



Task 3: Dolls

Marc is teaching some children about objects with different sizes. To demonstrate this concept, he will be using dolls. These dolls are hollow on the inside, so smaller dolls can be placed inside larger ones.

Each doll has a certain size. A doll of size x can fit inside another doll of size y if $y - x \geq 2$. In other words, a smaller doll can fit in a larger doll if the difference in size between the larger doll and the smaller doll is at least 2.

A doll stack is formed by selecting some dolls that Marc has and repeatedly fitting the smallest doll into the second smallest doll until only one doll is left. The size of a doll stack is the number of dolls used to create it.

There are n days. On the i^{th} ($1 \leq i \leq n$) day, Marc will buy a doll of size $a[i]$. After buying the doll, he will try to construct a doll stack with the maximum number of dolls. Help Marc compute, for each day, the maximum size of a doll stack using the dolls available on that day.

Input format

Your program must read from standard input.

The first line of input contains exactly 1 integer, n .

The second line contain n integers $a[1], a[2], \dots, a[n]$, representing the sizes of the dolls bought on each of the n days.

Output format

Your program must print to standard output.

The output should contain n integers on a single line and separated by spaces. The i -th integer should be the maximum size of a doll stack using the dolls available on that day.

Subtasks

For all testcases, the input will satisfy the following bounds:



- $1 \leq n \leq 100\,000$
- $1 \leq a[i] \leq 500\,000$

Your program will be tested on input instances that satisfy the following restrictions:

Subtask	Marks	Additional Constraints
1	23	$n \leq 200$
2	14	$a[i]$ is not a multiple of 2 for all i ($1 \leq i \leq n$)
3	27	$a[i]$ is not a multiple of 4 for all i ($1 \leq i \leq n$)
4	36	No additional restrictions

Sample Testcase 1

This testcase is valid for subtasks 1 and 4.

Input	Output
5 1 2 3 4 5	1 1 2 2 3

Sample Testcase 1 Explanation

Day 1: Marc can only stack doll 1.

Day 2: Marc can stack either doll of size 1 or doll of size 2.

Day 3: Marc can stack doll of size 1 and doll of size 3. He cannot stack all 3 dolls as doll of size 2 does not fit inside doll of size 3.

Day 4: Marc can stack either doll of size 1 and doll of size 3, doll of size 1 and doll of size 4 or doll of size 2 and doll of size 4.

Day 5: Marc can stack doll 1, 3 and 5.

Sample Testcase 2

This testcase is valid for subtasks 1 and 4.



Input	Output
5 2 4 6 8 10	1 2 3 4 5

Sample Testcase 2 Explanation

All dolls can be stacked as each day passes because the gap between adjacent dolls is equal to 2.

Sample Testcase 3

This testcase is valid for subtasks 1, 3 and 4.

Input	Output
5 3 3 1 3 2	1 1 2 2 2

Sample Testcase 3 Explanation

On the first 2 days, Marc can only stack 1 doll of size 3.

On the 3rd day, Marc can stack the doll of size 1.

On the 5th day, Marc **cannot** stack the doll of size 2 because the gap between the doll of size 3 and itself is exactly 1.