PROBLEM 4

ORAC

Time and memory limits: 1 second, 256 MB

There are N informatics problems on the ORAC training site and you want to solve all of them! You have analysed all the problems, and the ith problem has a *difficulty score* of D_i. You can only solve a problem if your current informatics *skill level* is at least D_i. Unfortunately, your current skill level is 0.

Until you've solved all N problems, you will structure every day as follows:

- Each morning, you either
    - *Train*, increasing your skill level by 1, or
    - *Relax*, decreasing your skill level by 1 (your skill level can become negative).
- Each afternoon, you may solve **one** problem of your choosing, if your skill level is greater than or equal to the difficulty score of the problem.

You don't mind how many days it takes to finish all N problems, but you do enjoy relaxing. Specifically, you want to **minimise the number of mornings that you spend training**.

What is the minimum number of mornings you must spend training to solve all N problems, if you carefully plan your training, relaxing, and problem-solving?

Subtasks and constraints

Your program will be graded using many secret tests. Every test follows some rules:

- $1 \leq N \leq 200\,000$.
- $1 \leq D_i \leq 200\,000$ for all i.
- $D_i \leq D_{i+1}$ for all i. That is, the problem difficulties are in ascending order. However, you are allowed to solve the problems in any order.

The secret tests are divided into subtasks. Your program must correctly solve **every test** within a subtask to earn the marks for that subtask:

- For Subtask 1 (10 marks), $D_i = 1$ for all i and $N \leq 1000$.
- For Subtask 2 (20 marks), $D_i \leq 2$ for all i and $N \leq 1000$.
- For Subtask 3 (40 marks), $D_i \leq 1000$ for all i and $N \leq 1000$.
- For Subtask 4 (30 marks), no special rules apply.

Input

Your solution must read input and print output. We recommend using the solution templates (which you can find on the competition website) to help you with input and output.

The input follows a specific format:

- The 1st line contains the integer N.
- The 2nd line contains N integers describing the difficulty level of the problems. The ith of these is D_i.

Output

Your solution must print a single integer: the minimum number of mornings you must spend training to solve all N problems.

Sample input 1

```
6
1 1 1 1 1 1
```

Sample output 1

```
4
```

Sample input 2

```
4
1 2 2 2
```

Sample output 2

```
3
```

Sample input 3

```
10
3 3 3 3 4 4 4 5 5 7
```

Sample output 3

```
8
```

Explanation

In the 1st sample case, the minimum number of days you must train is 4. One way to structure your days is shown below.

Day	Skill before	Morning	Skill after	Afternoon
Day 1	0	Train	1	Solve 1st task $(D_1 = 1)$
Day 2	1	Train	2	Solve 2nd task $(D_2 = 1)$
Day 3	2	Relax	1	Solve 3rd task $(D_3 = 1)$
Day 4	1	Train	2	Solve 4th task $(D_4 = 1)$
Day 5	2	Relax	1	Solve 5th task $(D_5 = 1)$
Day 6	1	Train	2	Solve 6th task $(D_6 = 1)$

In the 2nd sample case, the minimum number of days you must train is 3. One way to structure your days is shown below.

Day	Skill before	Morning	Skill after	Afternoon
Day 1	0	Train	1	Do nothing
Day 2	1	Train	2	Solve 2nd task $(D_2 = 2)$
Day 3	2	Train	3	Solve 3rd task $(D_3 = 2)$
Day 4	3	Relax	2	Solve 4th task $(D_4 = 2)$
Day 5	2	Relax	1	Solve 1st task $(D_1 = 1)$

In the 3rd sample case, the minimum number of days you must train is 8.