
```

Since $1 + 2 = 3$, the output should be 3.

Sample Input 2

```
5 - 7
```

Sample Output 2

```
-2
```

B - Contest with Drinks Easy

Time Limit: 2 sec / Memory Limit: 256 MiB

Score : 200 points

Problem Statement

Joisino is about to compete in the final round of a certain programming competition. In this contest, there are N problems, numbered 1 through N. Joisino knows that it takes her T_i seconds to solve problem $i(1 \leqq i \leqq N)$.

Also, there are M kinds of drinks offered to the contestants, numbered 1 through M. If Joisino takes drink $i(1 \leqq i \leqq M)$, her brain will be stimulated and the time it takes for her to solve problem P_i will become X_i seconds. It does not affect the time to solve the other problems.

A contestant is allowed to take exactly one of the drinks before the start of the contest. For each drink, Joisino wants to know how many seconds it takes her to solve all the problems if she takes that drink. Here, assume that the time it takes her to solve all the problems is equal to the sum of the time it takes for her to solve individual problems. Your task is to write a program to calculate it instead of her.

Constraints

- All input values are integers.
- $1 \leqq N \leqq 100$
- $1 \leqq T_i \leqq 10^5$
- $1 \leqq M \leqq 100$
- $1 \leqq P_i \leqq N$
- $1 \leqq X_i \leqq 10^5$

Input

The input is given from Standard Input in the following format:

$$
\begin{aligned}
&N \\
&T_1 \ \ T_2 \ \ \ldots \ \ T_N \\
&M \\
&P_1 \ \ X_1 \\
&P_2 \ \ X_2 \\
&\vdots \\
&P_M \ \ X_M
\end{aligned}
$$

Output

For each drink, calculate how many seconds it takes Joisino to solve all the problems if she takes that drink, and print the results, one per line.

Sample Input 1

```
3
2 1 4
2
1 1
2 3
```

Sample Output 1

```
6
9
```

If Joisino takes drink 1, the time it takes her to solve each problem will be 1, 1 and 4 seconds, respectively, totaling 6 seconds.

If Joisino takes drink 2, the time it takes her to solve each problem will be 2, 3 and 4 seconds, respectively, totaling 9 seconds.

Sample Input 2

```
5
7 2 3 8 5
3
4 2
1 7
4 13
```

Sample Output 2

```
19
25
30
```

C - Lining Up

Time Limit: 2 sec / Memory Limit: 256 MiB

Score : 300 points

Problem Statement

There are N people, conveniently numbered 1 through N. They were standing in a row yesterday, but now they are unsure of the order in which they were standing. However, each person remembered the following fact: the absolute difference of the number of the people who were standing to the left of that person, and the number of the people who were standing to the right of that person. According to their reports, the difference above for person i is A_i.

Based on these reports, find the number of the possible orders in which they were standing. Since it can be extremely large, print the answer modulo $10^9 + 7$. Note that the reports may be incorrect and thus there may be no consistent order. In such a case, print 0.

Constraints

- $1 \leqq N \leqq 10^5$
- $0 \leqq A_i \leqq N - 1$

Input

The input is given from Standard Input in the following format:

N
$A_1 \quad A_2 \quad \ldots \quad A_N$

Output

Print the number of the possible orders in which they were standing, modulo $10^9 + 7$.

Sample Input 1

```
5
2 4 4 0 2
```

Sample Output 1

```
4
```

There are four possible orders, as follows:

- $2, 1, 4, 5, 3$
- $2, 5, 4, 1, 3$
- $3, 1, 4, 5, 2$
- $3, 5, 4, 1, 2$

Sample Input 2

```
7
6 4 0 2 4 0 2
```

Sample Output 2

```
0
```

Any order would be inconsistent with the reports, thus the answer is 0.

Sample Input 3

```
8
7 5 1 1 7 3 5 3
```

Sample Output 3

```
16
```

D - Xor Sum

Time Limit: 2 sec / Memory Limit: 256 MiB

Score : 600 points

Problem Statement

You are given a positive integer N. Find the number of the pairs of integers u and v $(0 \leqq u, v \leqq N)$ such that there exist two non-negative integers a and b satisfying $a\ xor\ b = u$ and $a + b = v$. Here, xor denotes the bitwise exclusive OR. Since it can be extremely large, compute the answer modulo $10^9 + 7$.

Constraints

- $1 \leqq N \leqq 10^{18}$

Input

The input is given from Standard Input in the following format:

```
N
```

Output

Print the number of the possible pairs of integers u and v, modulo $10^9 + 7$.

Sample Input 1

```
3
```

Sample Output 1

```
5
```

The five possible pairs of u and v are:

- $u = 0, v = 0$ (Let $a = 0, b = 0$, then $0\ xor\ 0 = 0, 0 + 0 = 0$.)
- $u = 0, v = 2$ (Let $a = 1, b = 1$, then $1\ xor\ 1 = 0, 1 + 1 = 2$.)
- $u = 1, v = 1$ (Let $a = 1, b = 0$, then $1\ xor\ 0 = 1, 1 + 0 = 1$.)
- $u = 2, v = 2$ (Let $a = 2, b = 0$, then $2\ xor\ 0 = 2, 2 + 0 = 2$.)
- $u = 3, v = 3$ (Let $a = 3, b = 0$, then $3\ xor\ 0 = 3, 3 + 0 = 3$.)

Sample Input 2

```
1422
```

Sample Output 2

```
52277
```

Sample Input 3

```
1000000000000000000
```

Sample Output 3

```
787014179
```