



Separator (separator)

Day	practice session
Language	English
Time limit:	1.2 seconds
Memory limit:	1,048,576 kB

Let $A = (a_1, a_2, \dots)$ be a sequence of **distinct** integers. An index j is called a **separator** if the following two conditions hold:

- for all $k < j$: $a_k < a_j$,
- for all $k > j$: $a_k > a_j$.

In other words, the array A consists of three parts: all elements smaller than a_j , then a_j itself, and finally all elements greater than a_j .

For instance, let $A = (30, 10, 20, 50, 80, 60, 90)$. The separators are the indices 4 and 7, corresponding to the values 50 and 90.

The sequence A is initially empty. You are given a sequence a_1, \dots, a_n of elements to append to A , one after another. After appending each a_i , output the current number s_i of separators in the sequence you have.

The input format is selected so that you have to compute the answers **online**. Instead of the elements a_i you should append to A , you are given a sequence b_i .

Process the input as follows:

The empty sequence A contains $s_0 = 0$ separators.

For each i from 1 to n , inclusive:

1. Calculate the value $a_i = (b_i + s_{i-1}) \bmod 10^9$.
2. Append a_i to the sequence A .
3. Calculate s_i : the number of separators in the current sequence A .
4. Output a line containing the value s_i .

Input

The first line contains a single integer n ($1 \leq n \leq 10^6$): the number of queries to process.

Then, n lines follow. The i -th of these lines contains the integer b_i ($0 \leq b_i \leq 10^9 - 1$). The values b_i are chosen in such a way that the values a_i you'll compute will all be distinct.

Output

As described above, output n lines with the values s_1 through s_n .

Scoring

Subtask 1 (20 points): $n \leq 100$.

Subtask 2 (30 points): $n \leq 1000$.

Subtask 3 (40 points): $n \leq 100,000$.

Subtask 4 (10 points): no additional constraints.

Examples

standard input	standard output
7	1
30	0
9	0
20	1
50	2
79	1
58	2
89	
10	1
0	2
0	3
0	4
0	5
0	6
0	7
0	8
0	9
0	10
0	

Note

The first example equals is described in the problem statement.

The second example is decoded as $A = (0, 1, 2, 3, 4, 5, 6, 7, 8, 9)$.