Problem A. Jonathan the Poet

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

Jonathan the Poet has finished his new poem recently. But something went wrong and now he thinks that rhyme could be better. He believe that applying cyclic shift by K positions will fix the problem. Jonathan's new poem is a sequential list of words. Jonathan is tired and asked your help to find such cyclic shift.

To clarify, you are given a poem of N words as a single linked list. Your task is to write function that shifts linked list by K positions and returns the head of new linked list.

Input

The first line contains two integers N and K ($1 \leqslant K < N \leqslant 10^5$) - number of words in the poem.

The second line contains N words that consist of lowercase latin letters. It is guaranteed that the total length of all words does not exceed $3 \cdot 10^5$.

Output

If your function is implemented correctly, program will print the poem with order of words shifted by K positions.

Examples

standard input	standard output
5 2 the show must go on	must go on the show
5 3 another one bites the dust	the dust another one bites

Note

Go to the link

`https://pastebin.ubuntu.com/p/RkfQ7d9P2w/`, if you use `C++`,

`https://pastebin.ubuntu.com/p/YDDCMqbkjk/`, if you use `Python`,

and take already written code from there. Your only task is to implement function

`cyclicShift(Node* head, int k)`, if you use `C++`,

`cyclic_shift(head, k)`, if you use `Python`.

Problem B. AaAaAaAAaAaAAa

Input file:	`standard input`
Output file:	`standard output`
Time limit:	4 seconds
Memory limit:	256 megabytes

You are given q ($1 \leq q \leq 6 * 10^5$) queries. Also there is an empty array a. There is two types of queries:

1 x ($1 \leq x \leq 1000$): Add x to the end of array a

2: Reverse the array a

Output the array after q queries.

Input

First line contains q - the number of queries. The next q lines contain queries.

Output

Output the array a after all queries.

Example

standard input	standard output
9 1 2 1 3 2 1 4 1 5 2 1 1 2 1 1	1 3 2 4 5 1

Problem C1. Patchwork Staccato I

Input file:	`standard input`
Output file:	`standard output`
Time limit:	4 seconds
Memory limit:	256 megabytes

You are given array a ($1 \le a_i \le 10^9$) of length n ($1 \le n \le 100$) and q ($1 \le q \le 100$) queries. In query i you are given two pairs of segments l_1, r_1, l_2, r_2 ($1 \le l_1 \le r_1 \le 10^9, 1 \le l_2 \le r_2 \le 10^9$), find number of indices c ($1 \le c \le n$) for which one of the following conditions is satisfied: $l_1 \le a_c \le r_1$ or $l_2 \le a_c \le r_2$.

Input

First line contains two integers n, q. The next q lines contain 4 integers l_1, r_1, l_2, r_2.

Output

Output q lines - answers to the queries.

Example

standard input	standard output
7 3 21 1 2 3 5 8 13 1 5 13 21 1 1 2 3 1 3 2 8	6 3 5

Problem C2. Patchwork Staccato II

Input file:	`standard input`
Output file:	`standard output`
Time limit:	6 seconds
Memory limit:	256 megabytes

You are given array a ($1 \le a_i \le 10^9$) of length n ($1 \le n \le 10^5$) and q queries. In query i you are given two pairs of segments l_1, r_1, l_2, r_2 ($1 \le l_1 \le r_1 \le 10^9, 1 \le l_2 \le r_2 \le 10^9$), find number of indices c ($1 \le c \le n$) for which one of the following conditions is satisfied: $l_1 \le a_c \le r_1$ or $l_2 \le a_c \le r_2$.

Input

First line contains two integers n, q. The next q lines contain 4 integers l_1, r_1, l_2, r_2.

Output

Output q lines - answers to the queries.

Example

standard input	standard output
7 3 21 1 2 3 5 8 13 1 5 13 21 1 1 2 3 1 3 2 8	6 3 5

Problem D. Jonathan the Farmer

Input file:	`standard input`
Output file:	`standard output`
Time limit:	5 seconds
Memory limit:	256 megabytes

Jonathan is the Farmer whose household was damaged by a huge hurricane. He lost majority of his cattle. One day he walked near his farm and observed that there are N sheeps on the field. Each sheep is always grazing inside some rectangular area. Jonathan remembered such areas for each sheep. When he came home, he decided to build a paddock to catch at least K sheeps (to catch a sheep Jonathan must cover sheep's pasture fully). Jonathan prefers squares rather than usual rectangles, therefore he want to build square paddock with the corner at point $(0, 0)$. Material for paddock costs money, so Jonathan wants to minimize the length of paddock side. He is not very good at math, please help him find this length.

Input

The first line of the input contains two integers N and K ($1 \leqslant K \leqslant N \leqslant 2 \cdot 10^5$) - number of sheeps grazing in the field and the number of sheeps Jonathan wants to catch.

Each of the next N lines contain four integers $x_{i,1}$, $y_{i,1}$, $x_{i,2}$, $y_{i,2}$ ($1 \leqslant x_{i,1} < x_{i,2} \leqslant 10^9$, $1 \leqslant y_{i,1} < y_{i,2} \leqslant 10^9$) - coordinates of bottom-left and top-right corners of the i_{th} sheep's pasture.

Output

Find the minimum length of square paddock such that at least K sheeps' pastures fit there.

Examples

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

Problem E1. Jonathan the Thief I

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

Jonathan is the Thief of all times and places. Today he intends to rob one rich house. There are N safes, numbered from 1 to N, in this house. The password for the safe with number x is fixed unordered pair (a, b), e.g $(a, b) = (b, a)$, such that $a \cdot b = x$ and $a, b \neq x$ (ironically, some safes can not be opened at all). Jonathan knows that failed attempt set off the burglar alarm, so he want to know how many safes he is guaranteed to crack. Please, help him calculate this number.

Input

The input contains single integer N ($1 \leqslant N \leqslant 1000$) - number of safes in the house.

Output

Print the number of safes that Jonathan can crack safely.

Examples

standard input	standard output
15	7
836	255

Note

With data from the first sample Jonathan can crack safes with number 4, 6, 8, 9, 10, 14, 15.

Problem E2. Jonathan the Thief II

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

Jonathan is the Thief of all times and places. Today he intends to rob one rich house. There are N safes, numbered from 1 to N, in this house. The password for the safe with number x is fixed unordered pair (a, b), e.g $(a, b) = (b, a)$, such that $a \cdot b = x$ and $a, b \neq x$ (ironically, some safes can not be opened at all). Jonathan knows that failed attempt set off the burglar alarm, so he want to know how many safes he is guaranteed to crack. Please, help him calculate this number.

Input

The input contains single integer N ($1 \leqslant N \leqslant 10^5$) - number of safes in the house.

Output

Print the number of safes that Jonathan can crack safely.

Examples

standard input	standard output
15	7
83836	19788

Note

With data from the first sample Jonathan can crack safes with number 4, 6, 8, 9, 10, 14, 15.