Problem A. Snake

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Write a program that outputs the coordinates of elements from a array of size n$\times m$, which is filled like snake. Snake array - which is filled in like this:

- For all j and k $(j < k)$: $a_{ij} > a_{(i+1)j}$.
- If i is even then, for all j and k $(j < k)$: $a_{ij} > a_{ik}$.
- If i is odd then, for all j and k $(j < k)$: $a_{ij} < a_{ik}$.

Here is an example of 3×4 Snake array

25 23 20 19

13 15 17 18

12 10 9 8

Input

The first line of input contains a single number t - the number of elements which you must find. $1 \leq t \leq 10000$

The next line contains t integers - the values of the elements that you need print their coordinates.

The next line of input contains 2 space-separated integers, n and m, the number of rows and the columns. $1 \leq n,m \leq 800$

The next n lines contain m integers. Snake array n × m, $-10^7 \leq a_{ij} \leq 10^7$ for each $0 \leq i \leq n$, $0 \leq j \leq m$

Output

Print k lines the answer with coordinates for each case. If the given element is not in the snake array, then print -1.

Examples

standard input	standard output
5 10 15 13 8 23 3 4 25 23 20 19 13 15 17 18 12 10 9 8	2 1 1 1 1 0 2 3 0 1
8 1 7 17 12 6 15 18 20 5 5 25 24 23 22 21 16 17 18 19 20 15 14 13 12 11 6 7 8 9 10 5 4 3 2 1	4 4 3 1 1 1 2 3 3 0 2 0 1 2 1 4
4 -2 7 8 4 2 3 9 8 5 -1 3 4	-1 -1 0 1 1 2

Note

In the third example, the elements -2 and 7 is do not exist. Therefore, you should print -1.

Problem B. Oshiete oshiete yo sono shikumi wo

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

There is only one road and n houses in the Tokyo, and all the houses are on this road. House numbered from 1 to n and appear in this order. There are a_i ghouls living in the $i-th$ house. Due to the RC-cells infection, a $k-1$ roadblock needs to be installed between houses in Tokyo, so that k blocks of houses are detached. Kaneki Ken wants to divide ghouls so that the maximum number of ghouls over blocks (consecutive houses detached by roadblocks) is minimal. Help Kaneki find this number.

Subtasks

1. (20%) $n \leq 100$
2. (30%) $n \leq 1000$
3. (50%) other tests

Input

The first line contains integers n and k ($1 \leq k \leq n \leq 10^5$). The second line contains the elements of the array a_i ($1 \leq a_i \leq 10^9$).

Output

Print one number - the minimum possible maximum number of ghouls on the section of the roadblock.

Examples

standard input	standard output
10 3 3 4 2 1 3 4 5 2 2 3	12
10 4 3 1 2 4 10 8 4 2 5 3	12
2 1 399265 867718	1266983

Note

In the first example: (3+4+2+1), (3+4+5), (2+2+3)

Problem C. Patchwork Staccato I

Input file:	`standard input`
Output file:	`standard output`
Time limit:	4 seconds
Memory limit:	256 megabytes

You are given array a ($1 \le a_i \le 10^9$) of length n ($1 \le n \le 100$) and q ($1 \le q \le 100$) queries. In query i you are given two pairs of segments l_1, r_1, l_2, r_2 ($1 \le l_1 \le r_1 \le 10^9, 1 \le l_2 \le r_2 \le 10^9$), find number of indices c ($1 \le c \le n$) for which one of the following conditions is satisfied: $l_1 \le a_c \le r_1$ or $l_2 \le a_c \le r_2$.

Input

First line contains two integers n, q. The next q lines contain 4 integers l_1, r_1, l_2, r_2.

Output

Output q lines - answers to the queries.

Example

standard input	standard output
7 3 21 1 2 3 5 8 13 1 5 13 21 1 1 2 3 1 3 2 8	6 3 5

Problem D. Patchwork Staccato II

Input file:	`standard input`
Output file:	`standard output`
Time limit:	6 seconds
Memory limit:	256 megabytes

You are given array a ($1 \le a_i \le 10^9$) of length n ($1 \le n \le 10^5$) and q queries. In query i you are given two pairs of segments l_1, r_1, l_2, r_2 ($1 \le l_1 \le r_1 \le 10^9, 1 \le l_2 \le r_2 \le 10^9$), find number of indices c ($1 \le c \le n$) for which one of the following conditions is satisfied: $l_1 \le a_c \le r_1$ or $l_2 \le a_c \le r_2$.

Input

First line contains two integers n, q. The next q lines contain 4 integers l_1, r_1, l_2, r_2.

Output

Output q lines - answers to the queries.

Example

standard input	standard output
7 3 21 1 2 3 5 8 13 1 5 13 21 1 1 2 3 1 3 2 8	6 3 5

Problem E. Jonathan the Farmer

Input file:	`standard input`
Output file:	`standard output`
Time limit:	5 seconds
Memory limit:	256 megabytes

Jonathan is the Farmer whose household was damaged by a huge hurricane. He lost majority of his cattle. One day he walked near his farm and observed that there are N sheeps on the field. Each sheep is always grazing inside some rectangular area. Jonathan remembered such areas for each sheep. When he came home, he decided to build a paddock to catch at least K sheeps (to catch a sheep Jonathan must cover sheep's pasture fully). Jonathan prefers squares rather than usual rectangles, therefore he want to build square paddock with the corner at point $(0, 0)$. Material for paddock costs money, so Jonathan wants to minimize the length of paddock side. He is not very good at math, please help him find this length.

Input

The first line of the input contains two integers N and K ($1 \leqslant K \leqslant N \leqslant 2 \cdot 10^5$) - number of sheeps grazing in the field and the number of sheeps Jonathan wants to catch.

Each of the next N lines contain four integers $x_{i,1}$, $y_{i,1}$, $x_{i,2}$, $y_{i,2}$ ($1 \leqslant x_{i,1} < x_{i,2} \leqslant 10^9$, $1 \leqslant y_{i,1} < y_{i,2} \leqslant 10^9$) - coordinates of bottom-left and top-right corners of the i_{th} sheep's pasture.

Output

Find the minimum length of square paddock such that at least K sheeps' pastures fit there.

Examples

standard input	standard output
10 7 5 1 7 8 1 3 5 4 5 8 8 10 7 1 8 5 9 1 10 5 4 4 7 5 1 6 7 7 5 7 9 10 4 8 5 9 4 2 5 3	9
10 2 7 4 8 9 7 7 8 8 4 3 6 7 4 1 8 6 4 2 10 5 1 3 2 10 6 8 7 9 7 5 8 6 4 4 8 5 4 1 5 2	7

Problem F. Win me if you can!

Input file: `standard input`
Output file: `standard output`
Time limit: 1 second
Memory limit: 256 megabytes

Mark is going to fight for Fight Club. There were N competitors with different powers. There will be P rounds to fight and in each round Mark's power will be changed. With power M, Mark can kill all the competitors whose power is equal to or less than his. Round by round, all the competitors who are dead in the previous round will be reborn. Such that in each round there will be N competitors to fight. As Mark is tired, please, help him to count the number of competitors that he can win in each round and the total sum of their powers.

Input

The first line contains an integer N ($1 \leqslant N \leqslant 10^6$) - the number of competitors without Mark. Next line contains N integers a_i ($1 \leqslant a_i \leqslant 10^3$) - powers of these competitors. The third line contains one integer P ($1 \leqslant \mathrm{N} \leqslant 10^6$) number of rounds. Each of the next P lines contains an integer p_i ($1 \leqslant a_i \leqslant 10^3$) - power of Mark at each round.

Output

On each of the P lines print one integer - how many competitors Mark will win and the sum of their powers.

Example

standard input	standard output
7 7 9 1 8 2 6 2 2 4 8	3 5 6 26

Problem G. Santa Jonathan

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Christmas is coming! It means that each child living in the Duck Islands must receive a long-awaited gift. All children from the same island wish for a rubber duck of the same color (colors are distinct among all islands). During one flight Santa Jonathan can deliver gifts only of one color and the number of gifts that he can deliver at a time is restricted by the capacity of his bag. Santa Jonathan appreciates his time very much, so he wants to do no more than f flights. Please, help him find the least possible capacity of the bag to deliver all gifts during no more than f flights.

Input

The first line of the input contains two integers n and f - number of islands in the Duck Kingdom and number of flights ($1 \leqslant n \leqslant f \leqslant 10^5$).

The second line of the input contains n integers c_i - number of children in the i_{th} island ($1 \leqslant c_i \leqslant 10^4$).

Output

Please, find the least posible capacity of the bag that satisfies all conditions.

Examples

standard input	standard output
3 6 10 10 10	5
5 7 10 34 14 6 20	17

Problem H. Debugging

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Jonathan almost finished his project by Object-Oriented Programing course. His code consists of N consecutive blocks, each of them consists of a certain amount of lines. Unfortunately, Jonathan made a lot of mistakes. Compiler showed that Jonathan made M mistakes, each of them is described by the number of line where this mistake was made. To debug his project faster, Jonathan wants to define number of block in which he made a mistake. Please, help Jonathan debug his project before deadline will expire.

Input

First line consists of integers N and M - number of blocks and mistakes ($1 \leqslant N, M \leqslant 2 \cdot 10^5$).

The second line contains N integers a_i - number of lines in the i_{th} block ($1 \leqslant a_i \leqslant 10^4$).

Each of the next M lines contains one integer b_i - number of line where the i_{th} mistake was made ($1 \leqslant b_i \leqslant 2 \cdot 10^9$).

Output

Print M lines, the i_{th} line must contain the number of block in which the i_{th} mistake was made.

Examples

standard input	standard output
2 1 3 4 5	2
3 3 5 7 6 5 10 15	1 2 3

Note

In the first sample lines [1, 3] belong to the first block and lines [4, 7] to the second. So, Jonathan will find mistake at the fifth line at the second block.

In the second sample lines [1, 5], [6, 12], [13, 18] belong to the first, second and third blocks respectively. So, the fifth line is inside first block, the tenth line is inside second block and the fifteenth line is inside third block.

Hint: Think about inplementing binary search function to solve this problem.

Hint: Build a new array P, where P_i is the line at which i_{th} block ends. You can notice, that this array is sorted.

Problem I. 75883. Binary search

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

You are given a sorted array. Try to find number x from this array.

Input

You are given n and n elements. After that, in the next line you are given a number x.

Output

If the given number x is in this array, print Yes, else print No.

Examples

standard input	standard output
5 1 2 3 4 5 1	Yes
5 1 2 3 4 5 2	Yes
5 1 2 3 4 5 7	No
5 1 2 3 4 5 10	No
5 1 2 3 4 5 5	Yes

Problem J. Robin Hood stealing the Gold

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Robin Hood wants to steal the golden bars from the bank of High Sheriff aiming to distribute them to poor local people. There are N bags of golden bars, the i-th bag has $bags[i]$ bars. Sheriff has gone and will return in H hours.

Robin can steal K bars per hour. Each hour, he chooses a single bag of golden bars, and steals K bars from that bag. If there are less than K bars in the bag, he steals them all, and won't steal any more during this hour.

Robin Hood wants to steal all of the golden bars before the Sheriff comes back.

Return the minimum number K such that Robin can steal ALL of the golden bars within H hours.

Input

The first line of the input contains two space-separated integers $N(1 \le N \le 10^4), H(N \le H \le 10^9)$, the number of bags of golden bars and the number of hours for which Sheriff has gone. The next line contains N space-separated integers $(1 \le bags[i] \le 10^9)$ denoting the number of golden bars in each bag.

Output

Print the minimum number K such that Robin Hood can steal all of the N golden bars within the limit of H hours.

Examples

standard input	standard output
4 8 3 6 7 11	4
5 5 30 11 23 4 20	30
5 6 30 11 23 4 20	23

Note

K is Robin's speed of stealing the bars such that $\sum_{i=1}^{N} \frac{bags[i]}{K} = H$.

If Robin can finish stealing all the bars (within H hours) with speed of K, he can finish with a larger speed too.

If we let $possible(K)$ be true if and only if Robin can finish with a speed of K, then there is some X such that $possible(K) = true$ if and only if $K \ge X$.

For the first test case there is some $X = 4$ so that $possible(1) = possible(2) = possible(3) = false$, and $possible(4) = possible(5) = \cdots = true$. $K = 4$ is the minimum K such that $\frac{3}{4}+\frac{6}{4}+\frac{7}{4}+\frac{11}{4} = 1+2+2+3 = 8$. $K = 5$ is also a right answer but it is not a minimum K.