

C. Ivan and Powers of Two

time limit per test: 0.5 seconds

memory limit per test: 256 megabytes

input: standard input

output: standard output

Ivan has got an array of n non-negative integers a_1, a_2, \dots, a_n . Ivan knows that the array is sorted in the non-decreasing order.

Ivan wrote out integers $2^{a_1}, 2^{a_2}, \dots, 2^{a_n}$ on a piece of paper. Now he wonders, what minimum number of integers of form 2^b ($b \geq 0$) need to be added to the piece of paper so that the sum of all integers written on the paper equalled $2^v - 1$ for some integer v ($v \geq 0$).

Help Ivan, find the required quantity of numbers.

Input

The first line contains integer n ($1 \leq n \leq 10^5$). The second input line contains n space-separated integers a_1, a_2, \dots, a_n ($0 \leq a_i \leq 2 \cdot 10^9$). It is guaranteed that $a_1 \leq a_2 \leq \dots \leq a_n$.

Output

Print a single integer — the answer to the problem.

Examples

input
4 0 1 1 1
output
0

input
1 3
output
3

Note

In the first sample you do not need to add anything, the sum of numbers already equals $2^3 - 1 = 7$.

In the second sample you need to add numbers $2^0, 2^1, 2^2$.