A Math Contest P10 - Tricky Multisets

Time limit: 1.0s **Memory limit:** 256M

You are given a multiset S. Each element in the multiset is an integer between $-N$ and N (inclusive), where i appears a_i times in the multiset.

In each operation, you choose two different elements of the multiset, X and Y, such that $|X - Y| = 2$. Then, X and Y will be deleted from the multiset, and $\frac{X+Y}{2}$ will be added to the multiset twice.

Find the minimum number of operations such that every element of S is equal to 0. The data guarantees that such a sequence of operations will exist.

Constraints

$1 \leq N \leq 5 \times 10^5$

$0 \leq \sum a_i \leq 10^{18}$

Input Specification

The first line contains an integer, N.

The next line contains $2N + 1$ integers, $a_{-N}, a_{-N+1}, \ldots, a_N$.

Output Specification

Output the minimum number of operations to set all elements to 0 modulo $10^9 + 7$.

Sample Input

```
2
1 1 1 1 1
```

Sample Output

```
5
```

Explanation for Sample

Let's keep track of the elements in the multiset after each operation.

Initially, the multiset has the elements $\{-2, -1, 0, 1, 2\}$ within it.

1. Choose $X = 2$ and $Y = 0 : \{-2, -1, 1, 1, 1\}$
2. Choose $X = 1$ and $Y = -1 : \{-2, 0, 0, 1, 1\}$
3. Choose $X = -2$ and $Y = 0 : \{-1, -1, 0, 1, 1\}$
4. Choose $X = -1$ and $Y = 1 : \{-1, 0, 0, 0, 1\}$
5. Choose $X = -1$ and $Y = 1 : \{0, 0, 0, 0, 0\}$

It can be proven that 5 is the minimum number of operations required to set everything to 0.