Problem A. Group Formation

SALLAM

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	256 megabytes

There is a college class consisting of n students, numbered from 1 to n.

The class's professor intends to form k distinct groups from these students.

Certain students have expressed specific grouping preferences. These preferences are presented in pairs, denoted as $u - v$, where student u and student v wish to be in the same group.

Given the number of students n, the desired number of groups k, and a list of m pairs u and v denoting the student preferences, can the professor successfully form k groups while satisfying all student preferences?

Input

The first line contains three integers n, m, and k. $(1 \leq n, k \leq 10^5)$, $(1 \leq m \leq min(10^5, \frac{n \times (n-1)}{2}))$ — The total number of students in the class, the number of student preferences, and the desired number of groups, respectively.

The following m lines each contain a pair u and v. $(1 \leq u, v \leq n)$ — this represents that student u and student v wish to be in the same group.

Output

Print 'YES' if it is possible to form m groups given the student preferences. Otherwise, print 'NO'.

Scoring

Subtask 1: $(1 \leq n, k \leq 10)$, $(1 \leq m \leq min(10, \frac{n \times (n-1)}{2}))$ (30 points)

Subtask 2: $(1 \leq n, k \leq 10^5)$, $(1 \leq m \leq min(10^5, \frac{n \times (n-1)}{2}))$ (70 points)

Examples

standard input	standard output
6 2 3 1 5 2 4	YES
6 3 4 1 2 2 3 3 5	NO
10 6 4 1 2 2 5 4 7 8 9 6 7 10 2	YES

Problem B. Maximizing Happiness

Input file:	`standard input`
Output file:	`standard output`
Time limit:	2 seconds
Memory limit:	256 megabytes

You are in a store that sells only chocolate, and you are a chocolate lover. Eating chocolate increases your happiness by a specific value.

Your main goal is to maximize your happiness by purchasing chocolates. Each type of chocolate has a specific happiness value associated with it.

There are n different types of chocolates available, each uniquely numbered from 1 to n. You have decided to buy **at most** one piece of each type of chocolate.

The $i-th$ type of chocolate provides a happiness increase of h_i and costs c_i £. And you have a budget of m to spend on chocolates.

Given n types of chocolates with their associated happiness values h_i and costs c_i, and a total budget of m. m , print the maximum possible total happiness value that can be achieved within the budget of m.

Input

The first line contains two integers n and m $(1 \leq n \leq 100, 1 \leq m \leq 1000)$ — The number of chocolate types, and the total amount of money you have, respectively.

The second line contains n integers $h_1, h_2, ..., h_n$ $(1 \leq h_i \leq 1000)$ — h_i represents the happiness value of the $i-th$ chocolate type.

The third line contains n integers $c_1, c_2, ..., c_n$ $(1 \leq c_i \leq 1000)$ — c_i represents the cost of the $i-th$ chocolate type.

Output

In the first line, print the maximum total happiness value you can achieve with your budget.

Scoring

Subtask 1: $(1 \leq n \leq 20, 1 \leq m \leq 1000)$, the rest of the constraints are unchanged. (50 points)

Subtask 2: $(1 \leq n \leq 100, 1 \leq m \leq 1000)$, the rest of the constraints are unchanged. (50 points)

Examples

standard input	standard output
5 34 12 1 7 8 6 178 30 13 34 87	8
10 100 16 9 17 5 23 21 25 25 25 2 27 131 132 6 6 56 100 1 25 100	99

Problem C. Taking A Walk

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

Ahmed, Omar, and Karim live in the same neighborhood. The neighborhood consists of n houses and $n-1$ roads. Each road connects a pair of houses u and v. Any house can be reached from any other house using the roads in the neighborhood. The houses are numbered from 1 to n.

Ahmed lives in house a, Omar lives in house o, and Karim lives in house k. Ahmed wants to go to Karim's house. To do this, he will walk through some roads and may need to pass through other houses before he reaches Karim's house. Ahmed wants to talk to Omar so he wants to pass through Omar's house on his way to Karim's house. However, Ahmed does not want to walk an extra distance to be able to talk to Omar, so he doesn't want to pass through any house more than once.

Help Ahmed and determine whether it is possible for him to pass through Omar's house and reach Karim's house in the end without passing through any house more than once.

Input

The first line contains a single integer n representing the number of houses in the neighborhood. $3 \leq n \leq 2 \times 10^5$

The second line contains three integers a, o, and k representing the number of Ahmed's house, Omar's house, and Karim's house respectively. $1 \leq a, o, k \leq n$. The integers a, o, and k are pairwise distinct.

The following $n-1$ lines contain the description of the roads. Each of these lines contains a pair of integers u and v, this means that there is a road between house u and house v.

Output

If there is a way for Ahmed to pass through Omar's house and reach Karim's house without passing through any house more than once, output 'YES' , otherwise output 'NO'.

Scoring

Subtask 1: $3 \leq n \leq 10$ (30 points)

Subtask 2: $3 \leq n \leq 20$ (30 points)

Subtask 3: $3 \leq n \leq 2 \times 10^5$ (40 points)

Examples

standard input	standard output
5 1 2 4 1 2 1 3 1 4 1 5	NO
5 3 2 4 1 2 2 4 1 3 2 5	YES

Problem D. Change Making

Input file:	standard input
Output file:	standard output
Time limit:	2 seconds
Memory limit:	256 megabytes

A cashier is working in a store and has an unlimited supply of coins in the following denominations: 1, 6, 11, 21, and 47.

The cashier needs to give change to a customer for an amount of money, n. How many unique ways can the cashier make a change for n using the available coin types?

Input

The total amount of money, n ($1 \leq n \leq 10^5$), for which change needs to be given.

Output

The total number of different ways to make change for n using any combination of the available coins.

Scoring

Subtask 1: ($1 \leq n \leq 20$) (40 points)

Subtask 2: ($1 \leq n \leq 10^5$) (60 points)

Examples

standard input	standard output
12	4
35	19

Note

In the first sample, the sum 12 can be formed using the following ways:
(1,1,1,1,1,1,1,1,1,1,1,1), (1,1,1,1,1,1,6), (6,6), and (1,11).

Problem E. Beautiful Numbers

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

Let us call a number beautiful if the difference between each two consecutive digits in the number is at **most 2**.

For example, the number 467 is beautiful because $| 4 - 6 | = 2$ and $| 6 - 7 | = 1$. The number 498 is not beautiful as $| 4 - 9 | = 5$. Other examples of beautiful numbers are 111, 875, and 224.

Given two positive integers L and R where $L \leq R$, count the number of beautiful numbers between L and R inclusive.

Input

The only line of input contains two integers L and R which are described in the statement. $1 \leq L \leq R \leq 10^{18}$

Output

A single integer, the number of beautiful numbers in the range L to R inclusive.

Scoring

Subtask 1: $1 \leq L \leq R \leq 10^5$ (40 points)

Subtask 2: $1 \leq L \leq R \leq 10^{18}$ (60 points)

Examples

standard input	standard output
10 20	5
7 15	7
1 10000000000000000	2346461474628