H: Figurines

Time limit: 3 seconds

Bob has a lot of mini figurines. He likes to display some of them on a shelf above his computer screen and he likes to regularly change which figurines appear. This ever-changing decoration is really enjoyable. Bob takes care of never adding the same mini figurine more than once. Bob has only N mini figurines and after N days he arrives at the point where each of the N figurines have been added and then removed from the shelf (which is thus empty).

Bob has a very good memory. He is able to remember which mini figurines were displayed on each of the past days. So Bob wants to run a little mental exercise to test its memory and computation ability. For this purpose, Bob numbers his figurines with the numbers $0, \ldots, N-1$ and selects a sequence of N integers $d_0 \ldots d_{N-1}$ all in the range $[0; N]$. Then, Bob computes a sequence $x_0, \ldots, x_N$ in the following way: $x_0 = 0$ and $x_{i+1} = (x_i + y_i) \bmod N$ where mod is the modulo operation and y_i is the number of figurines displayed on day d_i that have a number higher or equal to x_i. The result of Bob's computation is x_N.

More formally, if we note $S(i)$ the subset of $\{0, \ldots, N-1\}$ corresponding to figurines displayed on the shelf on day i, we have:

- $S(0)$ is the empty set;
- $S(i)$ is obtained from $S(i-1)$ by inserting and removing some elements.

Each element $0 \leqslant j < N$ is inserted and removed exactly once and thus, the last set $S(N)$ is also the empty set. The computation that Bob performs corresponds to the following program:

$x_0 \leftarrow 0$
for $i \in [0; N-1]$
    $x_{i+1} \leftarrow (x_i + \#\{y \in S(d_i) \text{ such that } y \geqslant x_i\}) \mod N$
output x_N

Bob asks you to verify his computation. For that he gives you the numbers he used during its computation (the $d_0, \ldots, d_{N-1}$) as well as the log of which figurines he added or removed every day. Note that a mini figurine added on day i and removed on day j is present on a day k when $i \leqslant k < j$. You should tell him the number that you found at the end of the computation.

Input

The input is composed of $2N+1$ lines.

- The first line contains the integer N.
- Lines 2 to $N+1$ describe the figurines added and removed. Line $i+1$ contains space-separated $+j$ or $-j$, with $0 \leqslant j < N$, to indicate that j is added or removed on day i. This line may be empty. A line may contain both $+j$ and $-j$, in that order.
- Lines $N+2$ to $2N+1$ describe the sequence $d_0, \ldots, d_{N-1}$. Line $N+2+i$ contains the integer d_i with $0 \leqslant d_i \leqslant N$.

Output

The output should contain a single line with a single integer which is x_N.

Limits

- $1 \leqslant N \leqslant 100\,000$

Sample Input

```
3
+0 +2
-0 +1
-1 -2
1
2
2
```

Sample Output

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2
```

Sample Explanation

The output is 2 since

- first, $x \leftarrow 2$ since $S(1) = \{0, 2\}$ and $\#\{y \in S(1)$ such that $y \geqslant 0\} = 2$;
- then, $x \leftarrow 0$ since $S(2) = \{1, 2\}$ and $\#\{y \in S(2)$ such that $y \geqslant 2\} = 1$;
- and finally, $x \leftarrow 2$ since $S(2) = \{1, 2\}$ and $\#\{y \in S(2)$ such that $y \geqslant 0\} = 2$.