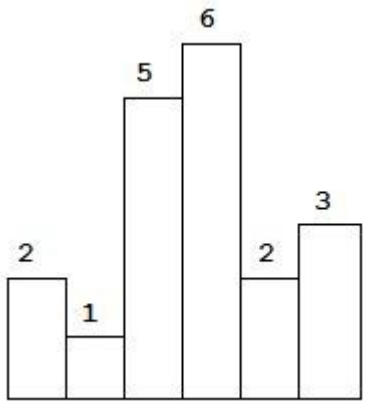
第一题：

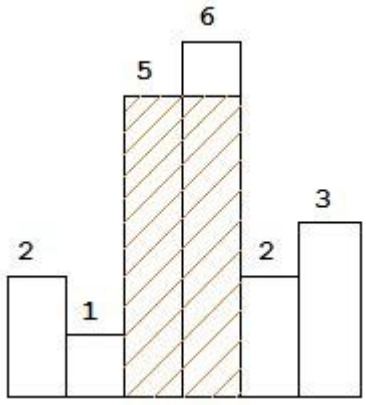
【LeetCode】84. Largest Rectangle in Histogram

Largest Rectangle in Histogram

Given n non-negative integers representing the histogram's bar height where the width of each bar is 1, find the area of largest rectangle in the histogram.



Above is a histogram where width of each bar is 1, given height = [2,1,5,6,2,3].



The largest rectangle is shown in the shaded area, which has area = 10 unit.

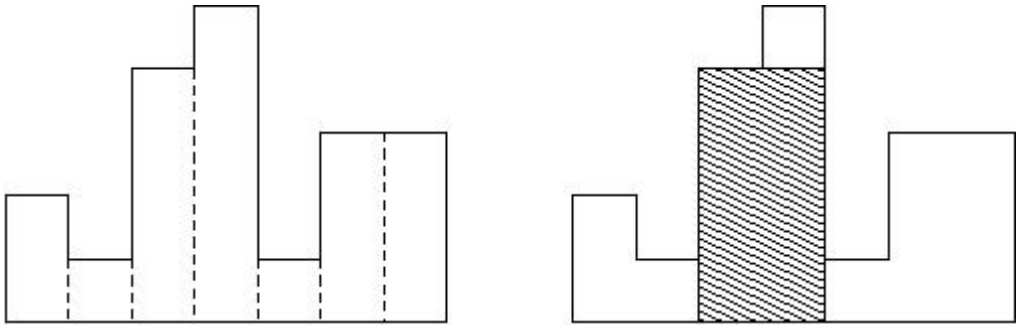
For example,

```
Given  height  =  [2,1,5,6,2,3],
return  10.
```

第二题：

Description

A histogram is a polygon composed of a sequence of rectangles aligned at a common base line. The rectangles have equal widths but may have different heights. For example, the figure on the left shows the histogram that consists of rectangles with the heights 2, 1, 4, 5, 1, 3, 3, measured in units where 1 is the width of the rectangles:



Usually, histograms are used to represent discrete distributions, e.g., the frequencies of characters in texts. Note that the order of the rectangles, i.e., their heights, is important. Calculate the area of the largest rectangle in a histogram that is aligned at the common base line, too. The figure on the right shows the largest aligned rectangle for the depicted histogram.

Input

The input contains several test cases. Each test case describes a histogram and starts with an integer n, denoting the number of rectangles it is composed of. You may assume that $1 <= n <= 100000$. Then follow n integers $h_1,...,h_n$, where $0 <= h_i <= 1000000000$. These numbers denote the heights of the rectangles of the histogram in left-to-right order. The width of each rectangle is 1. A zero follows the input for the last test case.

Output

For each test case output on a single line the area of the largest rectangle in the specified histogram. Remember that this rectangle must be aligned at the common base line.

Sample Input

```
7 2 1 4 5 1 3 3
4 1000 1000 1000 1000
0
```

Sample Output

```
8
4000
```

Hint

Huge input, scanf is recommended.

Source

Ulm Local 2003

第三题：

Description

Given a *m*-by-*n* (0,1)-matrix, of all its submatrices of all 1's which is the largest? By *largest* we mean that the submatrix has the most elements.

Input

The input contains multiple test cases. Each test case begins with *m* and *n* ($1 \leq m, n \leq 2000$) on line. Then come the elements of a (0,1)-matrix in row-major order on *m* lines each with *n* numbers. The input ends once EOF is met.

Output

For each test case, output one line containing the number of elements of the largest submatrix of all 1's. If the given matrix is of all 0's, output 0.

Sample Input

```
2 2
0 0
0 0
4 4
0 0 0 0
0 1 1 0
0 1 1 0
0 0 0 0
```

Sample Output

```
0
4
```

Source

POJ Founder Monthly Contest – 2008.01.31, xfxyjwf

第四题：

The farmer decided to build a barn on his farm. But on his farm there are trees and other buildings, which he does not want to remove.

For simplicity, we represent the farm as a rectangular grid of height and width . Each of the trees and buildings are located in one or more cells of the grid. The barn is a rectangle and should be built on the free cells of the grid.

Help the farmer to find out how many ways there are to place the barn, for all possible sizes of barns.

Input Format

The first line contains two integers and - the dimensions of the farm.

The next lines contains description of the farm: each line contains characters - `0` or `1` (`1` means the cell is available/free for building the barn).

Output Format

Write lines with integers in each line. The value in the line must be equal to the number of ways to place a barn with height and width in the farm.

Constraints

Sample input

```
3 3

011

110

110
```

Sample Output

```
6 3 0

3 1 0

1 0 0
```

Explanation

Barns with height 1 and width 1:

```
0*1   01*   011   011   011   011

110   110   *10   1*0   110   110

110   110   110   110   *10   1*0
```

Barns with height 1 and width 2:

```
0**   011   011

110   **0   110

110   110   **0
```

Barns with height 2 and width 1:

```
0*1   011   011

1*0   *10   1*0

110   *10   1*0
```

Barns with height 2 and width 2 (there is only one):

```
O11

**O

**O
```

Barns with height 3 and width 1 (there is only one):

```
O*1

1*O

1*O
```

Time Limits: C/C++ 1 sec, Java/C# 2 sec, other languages follow standard TL given

in Environment