1

Room Temperature

President K is taking on the role of adjusting the room temperature of the officers' room. He wants to make the officers as comfortable as possible.

Now there are N officers in the room. Each officer is numbered from 1 to N, and the appropriate temperature for officers i ($1 \leq i \leq N$) is A_i degrees when (s)he is not wearing jackets. For each officer, the appropriate temperature drops by T degrees every time (s)he wears a jacket. In other words, when the officer i is wearing k jackets, her/his appropriate temperature is $A_i - kT$ degrees.

When the room temperature is x degrees and the appropriate temperature of a certain officer is y degrees, the **discomfort index** of the officer is expressed as $|x - y|$. Note that $|t|$ represents the absolute value of t. Each officer wears the appropriate number of jackets of 0 or more to minimize discomfort index, depending on the room temperature.

Here, president K decided to call the maximum discomfort index among all officers as **room's unpleasantness**, and set the room temperature so that the room's unpleasantness was minimized. Note that the room temperature must be an integer.

Write a program which, given information about the officers and the appropriate temperature, calculates the minimum room's unpleasantness.

Input

Read the following data from the standard input.

$N\ T$
$A_1\ A_2\ \cdots\ A_N$

Output

Write one line to the standard output. The output should contain the minimum room's unpleasantness.

Constraints

- $2 \leq N \leq 500\,000$.
- $1 \leq T \leq 10^9$.
- $1 \leq A_i \leq 10^9$ $(1 \leq i \leq N)$.
- Given values are all integers.

Subtasks

1. (15 points) $N = 2$.
2. (5 points) $N \leq 3\,000$, $T = 1$.
3. (30 points) $N \leq 3\,000$, $T \leq 2$.
4. (35 points) $N \leq 3\,000$, $T \leq 3\,000$.
5. (15 points) No additional constraints.

Sample Input and Output

Sample Input 1	Sample Output 1
2 4 19 24	1

For example, if the room temperature is set to 16 degrees, the appropriate temperature for officer 1 will be 15 degrees by wearing one jacket; the discomfort index is $|16 - 15| = 1$. The appropriate temperature for officer 2 will be 16 degrees by wearing two jackets; the discomfort index is $|16 - 16| = 0$. At this time, the room's unpleasantness becomes 1.

Since the room's unpleasantness cannot be made smaller than 1, output 1.

This sample input satisfies the constraints of Subtasks 1, 4, 5.

Sample Input 2	Sample Output 2
3 1 21 19 23	0

For example, if the room temperature is set to 19 degrees, the room's unpleasantness becomes 0. Output 0.

This sample input satisfies the constraints of Subtasks 2, 3, 4, 5.

Sample Input 3	Sample Output 3
6 8 24 22 21 25 29 17	2

For example, if the room temperature is set to 15 degrees, the room's unpleasantness becomes 2. Since the room's unpleasantness cannot be made smaller than 2, output 2.

This sample input satisfies the constraints of Subtasks 4, 5.

2

Construction Project 2

There are N stations in JOI Kingdom, numbered from 1 to N. There are M train lines in JOI Kingdom, numbered from 1 to M. The train line i ($1 \leq i \leq M$) connects station A_i and station B_i bi-directionally, and requires C_i minutes for travel.

You, a minister of JOI Kingdom, decided to construct a new train line as follows.

- You choose integers u and v, which satisfy $1 \leq u < v \leq N$. You construct a new train line, which connects station u and station v bi-directionally, and requires L minutes for travel. Note that you can choose 2 integers such that there already be a train line connecting station u and station v.

After you construct a new train line, the King of JOI Kingdom becomes happy if he can move from station S to station T within K minutes by using some train lines. Note that transit times and waiting times for train lines are not considered.

There are $\frac{N(N-1)}{2}$ ways when you choose 2 integers u and v, and you want to know how many of these ways make the King happy.

Write a program which, given information of stations, the train lines, and the King's request, calculates number of ways to choose 2 integers that make the King happy.

Input

Read the following data from the standard input.

N M
S T L K
A_1 B_1 C_1
A_2 B_2 C_2
$\vdots$
A_M B_M C_M

Output

Write one line to the standard output. The output should contain number of ways to choose 2 integers that make the King happy.

Constraints

- $2 \leq N \leq 200\,000$.
- $1 \leq M \leq 200\,000$.
- $1 \leq S < T \leq N$.
- $1 \leq L \leq 10^9$.
- $1 \leq K \leq 10^{15}$.
- $1 \leq A_i < B_i \leq N$ $(1 \leq i \leq M)$.
- $(A_i, B_i) \neq (A_j, B_j)$ $(1 \leq i < j \leq M)$.
- $1 \leq C_i \leq 10^9$ $(1 \leq i \leq M)$.
- Given values are all integers.

Subtasks

1. (8 points) $L = 1$, $K = 2$, $C_i = 1$ $(1 \leq i \leq M)$.
2. (16 points) $N \leq 50$, $M \leq 50$.
3. (29 points) $N \leq 3\,000$, $M \leq 3\,000$.
4. (47 points) No additional constraints.

Sample Input and Sample Output

Sample Input 1	Sample Output 1
7 8 6 7 1 2 1 2 1 1 6 1 2 3 1 2 4 1 3 5 1 3 7 1 4 5 1 5 6 1	4

Suppose you choose $u = 3, v = 6$. You construct a new train line that connects station 3 and station 6 and requires 1 minute for travel.

After you construct a new train line, it is possible to move from station 6 to station 7 in 2 minutes by using some train lines as follows. The King becomes happy because he can move from station 6 to station 7 within 2 minutes.

1. Move from station 6 to station 3 by using a train line which connects station 3 and station 6 bi-directionally. This takes 1 minutes.
2. Move from station 3 to station 7 by using a train line which connects station 3 and station 7 bi-directionally. This takes 1 minutes.

There are 4 ways to choose 2 integers that make the King happy, including this case. Therefore, output 4.

This sample input satisfies the constraints of Subtasks 1, 2, 3, 4.

Sample Input 2	Sample Output 2
3 2 1 3 1 2 1 2 1 2 3 1	3

No matter how you choose the 2 integers, the King becomes happy. In other words, there are 3 ways to choose 2 integers that make the King happy. Therefore, output 3.

This sample input satisfies the constraints of Subtasks 1, 2, 3, 4.

Sample Input 3	Sample Output 3
6 4 2 5 1000000000 1 1 2 1000000000 2 3 1000000000 2 4 1000000000 5 6 1000000000	0

No matter how you choose the 2 integers, the King doesn't become happy. Therefore, output 0.

This sample input satisfies the constraints of Subtasks 2, 3, 4.

Sample Input 4	Sample Output 4
18 21 4 8 678730772 3000000062 5 13 805281073 8 17 80983648 3 8 996533440 10 16 514277428 2 5 57914340 6 11 966149890 8 12 532734310 2 9 188599710 2 3 966306014 12 16 656457780 16 18 662633078 1 15 698078877 2 8 665665772 2 6 652261981 14 15 712798281 7 13 571169114 13 14 860543313 6 7 454251187 9 14 293590683 6 14 959532841 3 11 591245645	16

This sample input satisfies the constraints of Subtasks 2, 3, 4.

3

Marathon Race 2

JOI Avenue is a road of length L in an east-west direction. The place of l meters ($0 \le l \le L$) from the west end on the road is called "position l".

The first marathon race in JOI Avenue is going to be held this year. The race has a different regulation from normal one, which is described in the following:

- Before the race, N balls are located on the road. The i-th ball ($1 \le i \le N$) is located at position X_i. Multiple balls may be located at the same position.
- The participant starts at the designated position.
- The participant collects all N balls and finishes at the designated position. When this is achieved within the designated time limit, one **completes the race**. However, once the participant collect a ball, they must not put the ball on the road, otherwise they will be disqualified from the race.

The starting and finishing position, and the time limit, are not yet announced, but it is known that they are chosen from Q scenarios. The j-th scenario ($1 \le j \le Q$) is that, the participant starts at position S_j, finishes at position G_j, and the time limit is T_j seconds.

Rie is participating in the marathon race. She spends 1 second to collect 1 ball. She spends $x + 1$ seconds to move 1 meter, where x is the number of balls she is carrying.

Write a program which, given the information of JOI Avenue, the positions of balls, and the scenarios, determines whether there exists a way for Rie to complete the race, for each scenario.

Input

Read the following data from the standard input.

N L
X_1 X_2 $\cdots$ X_N
Q
S_1 G_1 T_1
S_2 G_2 T_2
$\vdots$
S_Q G_Q T_Q

Output

Write Q lines to the standard output. On the j-th line ($1 \leq j \leq Q$), output `Yes` if there exists a way for Rie to complete the race for scenario j, and `No` otherwise.

Constraints

- $1 \leq N \leq 500\,000$.
- $1 \leq L \leq 500\,000$.
- $0 \leq X_i \leq L$ ($1 \leq i \leq N$).
- $1 \leq Q \leq 500\,000$.
- $0 \leq S_j \leq L$ ($1 \leq j \leq Q$).
- $0 \leq G_j \leq L$ ($1 \leq j \leq Q$).
- $1 \leq T_j \leq 500\,000$ ($1 \leq j \leq Q$).
- Given values are all integers.

Subtasks

1. (7 points) $N \leq 7$, $Q \leq 10$, $S_j = 0$, $G_j = 0$ ($1 \leq j \leq Q$).
2. (7 points) $N \leq 7$, $Q \leq 10$.
3. (10 points) $N \leq 14$, $Q \leq 10$.
4. (28 points) $N \leq 100$, $Q \leq 10$.
5. (10 points) $N \leq 2\,000$, $Q \leq 10$.
6. (19 points) $N \leq 2\,000$.
7. (19 points) No additional constraints.

Sample Input and Output

Sample Input 1	Sample Output 1

`3 100`
`30 80 30`
`3`
`0 100 403`
`0 100 300`
`0 100 262`
	`Yes`
	`Yes`
	`No`

In the 1st scenario, the participant starts at position 0, finishes at position 100, and the time limit is 403 seconds. Rie can complete the race in 263 seconds, which is within the time limit, in the following way. Therefore, output `Yes` in the 1st line.

Order	Action	Time (sec.)	Total Time (sec.)
1	Start at position 0 and move to position 30.	30	30
2	Collect the 1st ball.	1	31
3	Collect the 3rd ball.	1	32
4	Move from position 30 to position 80.	150	182
5	Collect the 2nd ball.	1	183
6	Move from position 80 to position 100, and complete the race.	80	263

In the 2nd scenario, the starting and finishing position is the same as the 1st scenario, but the time limit is 300 seconds. Rie can complete the race in 263 seconds, which is within the time limit, in the same way as above. Therefore, output `Yes` in the 2nd line.

In the 3rd scenario, the starting and finishing position is the same as the 1st and the 2nd scenarios, but the time limit is 262 seconds. There does not exist a way for Rie to complete the race within the time limit. Therefore, output `No` in the 3rd line.

This sample input satisfies the constraints of Subtasks 2, 3, 4, 5, 6, 7.

Sample Input 2	Sample Output 2

`3 100`
`30 80 30`
`3`
`0 0 403`
`0 0 300`
`0 0 262`
	`Yes`
	`No`
	`No`

In the 1st scenario, the participant starts at position 0, finishes at position 0, and the time limit is 403 seconds. Rie can complete the race in 403 seconds, which is within the time limit, in the following way. Therefore, output `Yes` in the 1st line.

Order	Action	Time (sec.)	Total Time (sec.)
1	Start at position 0 and move to position 30.	30	30
2	Collect the 1st ball.	1	31
3	Move from position 30 to position 80.	100	131
4	Collect the 2nd ball.	1	132
5	Move from position 80 to position 30.	150	282
6	Collect the 3rd ball.	1	283
7	Move from position 30 to position 0, and complete the race.	120	403

In the 2nd and the 3rd scenarios, the starting and finishing position is the same as the 1st scenario, but the time limit is 300 seconds and 262 seconds, respectively. There does not exist a way for Rie to complete the race within the time limit, for both scenarios. Therefore, output `No` in the 2nd and the 3rd line.

This sample input satisfies the constraints of Subtasks 1, 2, 3, 4, 5, 6, 7.

Sample Input 3	Sample Output 3

`6 100`
`0 50 100 0 50 100`
`4`
`20 70 600`
`70 20 600`
`10 40 600`
`40 10 600`
	`No`
	`Yes`
	`No`
	`Yes`

This sample input satisfies the constraints of Subtasks 2, 3, 4, 5, 6, 7.

4 Gift Exchange

JOI Academy has N students, numbered from 1 to N.

A gift exchange party is planned to be held soon at JOI Academy. Each student has prepared a gift to bring there, and the value of the gift that student i ($1 \leq i \leq N$) will bring is A_i. Students are unwilling to receive a gift whose value is too less than that of their own gift. Specifically, student i will be dissatisfied if they receive a gift with a value strictly less than B_i. Here, $B_i < A_i$ always holds.

However, some of the N students may not actually participate in the party. President K, the director of JOI Academy, is considering Q possible groups of students as a group to participate in the gift exchange party, j-th ($1 \leq j \leq Q$) of which consists of $R_j - L_j + 1$ students $L_j, L_j + 1, \ldots, R_j$.

For some group of two or more students, if it is possible to exchange gifts within the group without anyone receiving their own gift or getting dissatisfied, that group is said to be **gift exchangeable**. More formally, a group of m students ($m \geq 2$) $p_1, p_2, \ldots, p_m$ is **gift exchangeable** if and only if there exists a sequence $q_1, q_2, \ldots, q_m$ which is a permutation of $p_1, p_2, \ldots, p_m$ and satisfies each of the following conditions. Here, q_k ($1 \leq k \leq m$) represents the number of student who gives their gift to student p_k.

- For all k ($1 \leq k \leq m$), $p_k \neq q_k$.
- For all k ($1 \leq k \leq m$), $A_{q_k} \geq B_{p_k}$.

President K is keen to make the gift exchange party successful, and thus examining whether each of the Q groups is gift exchangeable or not.

Write a program which, given information of students and groups, determines whether each of the Q groups is gift exchangeable or not.

Input

Read the following data from the standard input.

N
$A_1\ A_2\ \cdots\ A_N$
$B_1\ B_2\ \cdots\ B_N$
Q
$L_1\ R_1$
$L_2\ R_2$
$\vdots$
$L_Q\ R_Q$

Output

Write Q lines to the standard output. On the j-th line ($1 \leq j \leq Q$), output `Yes` if the j-th group is gift exchangeable, and `No` otherwise.

Constraints

- $2 \leq N \leq 500\,000$.
- $1 \leq B_i < A_i \leq 2N$ ($1 \leq i \leq N$).
- $A_1, B_1, A_2, B_2, \ldots, A_N, B_N$ are all distinct.
- $1 \leq Q \leq 200\,000$.
- $1 \leq L_j < R_j \leq N$ ($1 \leq j \leq Q$).
- Given values are all integers.

Subtasks

1. (4 points) $N \leq 10$, $Q \leq 10$.
2. (5 points) $N \leq 18$, $Q \leq 10$.
3. (10 points) $N \leq 100\,000$, $A_1 \geq 2N - 2$, $B_1 = 1$, $Q = 1$, $L_1 = 1$, $R_1 = N$.
4. (31 points) $N \leq 100\,000$, $Q \leq 10$.
5. (8 points) $N \leq 100\,000$, $A_i < A_{i+1}$, $B_i < B_{i+1}$ $(1 \leq i \leq N - 1)$.
6. (12 points) $N \leq 100\,000$, $A_i < A_{i+1}$ $(1 \leq i \leq N - 1)$.
7. (18 points) $N \leq 100\,000$.
8. (12 points) No additional constraints.

Sample Input and Output

Sample Input 1	Sample Output 1

`4`
`3 8 5 7`
`2 6 1 4`
`3`
`3 4`
`1 3`
`1 4`
	`Yes`
	`No`
	`Yes`

The first group consists of 2 students $3, 4$. If student 3 receives student 4's gift, and student 4 receives student 3's gift, neither of the students will be dissatisfied as $A_3 \geq B_4$ and $A_4 \geq B_3$. Therefore, this group is gift exchangeable, and output `Yes` on the first line.

The second group consists of 3 students $1, 2, 3$. Since $A_1 < B_2$ and $A_3 < B_2$, student 2 will be dissatisfied whichever gift of student 1 or 3 they receive. Therefore, this group is not gift exchangeable, and output `No` on the second line.

The third group consists of 4 students $1, 2, 3, 4$. For instance, if student 1 receives student 2's, student 2 receives student 4's, student 3 receives student 1's, and student 4 receives student 3's gift, none of the students will be dissatisfied. Therefore, this group is gift exchangeable, and output `Yes` on the third line.

This sample input satisfies the constraints of Subtasks $1, 2, 4, 7, 8$.

Sample Input 2	Sample Output 2
3 5 6 3 1 4 2 1 1 3	Yes

This sample input satisfies the constraints of Subtasks 1, 2, 3, 4, 7, 8.

Sample Input 3	Sample Output 3
5 3 4 6 9 10 1 2 5 7 8 3 1 5 1 2 2 4	No Yes No

This sample input satisfies the constraints of Subtasks 1, 2, 4, 5, 6, 7, 8.

Sample Input 4	Sample Output 4
10 2 5 8 10 12 14 16 17 19 20 1 4 7 6 11 13 9 3 18 15 8 2 9 1 6 2 8 2 4 1 2 1 6 7 10 5 8	No No Yes No No No Yes Yes

This sample input satisfies the constraints of Subtasks 1, 2, 4, 6, 7, 8.

5

Road Service 2

In JOI city, there is a grid-shaped road network consisting of H infinitely long east-west roads and W infinitely long north-south roads. Intersection (i, j) $(1 \leq i \leq H, 1 \leq j \leq W)$ is the intersection where the i-th northernmost east-west road and the j-th westernmost north-south road cross.

Currently, part of the roads is closed due to poor road conditions. Specifically, the status of the roads is as follows:

- The segment in the i-th northernmost east-west road $(1 \leq i \leq H)$ connecting intersection (i, j) and intersection $(i, j+1)$ $(1 \leq j \leq W-1)$ is closed if $A_{i,j} = 0$ and passable if $A_{i,j} = 1$.
- The segment in the j-th westernmost north-south road $(1 \leq j \leq W)$ connecting intersection (i, j) and intersection $(i+1, j)$ $(1 \leq i \leq H-1)$ is closed if $B_{i,j} = 0$ and passable if $B_{i,j} = 1$.
- The other part of the roads (the part of roads outside the $H \times W$ intersections) is closed.

President K, the mayor of JOI city, decided to make a **repair plan** of the road network. A repair plan consists of zero or more **repairs**. A repair is done by choosing an integer i satisfying $1 \leq i \leq H$ and doing the following:

> For **every** integer j satisfying $1 \leq j \leq W-1$, make the segment in the i-th northernmost east-west road connecting intersection (i, j) and intersection $(i, j+1)$ passable (if it is closed).
> The repair takes C_i days. Note that C_i is either 1 or 2.

Since no two repairs in a repair plan can be done in parallel, the **period** of a repair plan is equal to the sum of the time taken by repairs consisting the repair plan.

President K thinks that securing the route between city facilities is important and asks you Q questions. The k-th questions $(1 \leq k \leq Q)$ is as follows:

> Is there a repair plan that makes T_k intersections $(X_{k,1}, Y_{k,1}), (X_{k,2}, Y_{k,2}), \ldots, (X_{k,T_k}, Y_{k,T_k})$ mutually reachable? If so, what is the minimum possible period of such a repair plan?

Write a program which, given the status of the road network, the days taken by repairing each east-west road and the details of the questions by President K, answers all the questions.

Input

Read the following data from the standard input.

H W Q
$A_{1,1}A_{1,2}\cdots A_{1,W-1}$
$A_{2,1}A_{2,2}\cdots A_{2,W-1}$
$\vdots$
$A_{H,1}A_{H,2}\cdots A_{H,W-1}$
$B_{1,1}B_{1,2}\cdots B_{1,W}$
$B_{2,1}B_{2,2}\cdots B_{2,W}$
$\vdots$
$B_{H-1,1}B_{H-1,2}\cdots B_{H-1,W}$
C_1 C_2 $\cdots$ C_H
Query_1
Query_2
$\vdots$
Query_Q

Here, Query_k $(1 \le k \le Q)$ is as follows:

T_k
$X_{k,1}$ $Y_{k,1}$
$X_{k,2}$ $Y_{k,2}$
$\vdots$
X_{k,T_k} Y_{k,T_k}

Output

Write Q lines to the standard output. In the k-th line $(1 \le k \le Q)$, output the minimum possible period, in days, of a repair plan that makes T_k intersections $(X_{k,1}, Y_{k,1}), (X_{k,2}, Y_{k,2}), \ldots, (X_{k,T_k}, Y_{k,T_k})$ mutually reachable if such a repair plan exists. Otherwise, output `-1`.

Constraints

- $2 \le H$.
- $2 \le W$.
- $H \times W \le 1\,000\,000$.
- $1 \le Q \le 100\,000$.
- $A_{i,j}$ is either 0 or 1 ($1 \le i \le H, 1 \le j \le W - 1$).
- $B_{i,j}$ is either 0 or 1 ($1 \le i \le H - 1, 1 \le j \le W$).
- C_i is either 1 or 2 ($1 \le i \le H$).
- $2 \le T_k$ ($1 \le k \le Q$).
- $T_1 + T_2 + \cdots + T_Q \le 200\,000$.
- $1 \le X_{k,l} \le H$ ($1 \le k \le Q, 1 \le l \le T_k$).
- $1 \le Y_{k,l} \le W$ ($1 \le k \le Q, 1 \le l \le T_k$).
- $(X_{k,1}, Y_{k,1}), (X_{k,2}, Y_{k,2}), \ldots, (X_{k,T_k}, Y_{k,T_k})$ are distinct ($1 \le k \le Q$).
- Given values are all integers.

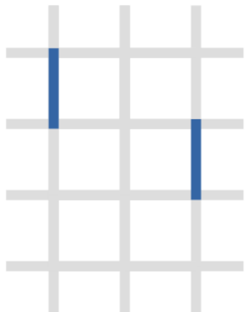
Subtasks

1. (10 points) $C_i = 1$ ($1 \le i \le H$), $Q \le 5$, $T_k = 2$ ($1 \le k \le Q$), $A_{i,j} = 0$ ($1 \le i \le H, 1 \le j \le W - 1$).
2. (6 points) $C_i = 1$ ($1 \le i \le H$), $Q \le 5$, $T_k = 2$ ($1 \le k \le Q$).
3. (15 points) $C_i = 1$ ($1 \le i \le H$), $Q \le 5$.
4. (11 points) $C_i = 1$ ($1 \le i \le H$), $T_k = 2$ ($1 \le k \le Q$).
5. (6 points) $C_i = 1$ ($1 \le i \le H$).
6. (12 points) $Q \le 5$.
7. (26 points) $T_k = 2$ ($1 \le k \le Q$).
8. (14 points) No additional constraints.

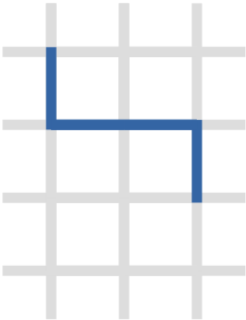
Sample Input and Output

Sample Input 1	Sample Output 1
4 3 4 00 00 00 00 100 001 000 1 1 1 1 2 1 1 3 3 2 3 1 1 2 2 2 3 3 3 2 4 2 3 2	1 3 0 -1

The figure below shows the current status of the road network. The gray part is closed, and the blue part is passable.



- In the first question, a repair with $i = 2$ will make the status of the road network as follows, and intersections $(1, 1)$ and $(3, 3)$ will be mutually connected.



  The period of a repair plan consisting of this single repair is 1 day, and there is no repair plan with a shorter period that makes intersections $(1, 1)$ and $(3, 3)$ mutually reachable, so your program should output 1 in the first line.
- In the second question, three repairs with $i = 1, 2, 3$ respectively will make the intersecion $(3, 1)$ and $(1, 2)$ mutually reachable. The period of a repair plan consisting of these three repairs is 3 days, and there is no repair plan with a shorter period that makes intersecions $(3, 1)$ and $(1, 2)$ mutually reachable, so your program should output 3 in the second line.
- In the third question, the intersections $(2, 3)$ and $(3, 3)$ are already mutually reachable, so your program should output 0 in the third line.
- In the fourth question, there is no repair plan that makes intersections $(4, 2)$ and $(3, 2)$ mutually reachable, so your program should output -1 in the fourth line.

This sample input satisfies the constraints of Subtasks $1, 2, 3, 4, 5, 6, 7, 8$.

Sample Input 2	Sample Output 2
4 4 4 100 110 011 010 0010 1001 0101 1 1 1 1 2 1 2 3 1 2 1 4 4 1 2 3 2 1 2 2 4 3 1 1	1 3 2 2

This sample input satisfies the constraints of Subtasks 2, 3, 4, 5, 6, 7, 8.

Sample Input 3	Sample Output 3
7 3 3 10 00 00 10 00 01 00 110 101 011 001 110 100 1 1 1 1 1 1 1 3 7 2 3 1 3 2 3 3 1 6 3 2 3 7 2 2 1 3 7 3 5 2 1 2 7 2 3 1	3 2 4

This sample input satisfies the constraints of Subtasks 3, 5, 6, 8.

Sample Input 4	Sample Output 4
4 3 3 00 00 10 00 110 011 001 1 2 2 2 2 1 1 3 1 2 4 3 2 1 2 4 1 1 3	1 2 5

This sample input satisfies the constraints of Subtasks 6, 7, 8.

Sample Input 5	Sample Output 5
7 3 2 01 00 00 00 00 10 01 100 110 011 001 101 001 1 1 2 1 1 2 2 3 7 2 1 3 5 1 5 1 1 2 2 3 1 2 3 4 2	4 1

This sample input satisfies the constraints of Subtasks 6, 8.