A - Adjacent Squares

Time Limit: 2 sec / Memory Limit: 1024 MB

Score : 100 points

Problem Statement

There is a grid with H horizontal rows and W vertical columns. Let (i, j) denote the square at the i-th row from the top and the j-th column from the left.
Find the number of squares that share a side with Square (R, C).

Here, two squares (a, b) and (c, d) are said to share a side if and only if $|a - c| + |b - d| = 1$ (where $|x|$ denotes the absolute value of x).

Constraints

- All values in input are integers.
- $1 \leq R \leq H \leq 10$
- $1 \leq C \leq W \leq 10$

Input

Input is given from Standard Input in the following format:

H W
R C

Output

Print the answer as an integer.

Sample Input 1 Copy

```
3 4
2 2
```

Sample Output 1 Copy

```
4
```

We will describe Sample Inputs/Outputs 1, 2, and 3 at once below Sample Output 3.

Sample Input 2 Copy

```
3 4
1 3
```

Sample Output 2 Copy

```
3
```

Sample Input 3 Copy

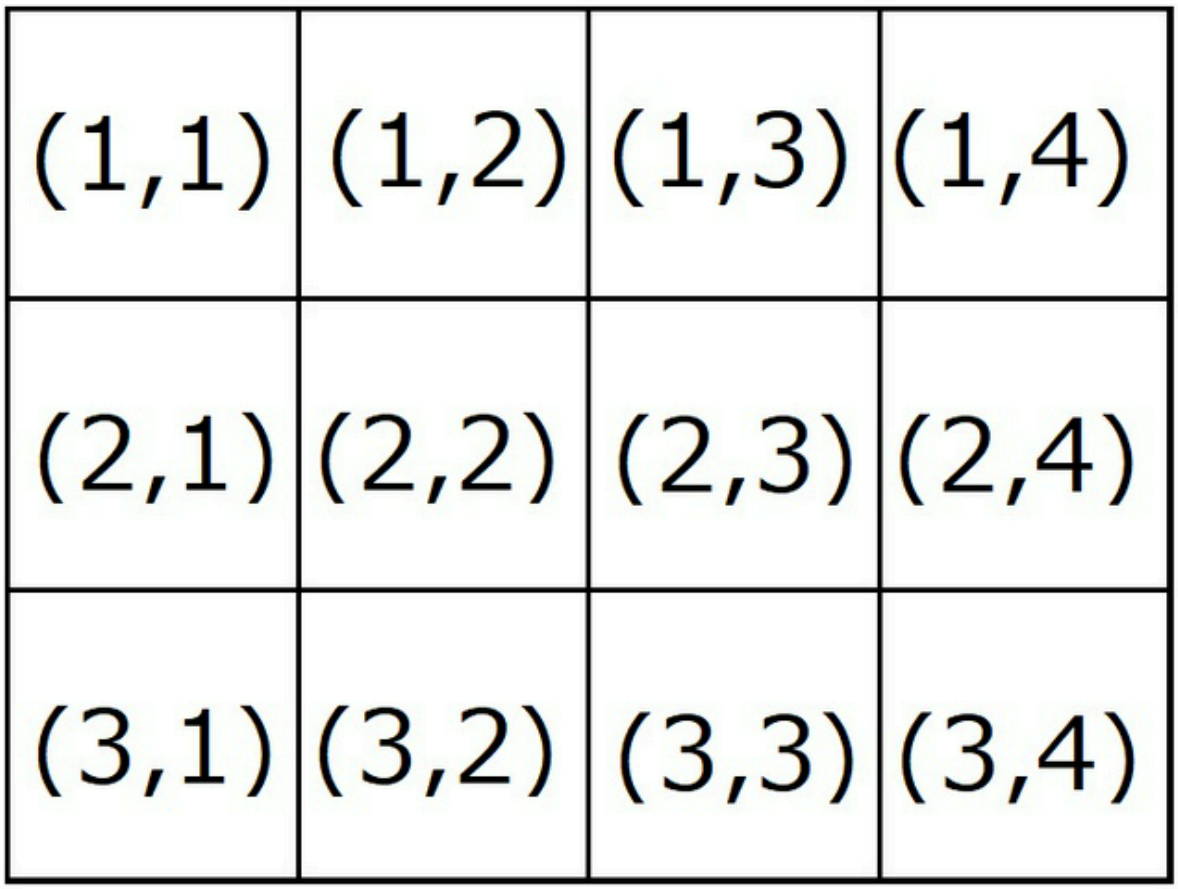
```
3 4
3 4
```

Sample Output 3 Copy

```
2
```

When $H = 3$ and $W = 4$, the grid looks as follows.

- For Sample Input 1, there are 4 squares adjacent to Square $(2, 2)$.
- For Sample Input 2, there are 3 squares adjacent to Square $(1, 3)$.
- For Sample Input 3, there are 2 squares adjacent to Square $(3, 4)$.



Sample Input 4 Copy

```
1 10
1 5
```

Sample Output 4 Copy

```
2
```

Sample Input 5 Copy

```
8 1
8 1
```

Sample Output 5 Copy

```
1
```

Sample Input 6 Copy

```
1 1
1 1
```

Sample Output 6 Copy

```
0
```

B - Enlarged Checker Board

Time Limit: 2 sec / Memory Limit: 1024 MB

Score : 200 points

Problem Statement

Tiles are aligned in N horizontal rows and N vertical columns. Each tile has a grid with A horizontal rows and B vertical columns. On the whole, the tiles form a grid X with $(A \times N)$ horizontal rows and $(B \times N)$ vertical columns.
For $1 \leq i, j \leq N$, Tile (i, j) denotes the tile at the i-th row from the top and the j-th column from the left.

Each square of X is painted as follows.

- Each tile is either a **white tile** or a **black tile**.
- Every square in a white tile is painted white; every square in a black tile is painted black.
- Tile $(1, 1)$ is a white tile.
- Two tiles sharing a side have different colors. Here, Tile (a, b) and Tile (c, d) are said to be sharing a side if and only if $|a - c| + |b - d| = 1$ (where $|x|$ denotes the absolute value of x).

Print the grid X in the format specified in the Output section.

Constraints

- $1 \leq N, A, B \leq 10$
- All values in input are integers.

Input

Input is given from Standard Input in the following format:

```
N A B
```

Output

Print $(A \times N)$ strings $S_1, \ldots, S_{A \times N}$ that satisfy the following condition, with newlines in between.

- Each of $S_1, \ldots, S_{A \times N}$ is a string of length $(B \times N)$ consisting of `.` and `#`.
- For each i and j $(1 \leq i \leq A \times N, 1 \leq j \leq B \times N)$, the j-th character of S_i is `.` if the square at the i-th row from the top and j-th column from the left in grid X is painted white; the character is `#` if the square is painted black.

Sample Input 1 Copy

```
4 3 2
```

Sample Output 1 Copy

```
..##..##
..##..##
..##..##
##..##..
##..##..
##..##..
..##..##
..##..##
..##..##
##..##..
##..##..
##..##..
```

Sample Input 2 Copy

```
5 1 5
```

Sample Output 2 Copy

```
.....#####.....#####.....
#####.....#####.....#####
.....#####.....#####.....
#####.....#####.....#####
.....#####.....#####.....
```

Sample Input 3 Copy

```
4 4 1
```

Sample Output 3 Copy

```
.#.#
.#.#
.#.#
.#.#
#.#.
#.#.
#.#.
#.#.
.#.#
.#.#
.#.#
.#.#
#.#.
#.#.
#.#.
#.#.
```

Sample Input 4 Copy

```
1 4 4
```

Sample Output 4 Copy

```
....
....
....
....
```

C - Adjacent Swaps

Time Limit: 2 sec / Memory Limit: 1024 MB

Score : 300 points

Problem Statement

N balls are lined up in a row from left to right. Initially, the i-th ($1 \leq i \leq N$) ball from the left has an integer i written on it.

Takahashi has performed Q operations. The i-th ($1 \leq i \leq Q$) operation was as follows.

- Swap the ball with the integer x_i written on it with the next ball to the right. If the ball with the integer x_i written on it was originally the rightmost ball, swap it with the next ball to the left instead.

Let a_i be the integer written on the i-th ($1 \leq i \leq N$) ball after the operations. Find $a_1, \ldots, a_N$.

Constraints

- $2 \leq N \leq 2 \times 10^5$
- $1 \leq Q \leq 2 \times 10^5$
- $1 \leq x_i \leq N$
- All values in input are integers.

Input

Input is given from Standard Input in the following format:

$$
\begin{aligned}
&N \quad Q \\
&x_1 \\
&\vdots \\
&x_Q
\end{aligned}
$$

Output

Print $a_1, \ldots, a_N$, with spaces in between.

Sample Input 1 Copy

```
5 5
1
2
3
4
5
```

Sample Output 1 Copy

```
1 2 3 5 4
```

The operations are performed as follows.

- Swap the ball with 1 written on it with the next ball to the right. Now, the balls have integers $2, 1, 3, 4, 5$ written on them, from left to right.
- Swap the ball with 2 written on it with the next ball to the right. Now, the balls have integers $1, 2, 3, 4, 5$ written on them, from left to right.
- Swap the ball with 3 written on it with the next ball to the right. Now, the balls have integers $1, 2, 4, 3, 5$ written on them, from left to right.
- Swap the ball with 4 written on it with the next ball to the right. Now, the balls have integers $1, 2, 3, 4, 5$ written on them, from left to right.
- Swap the ball with 5 written on it with the next ball to the left, since it is the rightmost ball. Now, the balls have integers $1, 2, 3, 5, 4$ written on them, from left to right.

Sample Input 2 Copy

```
7 7
7
7
7
7
7
7
7
```

Sample Output 2 Copy

```
1 2 3 4 5 7 6
```

Sample Input 3 Copy

```
10 6
1
5
2
9
6
6
```

Sample Output 3 Copy

```
1 2 3 4 5 7 6 8 10 9
```

D - 250-like Number

Time Limit: 2 sec / Memory Limit: 1024 MB

Score : 400 points

Problem Statement

Let us regard an integer k as "similar to 250" if the following condition is satisfied:

- k is represented as $k = p \times q^3$ with primes $p < q$.

How many integers less than or equal to N are "similar to 250"?

Constraints

- N is an integer between 1 and 10^{18} (inclusive)

Input

Input is given from Standard Input in the following format:

N

Output

Print the answer as an integer.

Sample Input 1 Copy

```
250
```

Sample Output 1 Copy

```
2
```

- $54 = 2 \times 3^3$ is "similar to 250".
- $250 = 2 \times 5^3$ is "similar to 250".

The two integers above are all the integers "similar to 250".

Sample Input 2 Copy

```
1
```

Sample Output 2 Copy

```
0
```

Sample Input 3 Copy

```
123456789012345
```

Sample Output 3 Copy

```
226863
```

E - Prefix Equality

Time Limit: 4 sec / Memory Limit: 1024 MB

Score : 500 points

Problem Statement

You are given integer sequences $A = (a_1, \ldots, a_N)$ and $B = (b_1, \ldots, b_N)$, each of length N.

For $i = 1, \ldots, Q$, answer the query in the following format.

- If the set of values contained in the first x_i terms of A, $(a_1, \ldots, a_{x_i})$, and the set of values contained in the first y_i terms of B, $(b_1, \ldots, b_{y_i})$, are equal, then print `Yes`; otherwise, print `No`.

Constraints

- $1 \leq N, Q \leq 2 \times 10^5$
- $1 \leq a_i, b_i \leq 10^9$
- $1 \leq x_i, y_i \leq N$
- All values in input are integers.

Input

Input is given from Standard Input in the following format:

$$
\begin{aligned}
&N \\
&a_1 \quad \ldots \quad a_N \\
&b_1 \quad \ldots \quad b_N \\
&Q \\
&x_1 \quad y_1 \\
&\vdots \\
&x_Q \quad y_Q
\end{aligned}
$$

Output

Print Q lines. The i-th line should contain the response to the i-th query.

Sample Input 1

Copy

```
5
1 2 3 4 5
1 2 2 4 3
7
1 1
2 2
2 3
3 3
4 4
4 5
5 5
```

Sample Output 1

Copy

```
Yes
Yes
Yes
No
No
Yes
No
```

Note that sets are a concept where it matters only whether each value is contained or not.

For the 3-rd query, the first 2 terms of A contain one 1 and one 2, while the first 3 terms of B contain one 1 and two 2's. However, the sets of values contained in the segments are both $\{1, 2\}$, which are equal.

Also, for the 6-th query, the values appear in different orders, but they are still equal as sets.

F - One Fourth

Time Limit: 2 sec / Memory Limit: 1024 MB

Score : 500 points

Problem Statement

ABC 250 is a commemorable quarter milestone for Takahashi, who aims to hold ABC 1000, so he is going to celebrate this contest by eating as close to $1/4$ of a pizza he bought as possible.

The pizza that Takahashi bought has a planar shape of convex N-gon. When the pizza is placed on an xy-plane, the i-th vertex has coordinates (X_i, Y_i).

Takahashi has decided to cut and eat the pizza as follows.

- First, Takahashi chooses two non-adjacent vertices from the vertices of the pizza and makes a cut with a knife along the line passing through those two points, dividing the pizza into two pieces.
- Then, he chooses one of the pieces at his choice and eats it.

Let a be the quarter ($= 1/4$) of the area of the pizza that Takahashi bought, and b be the area of the piece of pizza that Takahashi eats. Find the minimum possible value of $8 \times |a - b|$. We can prove that this value is always an integer.

Constraints

- All values in input are integers.
- $4 \leq N \leq 10^5$
- $|X_i|, |Y_i| \leq 4 \times 10^8$
- The given points are the vertices of a convex N-gon in the counterclockwise order.

Input

Input is given from Standard Input in the following format:

$$
\begin{aligned}
&N \\
&X_1 \ \ Y_1 \\
&X_2 \ \ Y_2 \\
&\ldots \\
&X_N \ \ Y_N
\end{aligned}
$$

Output

Print the answer as an integer.

Sample Input 1 Copy

```
5
3 0
2 3
-1 3
-3 1
-1 -1
```

Sample Output 1 Copy

```
1
```

Suppose that he makes a cut along the line passing through the 3-rd and the 5-th vertex and eats the piece containing the 4-th vertex.
Then, $a = \frac{33}{2} \times \frac{1}{4} = \frac{33}{8}, b = 4$, and $8 \times |a - b| = 1$, which is minimum possible.

Sample Input 2 Copy

```
4
400000000 400000000
-400000000 400000000
-400000000 -400000000
400000000 -400000000
```

Sample Output 2 Copy

```
1280000000000000000
```

Sample Input 3 Copy

```
6
-816 222
-801 -757
-165 -411
733 131
835 711
-374 979
```

Sample Output 3 Copy

```
157889
```

G - Stonks

Time Limit: 2 sec / Memory Limit: 1024 MB

Score : 600 points

Problem Statement

You are going to trade stocks of Company X for the next N days.

As a precognitive, you know that the stock price on the i-th day of trading will be P_i yen (the currency in Japan) per unit.

Every day, you can choose to do exactly one of the following.

- Buy one unit of stock for P_i yen.
  - You will obtain one unit of stock and your money will decrease by P_i yen.
- Sell one unit of stock for P_i yen.
  - You will lose one unit of stock and your money will increase by P_i yen.
- Do nothing.

You initially have 10^{100} yen, so you will never be short of money.

Find the maximum possible amount of money you will have gained when the N-th day has ended.
Even if you still possess some amount of stocks of Company X when the N-th day has ended, it is considered that they are worth 0 yen.

Constraints

- All values in input are integers.
- $1 \leq N \leq 2 \times 10^5$
- $1 \leq P_i \leq 10^9$

Input

Input is given from Standard Input in the following format:

N
$P_1 \quad P_2 \quad \ldots \quad P_N$

Output

Print the answer as an integer.

Sample Input 1 Copy

```
8
2 5 4 3 7 1 8 6
```

Sample Output 1 Copy

```
16
```

By acting as follows, your money will increase by 16 yen, which is the maximum possible.

- On the 1-th day, you buy 1 unit of stock. You now have 1 unit of stock, and your money has increased by -2 yen so far.
- On the 2-nd day, you sell 1 unit of stock. You now have 0 units of stocks, and your money has increased by 3 yen so far.
- On the 3-rd day, you buy 1 unit of stock. You now have 1 unit of stock, and your money has increased by -1 yen so far.
- On the 4-th day, you buy 1 unit of stock. You now have 2 units of stocks, and your money has increased by -4 yen so far.
- On the 5-th day, you sell 1 unit of stock. You now have 1 unit of stock, and your money has increased by 3 yen so far.
- On the 6-th day, you buy 1 unit of stock. You now have 2 units of stocks, and your money has increased by 2 yen so far.
- On the 7-th day, you sell 1 unit of stock. You now have 1 unit of stock, and your money has increased by 10 yen so far.
- On the 8-th day, you sell 1 unit of stock. You now have 0 units of stocks, and your money has increased by 16 yen so far.

Sample Input 2 Copy

```
5
10000 1000 100 10 1
```

Sample Output 2 Copy

```
0
```

Sample Input 3 Copy

```
15
300 1 4000 1 50000 900000000 20 600000 50000 300 50000 80000000 900000000 7000000 900000000
```

Sample Output 3 Copy

```
2787595378
```

Ex - Trespassing Takahashi

Time Limit: 7 sec / Memory Limit: 1024 MB

Score : 600 points

Problem Statement

There are N points numbered 1 through N, and M roads. The i-th ($1 \leq i \leq M$) road connects Point a_i and Point b_i bidirectionally and requires c_i minutes to pass through. One can travel from any point to any other point using some number of roads. There is a house on Points $1, \ldots, K$.

For $i = 1, \ldots, Q$, solve the following problem.

> Takahashi is currently at the house at Point x_i and wants to travel to the house at Point y_i.
> Once t_i minutes have passed since his last sleep, he cannot continue moving anymore.
> He can get sleep only at a point with a house, but he may do so any number of times.
> If he can travel from Point x_i to Point y_i, print `Yes`; otherwise, print `No`.

Constraints

- $2 \leq K \leq N \leq 2 \times 10^5$
- $N - 1 \leq M \leq \min(2 \times 10^5, \frac{N(N-1)}{2})$
- $1 \leq a_i < b_i \leq N$
- If $i \neq j$, then $(a_i, b_i) \neq (a_j, b_j)$.
- $1 \leq c_i \leq 10^9$
- One can travel from any point to any other point using some number of roads.
- $1 \leq Q \leq 2 \times 10^5$
- $1 \leq x_i < y_i \leq K$
- $1 \leq t_1 \leq \ldots \leq t_Q \leq 10^{15}$
- All values in input are integers.

Input

Input is given from Standard Input in the following format:

$$
\begin{aligned}
&N \quad M \quad K \\
&a_1 \quad b_1 \quad c_1 \\
&\vdots \\
&a_M \quad b_M \quad c_M \\
&Q \\
&x_1 \quad y_1 \quad t_1 \\
&\vdots \\
&x_Q \quad y_Q \quad t_Q
\end{aligned}
$$

Output

Print Q lines. The i-th line should contain the answer for the i-th problem.

Sample Input 1 Copy

```
6 6 3
1 4 1
4 6 4
2 5 2
3 5 3
5 6 5
1 2 15
3
2 3 4
2 3 5
1 3 12
```

Sample Output 1 Copy

```
No
Yes
Yes
```

In the 3-rd problem, it takes no less than 13 minutes from Point 1 to reach Point 3 directly. However, he can first travel to Point 2 in 12 minutes, get sleep in the house there, and then travel to Point 3. Thus, the answer is `Yes`.