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Problems

A Classical Matching Problem
B Race
C Positive String

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Problem A. Classical Matching Problem

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

Grammy likes to play with intervals. She has n intervals on an axis, the i-th of them is $[l_i, r_i]$. She wants to calculate the following interesting characteristics of these intervals.

1. a_1 such that if you can take any number of pairwise intersecting intervals, then at most a_1 intervals can be taken.

2. a_2 such that if you can take any number of pairwise non-intersecting intervals, then at most a_2 intervals can be taken.

3. a_3 such that if you can take any number of pairwise intersecting intervals away each time, then at least a_3 times are needed to take all intervals away.

4. a_4 such that if you can take any number of pairwise non-intersecting intervals away each time, then at least a_4 times are needed to take all intervals away.

Two intervals $[l_1, r_1]$ and $[l_2, r_2]$ intersect if and only if there exists a real number x such that $l_1 \le x \le r_1$ and $l_2 \le x \le r_2$.

Input

The first line contains an integer n ($1 \le n \le 3 \times 10^5$), denoting the number of intervals.

In the i-th of the following n lines, there are 2 integers l_i, r_i ($1 \le l_i < r_i \le 2n$)

It is guaranteed that $l_1, l_2, \ldots, l_n, r_1, r_2, \ldots, r_n$ is a permutation of 1 to $2n$.

Output

Output 4 lines. The i-th line contains a_i.

Example

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

Note

Hint: $11 \times 13 \times 17 =$

Problem B. Race

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

Pigetown is a city with n crossings and m bidirectional roads. A huge race event is going to be held in Pigetown. There are k types of race tracks, and each road in the city can be viewed as a particular type of race track.

In the race, each participant should choose an integer i such that $1 \leq i \leq q$, start at crossing S_i, visit each type of race tracks the same number of times, and finally arrive at crossing T_i in order to finish the race.

Grammy wants to know if it is possible to finish the race when choosing each integer i. Write a program to help her solve the problem.

Input

The first line contains 4 integers $n, m, k, q (1 \leq n, m, q \leq 200\,000,\ 1 \leq k \leq 30)$, indicating the number of crossings, the number of roads, the number of race track types, the upper limit of chosen integer i, respectively.

In the next m lines, each line contains 3 integers $u, v, t (1 \leq u, v \leq n, 1 \leq t \leq k)$, indicating that there is a bidirectional road between crossing u and crossing v with type t.

In the next q lines, each line contains 2 integers $S_i, T_i (1 \leq S_i, T_i \leq n)$, indicating one possible combination of starting point and ending point.

Output

Output q lines.

In the i-th line, if it is possible to finish the race while choosing integer i, output "Yes", otherwise output "No"(Without quotes).

Example

standard input	standard output
7 9 3 4 1 2 1 2 3 1 3 1 2 1 4 3 5 6 2 6 7 1 6 7 3 7 7 2 5 5 1 6 7 1 4 2 4 2 5	Yes No Yes No

Problem C. Positive String

Input file:	*standard input*
Output file:	*standard output*
Time limit:	2 seconds
Memory limit:	1024 mebibytes

Grammy had a unique insight about strings. She thinks that a string is *positive* if and only if it is lexicographically larger than its reversal.

Now you are given a string, please find out how many contiguous substrings of it are positive according to Grammy's insight.

Input

The single line contains a string S ($1 \leq |S| \leq 200\,000$), consisting of lowercase English letters only.

Output

Output a single integer denoting the number of positive substrings of S.

Examples

standard input	*standard output*
jjikkollp	4
pbpbppb	7