Codeforces Round #169 (Div. 2)

A. Lunch Rush

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

Having written another programming contest, three Rabbits decided to grab some lunch. The coach gave the team exactly k time units for the lunch break.

The Rabbits have a list of n restaurants to lunch in: the i-th restaurant is characterized by two integers f_i and t_i. Value t_i shows the time the Rabbits need to lunch in the i-th restaurant. If time t_i exceeds the time k that the coach has given for the lunch break, then the Rabbits' joy from lunching in this restaurant will equal $f_i - (t_i - k)$. Otherwise, the Rabbits get exactly f_i units of joy.

Your task is to find the value of the maximum joy the Rabbits can get from the lunch, depending on the restaurant. The Rabbits must choose **exactly** one restaurant to lunch in. Note that the joy value isn't necessarily a positive value.

Input

The first line contains two space-separated integers — n ($1 \le n \le 10^4$) and k ($1 \le k \le 10^9$) — the number of restaurants in the Rabbits' list and the time the coach has given them to lunch, correspondingly. Each of the next n lines contains two space-separated integers — f_i ($1 \le f_i \le 10^9$) and t_i ($1 \le t_i \le 10^9$) — the characteristics of the i-th restaurant.

Output

In a single line print a single integer — the maximum joy value that the Rabbits will get from the lunch.

Examples

input
2 5 3 3 4 5
output
4

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

input
1 5 1 7
output
-1

B. Little Girl and Game

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

The Little Girl loves problems on games very much. Here's one of them.

Two players have got a string S, consisting of lowercase English letters. They play a game that is described by the following rules:

- The players move in turns; In one move the player can remove an arbitrary letter from string S.
- If the player before his turn can reorder the letters in string S so as to get a palindrome, this player wins. A palindrome is a string that reads the same both ways (from left to right, and vice versa). For example, string "abba" is a palindrome and string "abc" isn't.

Determine which player will win, provided that both sides play optimally well — the one who moves first or the one who moves second.

Input

The input contains a single line, containing string S ($1 \leq |S| \leq 10^3$). String S consists of lowercase English letters.

Output

In a single line print word "First" if the first player wins (provided that both players play optimally well). Otherwise, print word "Second". Print the words without the quotes.

Examples

input
aba
output
First

input
abca
output
Second

C. Little Girl and Maximum Sum

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

The little girl loves the problems on array queries very much.

One day she came across a rather well-known problem: you've got an array of n elements (the elements of the array are indexed starting from 1); also, there are q queries, each one is defined by a pair of integers l_i, r_i $(1 \le l_i \le r_i \le n)$. You need to find for each query the sum of elements of the array with indexes from l_i to r_i, inclusive.

The little girl found the problem rather boring. She decided to reorder the array elements before replying to the queries in a way that makes the sum of query replies maximum possible. Your task is to find the value of this maximum sum.

Input

The first line contains two space-separated integers n ($1 \le n \le 2 \cdot 10^5$) and q ($1 \le q \le 2 \cdot 10^5$) — the number of elements in the array and the number of queries, correspondingly.

The next line contains n space-separated integers a_i ($1 \le a_i \le 2 \cdot 10^5$) — the array elements.

Each of the following q lines contains two space-separated integers l_i and r_i ($1 \le l_i \le r_i \le n$) — the i-th query.

Output

In a single line print a single integer — the maximum sum of query replies after the array elements are reordered.

Please, do not use the `%lld` specifier to read or write 64-bit integers in C++. It is preferred to use the `cin`, `cout` streams or the `%I64d` specifier.

Examples

input
3 3 5 3 2 1 2 2 3 1 3
output
25

input
5 3 5 2 4 1 3 1 5 2 3 2 3
output
33

D. Little Girl and Maximum XOR

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

A little girl loves problems on bitwise operations very much. Here's one of them.

You are given two integers l and r. Let's consider the values of $a \oplus b$ for all pairs of integers a and b ($l \le a \le b \le r$). Your task is to find the maximum value among all considered ones.

Expression $x \oplus y$ means applying bitwise excluding or operation to integers x and y. The given operation exists in all modern programming languages, for example, in languages *C++* and *Java* it is represented as "^", in *Pascal* — as «xor».

Input

The single line contains space-separated integers l and r ($1 \le l \le r \le 10^{18}$).

Please, do not use the `%lld` specifier to read or write 64-bit integers in C++. It is preferred to use the `cin`, `cout` streams or the `%I64d` specifier.

Output

In a single line print a single integer — the maximum value of $a \oplus b$ for all pairs of integers a, b ($l \le a \le b \le r$).

Examples

input
1 2
output
3

input
8 16
output
31

input
1 1
output
0

E. Little Girl and Problem on Trees

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

A little girl loves problems on trees very much. Here's one of them.

A tree is an undirected connected graph, not containing cycles. The degree of node x in the tree is the number of nodes y of the tree, such that each of them is connected with node x by some edge of the tree.

Let's consider a tree that consists of n nodes. We'll consider the tree's nodes indexed from 1 to n. The cosidered tree has the following property: each node except for node number 1 has the degree of at most 2.

Initially, each node of the tree contains number 0. Your task is to quickly process the requests of two types:

- Request of form: $0\ v\ x\ d$. In reply to the request you should add x to all numbers that are written in the nodes that are located at the distance of at most d from node v. The distance between two nodes is the number of edges on the shortest path between them.
- Request of form: $1\ v$. In reply to the request you should print the current number that is written in node v.

Input

The first line contains integers n ($2 \le n \le 10^5$) and q ($1 \le q \le 10^5$) — the number of tree nodes and the number of requests, correspondingly.

Each of the next $n - 1$ lines contains two integers u_i and v_i ($1 \le u_i, v_i \le n$, $u_i \ne v_i$), that show that there is an edge between nodes u_i and v_i. Each edge's description occurs in the input exactly once. It is guaranteed that the given graph is a tree that has the property that is described in the statement.

Next q lines describe the requests.

- The request to add has the following format: $0\ v\ x\ d$ ($1 \le v \le n$, $1 \le x \le 10^4$, $1 \le d < n$).
- The request to print the node value has the following format: $1\ v$ ($1 \le v \le n$).

The numbers in the lines are separated by single spaces.

Output

For each request to print the node value print an integer — the reply to the request.

Examples

input
3 6 1 2 1 3 0 3 1 2 0 2 3 1 0 1 5 2 1 1 1 2 1 3

output
9 9 6

input
6 11 1 2 2 5 5 4 1 6 1 3 0 3 1 3 0 3 4 5 0 2 1 4 0 1 5 5 0 4 6 2 1 1 1 2 1 3 1 4 1 5 1 6

output
11 17 11 16 17 11