Problem A. Brackets

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

A balanced bracket sequence is a string consisting of only brackets, such that this sequence, when inserted certain numbers and mathematical operations, gives a valid mathematical expression. Formally you can define balanced bracket sequence with:

e (the empty string) is a balanced bracket sequence.

if s is a balanced bracket sequence, then so are (s), {s}, [s].

if s and t are balanced bracket sequences, then so is st.

Verify if given string is balanced bracket sequence.

Input

Given sequence of symbols '[', '{', '(', ']', '}',)'.

Output

Print answer Yes or No.

Examples

standard input	standard output
`()[]{}`	`YES`
`({[)}]`	`NO`

Problem B. Chessman

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

Assyl loves chess. One of the rules of chess players: `"the only way to improve your skill is to play with stronger opponent"`. So there are N players each with some level $a[i], 1 \leq i \leq n$. Level of play of Assyl changes everyday, so you need to find the best opponent for him every day as his level varies. For each of Q days, print the minimal level among N players that is greater than or equal to X.

Input

The first line of the input contains an integer N - number of numbers in Assyl's opponents, Q - number of days. ($1 \leqslant$ N,Q $\leqslant 10^5$) The second line contains N integers a_i. ($1 \leqslant a_i \leqslant 10^9$) Each of the next Q lines contains one number.

Output

Print minimal number that is greater or equal to X and which is level of some player.

Examples

standard input	standard output
7 1 4 5 14 61 32 7 5 7	7
7 2 31 70 52 32 47 49 35 14 37	31 47

Note

It is guaranteed that there exist number greater than or equal to X.

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Problem C. Teachers and clues

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

Firstly, please go to the link and copy the template. `https://ideone.com/ViE12M`

It has one method: *ask*(int t), where t represents some time in seconds. Teacher is always asked about clues on quiz. Sometimes, teachers are kind to students, and give them clues. So if student asks about clue at some moment t, teacher will give him a clue and give clue to every student that asked question in last 3000 seconds (50 minutes, e.g. answers to all questions in range [t - 3000, t]). You must return number of students that will be given a clue. You may think that always different students asks for clues (no student ask for a clue twice).

It is guaranteed that every call to *ask* uses a strictly larger value of t than before.

Input

Given integer T the number of queries $1 <= T <= 10^6$

Output

Output the T lines the answer for each query

Examples

standard input	standard output
4 1 100 3001 3002	1 2 3 3
4 1 2000 5001 6003	1 2 1 2

Problem D. Triangle Binary Search Tree

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

You are given N integers in order of their insertion to Binary Search Tree. You draw a set of horizontal lines that goes through nodes with the same height. After that you can see triangles with nodes instead vertices and edges instead sides. Your task is to calculate the number of the smallest triangles.

Input

The first line consists of an integer N - number of nodes in Binary Search Tree ($1 \leqslant N \leqslant 10000$).

The second line contains N integers a_i - value of each node in Binary Search Tree in order of their insertion ($1 \leqslant a_i \leqslant N$).

It is guaranteed that there are no duplicates.

Output

Print the number of mini-triangles in resulting Binary Search Tree.

Examples

standard input	standard output
3 3 5 1	1
3 1 3 5	0
16 13 9 3 7 6 16 1 11 12 10 4 2 14 5 8 15	5

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Problem E. Balanced Binary Search Tree

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

You have an array with 2^N - 1 elements in it. You want to build the Binary Search Tree on this array, adding elements in order of their appearance in array (from left to right). But there is a probability of imbalance of such tree. That's why you decided to shuffle your array to obtain perfectly balanced Binary Search Tree after adding elements (from left to right, again). Your task is to print your array after appropriate shuffle. If there are several possible shuffles, print the array after applying any of them.

Note, that you are not asked for building Binary Search Tree, but only for shuffling array.

Input

The first line of input consists of single integer N that describes the length of the array ($1 \leqslant N \leqslant 15$).

The next line contains 2^N - 1 integers a_i - elements of the array ($0 \leqslant a_i \leqslant 2 \cdot 10^9$).

It is guaranteed that there is no duplicates in the array.

Output

Print 2^N - 1 integers - elements in your array after applying required shuffle.

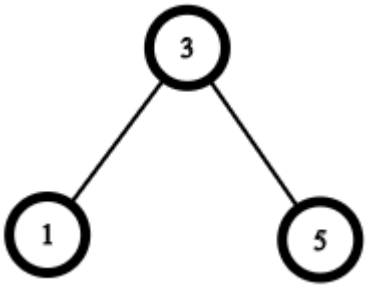
Examples

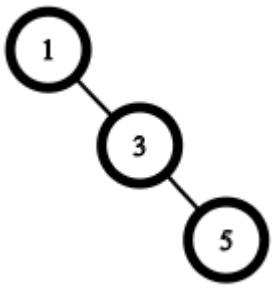
standard input	standard output
2 3 5 1	3 5 1
2 1 3 5	3 1 5

Note

In the first sample given array can be used for building balanced BST (left picture).

In the second sample given array gives such chain tree (right picture), so it must be shuffled.





Note, that for both samples [3, 5, 1] and [3, 1, 5] are correct answers.

Hint: Use divide and conquer method (recall advanced sorting algorithms) and implement recursive function to solve this problem

Problem F. Experiment with Mixtures

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	256 megabytes

Mark is making an experiment with the mixtures of different densities. For his experiment he wants all of the mixtures to have a density $\geq Min$. He uses the following formula to obtain a combined mixture: `new density = least density + 2*2nd least density`. Mark repeats the mixing until he gets all the mixtures with the density $\geq Min$. You are given the densities of mixtures. How many times Mark should mix his mixtures to get the densities of all mixtures $\geq Min$? Print -1 if this isn't possible.

Input

The first line consists of integers $N(1 \leq N \leq 10^6)$, the number of mixtures and $Min(0 \leq Min \leq 10^9)$, the minimum required density, separated by a space. The next line contains N space-separated integers $(0 \leq densities[i] \leq 10^6)$ describing the densities of mixtures.

Output

Print the number of operations that are needed to make all the densities $\geq Min$. Print -1 if it is impossible.

Examples

standard input	standard output
3 10 1 1 1	-1
6 7 1 2 3 9 10 12	2

Problem G. Inkar's birthday

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

Inkar's friends have prepared a cool present for her birthday. In order to receive the password for the gift box, she needs to solve the following problem. Given an array of n elements and m the number of queries consisting of two numbers l and r. The gift box password is the sum of the minimum elements of each segment.

Input

The first line of the input contains integer n and m ($1 \leq n, m \leq 2 \times 10^5$). The second line of the input contains n integer numbers $a_1, a_2, \ldots, a_n$ ($1 \leq a_i \leq 10^9$) — the array itself.

Following m lines contains queries of two numbers l and r ($1 \leq l \leq r \leq 2 \times 10^5$).

Output

Print the single line - the password for the gift box.

Examples

standard input	standard output
6 3 1 2 3 4 5 6 1 3 3 4 1 6	5
5 3 500 700 101 220 1001 1 2 3 4 4 5	821