The stairways of Saharna

Saharna is a beautiful, sceneric place in Moldova where, among all the caves and waterfalls, one can find a variety of stones of different forms and sizes. In the Middle Ages, these stones were used to construct the stairways of the fortresses. As a rule, each step of the stairway was formed of just one stone.

The stones are heavy and for this reason their positions are fixed along a string, that is the stones are in a given order. The craftsmen know the heights of the stones, hence they have a sequence of integers $H = (h_1, h_2, ..., h_i, ..., h_n)$, where h_i represents the height of the i^{th} stone.

To build a stairway, the craftsmen went along the string and selected consecutively a stone for each step of the stairway in construction. Obviously, a stone can be selected only when its height is not lower than the height of the previously selected stone.

As an example, if H = (1; 3; 4; 2; 3; 4; 1; 2; 2; 3; 3; 2), to build a stairway one can select the underlined stones in the sequence below:

$$H = (\underline{1}; 3; 4; \underline{2}; 3; 4; 1; \underline{2}; \underline{2}; \underline{3}; \underline{3}; 2).$$

Since bigger is necessarily better, to build a better castle the craftsmen had to use as many stones as possible for the construction of the stairways.

We denote by $L(H, k)$ the maximal number of stones that can be used to build k stairways, each having at least one step.

For the above example, it is not hard to see that $L(H,1) = 6$, that is, the underlined stones represent an optimal stairway.

Similarly, one can check that $L(H,2) = 9$, as can be seen from the example below, where the stones for the first stairway are underlined with one line (_) and the stones of the second stairway are underlined with a double line (‗) .

$$H = (\underline{1}; \underline{3}; \underline{\underline{4}}; \underline{2}; 3; \underline{\underline{4}}; 1; \underline{2}; \underline{2}; \underline{3}; \underline{3}; 2).$$

It is seen that for $k = 2$, for the first stairway the craftsmen use 6 stones, and for the second – 3.

If one wants to build 3 stairways, the maximal number of stones that can be used is seen in the example below:

$$H = (\underline{1}; \underline{3}; \underline{\underline{4}}; \underline{2}; \underline{3}; \underline{\underline{4}}; \underline{1}; \underline{\underline{2}}; \underline{\underline{2}}; \underline{3}; \underline{3}; \underline{\underline{2}}),$$

The bold underlinement represents a 3rd stairway, while the other lines have the same significance as before. Hence, $L(H,3) = 12$. One sees that for $k = 3$, for the first stairway 5 stones were used, for the second 4 stones, and for the third 3 stones. Please

remark that the first and second stairways chosen for $k = 3$ differ from the stairways chosen in the previous cases ($k = 1$ and $k = 2$).

It is also clear that by taking k to be consecutively 1, 2, 3, and so on, at some point, for some number q, $L(H, q) = n$, where n is the total number of stones.

Your task is to help the medieval craftsmen and write a program which, given the sequence of heights H, computes the maximal number of stones that can be used in k stairways - $L(H, k)$, where $k = 1, 2, ..., q$.

Input data. The text file `stairway.in` contains on the first line the positive integer n. The second line of the file contains the positive integers h_1, h_2, ..., h_i, ..., h_n, separated by blanks.

Output data. The text file `stairway.out` will contain on each of the q lines a positive integer. The k^{th} line of the file will contain the number $L(H, k)$, $k = 1, 2, ..., q$.

Example.

`stairway.in`

```
12
1 3 4 2 3 4 1 2 2 3 3 2
```

`stairway.out`

```
6
9
12
```

Restrictions. $1 \le n \le 5\,000$; $1 \le h_i \le 255$, $i = 1, 2, ..., n$.