Wall of Bricks

Problem Code: WALL

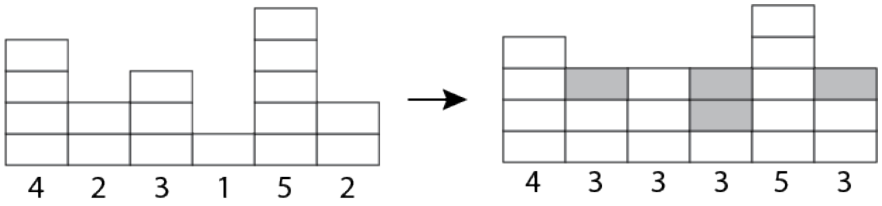
Design Challenge

Task Description

You are constructing a wall using bricks of unit height. The wall right now consists of n columns of bricks. The i-th column now has h_i bricks. You have m additional bricks at hand. You can add a brick to any column of the wall to increase its height by 1.

You would like your wall to be as strong as possible. As the strength of a wall is given by its lowest point, you thus want to maximize the lowest column of your wall. What is the maximum height of the lowest column you can achieve?

See below for an example wall [4, 2, 3, 1, 5, 2] of $n = 6$ columns. You have $m = 4$ additional bricks. Therefore you add 1 brick to the 2nd column, 2 to the 4th column, and 1 to the 6th column (illustrated gray). Your wall becomes [4, 3, 3, 3, 5, 3] and the minimum height is 3. This is the best you can do.



Constraints

h_i, m are non-negative integers.

Examples

Case 1: [4, 2, 3, 1, 5, 2], $m = 4$

Answer: 3

As illustrated above.

Case 2: [3, 2, 1], $m = 1$

Answer: 2

Add the only brick to the rightmost column.

Case 3: [1], $m = 100$

Answer: 101

There is only one column. Just add all you have to it.

Case 4: [3, 2, 1], $m = 0$

Answer: 1

You have no bricks at all. So the current wall is the best you can achieve (with the rightmost column being the lowest point).

Case 5: [1, 4, 2, 5, 3, 6], $m = 5$

Answer: 3

Requirements

Time: $O(n \log n)$ Your complexity shall not involve m.

Space: $O(n)$