Problem A. Jujubesister

Input file:	`standard input`
Output file:	`standard output`
Time limit:	8 seconds
Memory limit:	512 megabytes

Given a sequence of integers $a_1, \ldots, a_n$, you need to answer m questions. The answer to a question l, r is the amount of (i, j, k) s.t. $l \leq i < j < k \leq r, a_i = a_k > a_j$.

$1 \leq a_i \leq n$

$1 \leq l \leq r \leq n$

$1 \leq n, m \leq 5 \times 10^5$

Input

The first line contains two integers n, m . The next line contains n integers $a_1, \ldots, a_n$. For the next m lines, each line contains two integers l, r , means a question.

Output

For each question, output a line containing a single integer representing the answer.

Example

standard input	standard output
10 5 9 8 5 4 5 1 5 1 5 8 2 8 4 9 7 9 6 7 2 3	4 4 1 0 0

Problem B. Circle of Mistery

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

Ran is good at solving graph problems, but this time she has a great trouble because the problem Yukari gives her is too hard! Ran needs your help!

So here's the Circle of Mistery Problem:

Give an integer array w of length n and an integer k. Ran needs to construct a permutaion p. Let's use p to construct a graph: connect i and p_i together. Obviously, the graph will contain several circles. Ran has to make sure at least one circle $a_1 \to a_2 \to \cdots \to a_x \to a_1$ satisfy that $\sum w_{a_i} \geq k$.

Try to find the permutation p with the minimum number of inversions and output the number. An inversion in an array a is a pair of indices (i, j) such that $i > j$ and $a_i < a_j$.

Input

The first line contains two integers n ($1 \leq n \leq 10^3$) and k ($-10^6 \leq k \leq 10^6$).

The next line contains n integers, the i-th one means w_i ($-10^6 \leq w_i \leq 10^6$).

Output

If it's impossible to construct p, output -1. Otherwise output the minimum number of inversions in p.

Examples

standard input	standard output
3 3 2 2 1	1
5 3 -3 2 -1 0 2	3
2 -3 -5 -5	-1

Problem C. Cheeeeen the Cute Cat

Input file:	`standard input`
Output file:	`standard output`
Time limit:	0.8 seconds
Memory limit:	1024 megabytes

Chen loves bipartite graph matching problems. As a cat, Chen also loves playing with woolen balls. So she thinks the graph should be dense.

And here's The Cute Cat Matching Problem:

Given a bipartite graph with $2n$ nodes and $\frac{n(n-1)}{2}$ edges, guaranteed that there are no edges betwwen nodes $1, 2, \ldots, n$. There are no edges between nodes $n+1, n+2, \ldots, 2n$ too. Also, there's no edge between i $(1 \le i \le n)$ and $i+n$. If there's an edge between i $(1 \le i, j \le n)$ and $j+n$, then there will be no edge between j and $i+n$.

Help Chen find the maximum matching of the given graph.

Input

The first line contains one integer n $(2 \le n \le 3000)$, meanings the graph has $2n$ node. For the next n lines, each line while contain n 01s, forms a 01 matrix e $(e_{i,j} \in 0, 1)$. If $e_{i,j} = 1$, there will be an edge between node i and $n+j$.

Output

One integer, means the maximum matching of the given graph.

Examples

standard input	standard output
2 0 1 0 0	1
3 0 1 0 0 0 1 1 0 0	3

Problem D. Cirno's Perfect Equation Class

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

Ran is a puzzle lover and loves solving all kinds of math puzzles. One day, Cirno gives her an easy equation: $ka + b = c$.

Cirno gives the value of k, c and n, and want to know how many positive integer pairs (a, b) satisfy $ka + b = c$, $b|c$ (that means $c = xb$, $x \geq 1$) and $\gcd(a, b) \geq n$.

Cirno will ask q questions (that means there'll be q data cases). Help Ran answer them!

Input

The first line contains on integer q ($1 \leq q \leq 100$), means the number of test cases.

For the next q lines, each line contains three integers k, c, n ($1 \leq k, c, n \leq 10^9$).

Output

For each question, output a single integer representing the number of pairs (a, b) satisfying all restrictions.

Example

standard input	standard output
3 4 30 2 5 30 1 3 28 6	2 3 1

Note

In the example,

(5,10) and (6,6) satisfy all restrictions for the first question,

(3,15),(4,10) and (5,5) satisfy all restrictions for the second question,

and only (7,7) satisfy all restrictions for the third question.

Problem E. Red and Blue and Green

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

Ran loves intervals, inversions and trees, so she wants to make a problem mixing all of them together!

Ran has a unknown permutation p of length n and m pairwise distinic intervals, the i-th one is $[l_i, r_i]$. It's guaranteed that for two intervals i and j, let $l_i \le l_j$, then $r_i < l_j$ or $r_i \ge r_j$ always holds.

There will be m restrictions, the i-th one is like the number of inversions in $[l_i, r_i]$ must be odd/even. An inversion in an array a is a pair of indices (i, j) such that $i > j$ and $a_i < a_j$.

Now Ran what you to construct a permutation p and meet all restrictions, or report it is impossible.

Input

The first line contains two integers n and m ($1 \le n, m \le 10^3$).

For the next m lines, each line contains three integers l_i, r_i, w_i ($1 \le l_i \le r_i \le n$, $w_i \in \{0, 1\}$). If $w_i = 0$ then the number of inversions in $[l_i, r_i]$ must be even, $w_i = 1$ otherwise.

Output

Output -1 if it's impossible to construct p, or output n integers representing p.

Examples

standard input	standard output
4 2 1 3 1 1 2 0	1 3 2 4
4 1 1 1 1	-1

Problem F. NoCruelty

Input file:	standard input
Output file:	standard output
Time limit:	1 second
Memory limit:	512 megabytes

Given a sequence of integers $a_1, \ldots, a_n$, you need to process m operations. In an operation l, r, x , you need to update the sequence first, and then query how many different values are there in $a_1, \ldots, a_x$. When $l \leq r$, the update is sort $a_l, \ldots, a_r$ according to ascending order, or the update is sort $a_r, \ldots, a_l$ according to descending order.

$1 \leq a_i \leq n$

$1 \leq l, r, x \leq n$

$1 \leq n, m \leq 10^5$

Input

The first line contains two integers n, m . The next line contains n integers $a_1, \ldots, a_n$. For the next m lines, each line contains three integers $l \oplus c, r \oplus c, x \oplus c$, means an operation l, r, x. Where $\oplus$ is bitwise XOR, and c is the answer to the last operation (especially, $c = 0$ for the first operation).

Output

For each operation, output an integer in a line representing the answer.

Example

standard input	standard output
9 7 2 2 8 8 2 8 2 1 3 2 2 2 3 7 6 6 7 1 9 6 7 10 11 10 7 0 5 5 1 7	1 2 1 2 3 2 2

Problem G. Go to Play Maimai DX

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

Ran loves playing Maimai DX. However, to play it, she needs to perpare a big bottle of water, a pair of gloves, an earphone and some coins. She wants to play Maimai DX as soon as possible, but she has to take enough coins.

So here's the Maimai DX Problem:

Given an array a guaranteed that $1 \leq a_i \leq 4$ and an integer k. Let's call an interval $[l, r]$ good if it contains all 4 kinds of numbers. Try to find the shortest good interval with at least k 4s in it, and output it's length.

It's guaranteed that there're at least one 1s, 2s and 3s in a. Also, there're at least k 4s.

Input

The first line contains two integers n and k ($1 \leq k \leq n \leq 10^5$), n means a's length.

The next line contains n integers, the i-th one means a_i ($1 \leq a_i \leq 4$).

Output

One integer, means the length of the shortest good interval with at least k 4s in it.

Examples

standard input	standard output
6 2 4 1 1 4 2 3	6
8 2 4 2 3 4 1 1 4 2	5

Problem H. Nazrin the Greeeeeedy Mouse

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	1024 megabytes

There're n cheeses in the house. The i-th cheese is between point i and point $i+1$. The i-th cheese's size is a_i and its weight is b_i.

Nazrin is at point 1 in the beginning and wants to steal some cheeses. She has m chances to take the cheeses:

- In the i-th time, Nazrin brings a bag of size sz_i. Since she's greedy, for $i > 1$, $sz_i \geq sz_{i-1}$ always holds. She can travel from point 1 and take some cheeses. She can only travel from point x to $x+1$, or backwards. If she wants to travel from point x to point $x+1$, she has to dig a hole on the x-th cheese or take it. She can't take a cheese with a hole on it. Of course, the sum of the cheeses' size she takes in the i-th time can't be larger than sz_i. After taking the cheeses, she needs to go back to point 1.

Please maximize the sum of the weights of taken cheeses and output it.

Input

The first line contains two integer n ($1 \leq n \leq 200$) and m ($1 \leq m \leq 10^5$).

For the following n lines, the i-th line contains two integers a_i ($1 \leq a_i \leq 200$) and b_i ($1 \leq b_i \leq 10^5$).

The next line contains m integers, the i-th one is sz_i ($1 \leq sz_i \leq 200$). Notice that for $i > 1$, $sz_i \geq sz_{i-1}$.

Output

One integer, the maximum sum of the weights of taken cheeses.

Example

standard input	standard output
5 3 2 10 2 5 1 22 3 7 6 8 1 3 7	44

Note

In the example, Nazrin can take actions below to maximize the weight of taken cheeses:

In the first time, Nazrin stays at point 1 and gives up the first chance to take cheese.

In the Second time, Nazrin takes the cheese between point 1 and point 2, digs a hole in the cheese between point 2 and point 3, takes the cheese between point 3 and point 4, and then comes back to point 1 through the hole in the cheese between point 2 and point 3.

In the Third time, Nazrin travels to point 4 through the hole in the cheese between point 2 and point 3, digs a hole in the cheese between point 4 and point 5, takes the cheese between point 5 and point 6, and then comes back to point 1 through the hole in the cheeses between point 1 and point 5.

Problem I. The Yakumo Family

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

Ran feels boring at home, and wants to propose a math problem with Yukari and Chen!

So here's The Yakumo Family Problem:

Given an integer array a, try to calculate the value of the following equation modulo 998244353:

$$\sum_{1\le l_1\le r_1<l_2\le r_2<l_3\le r_3\le n} XOR(l_1,r_1)\times XOR(l_2,r_2)\times XOR(l_3,r_3)$$

$XOR(l,r)$ means $a_l\oplus a_{l+1}\oplus a_{l+2}\cdots\oplus a_r$, and $\oplus$ means bitwise XOR.

Input

The first line contains one integer n ($3\le n\le 2\times 10^5$), which means the length of a.

The next line contains n integers, the i-th integer means the value of a_i ($0\le a_i\le 10^9$).

Output

One integer, means the value of the equation modulo 998244353.

Examples

standard input	standard output
3 1 2 3	6
4 1 1 1 0	2

Problem J. OIL

Input file:	`standard input`
Output file:	`standard output`
Time limit:	15 seconds
Memory limit:	1024 megabytes

Given a sequence of integers $a_1, \ldots, a_n$, you need to process m operations. In an operation x , you need to change $a_1, a_2, \ldots, a_x$ to $a_x, \ldots, a_2, a_1$, and then query how many different k satisfies that there exists i, j that $1 \leq i \leq x < j \leq n$ s.t. $a_i = a_j = k$.

Operations are NOT independent.

There is no $1 \leq i < j < k < l \leq n$ s.t. $a_i = a_j = a_k = a_l$

$1 \leq a_i \leq n$

$1 \leq x \leq n$

$1 \leq n, m \leq 3 \times 10^5$

Input

The first line contains two integers n, m . The next line contains n integers $a_1, \ldots, a_n$. For the next m lines, each line contains an integer x , means an operation.

Output

For each operation, output an integer in a line representing the answer.

Example

standard input	standard output
6 5 4 2 5 5 4 4 2 5 5 3 6	1 1 1 2 0