Codeforces Round #422 (Div. 2)

A. I'm bored with life

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

Holidays have finished. Thanks to the help of the hacker Leha, Noora managed to enter the university of her dreams which is located in a town Pavlopolis. It's well known that universities provide students with dormitory for the period of university studies. Consequently Noora had to leave Vičkopolis and move to Pavlopolis. Thus Leha was left completely alone in a quiet town Vičkopolis. He almost even fell into a depression from boredom!

Leha came up with a task for himself to relax a little. He chooses two integers A and B and then calculates the greatest common divisor of integers "A factorial" and "B factorial". Formally the hacker wants to find out GCD($A!$, $B!$). It's well known that the factorial of an integer x is a product of all positive integers less than or equal to x. Thus $x! = 1 \cdot 2 \cdot 3 \cdot \ldots \cdot (x - 1) \cdot x$. For example $4! = 1 \cdot 2 \cdot 3 \cdot 4 = 24$. Recall that GCD($x$, y) is the largest positive integer q that divides (without a remainder) both x and y.

Leha has learned how to solve this task very effective. You are able to cope with it not worse, aren't you?

Input

The first and single line contains two integers A and B ($1 \le A, B \le 10^9$, $min(A, B) \le 12$).

Output

Print a single integer denoting the greatest common divisor of integers $A!$ and $B!$.

Example

input
4 3
output
6

Note

Consider the sample.

$4! = 1 \cdot 2 \cdot 3 \cdot 4 = 24$. $3! = 1 \cdot 2 \cdot 3 = 6$. The greatest common divisor of integers 24 and 6 is exactly 6.

B. Crossword solving

time limit per test: 1 second
memory limit per test: 256 megabytes
input: standard input
output: standard output

Erelong Leha was bored by calculating of the greatest common divisor of two factorials. Therefore he decided to solve some crosswords. It's well known that it is a very interesting occupation though it can be very difficult from time to time. In the course of solving one of the crosswords, Leha had to solve a simple task. You are able to do it too, aren't you?

Leha has two strings s and t. The hacker wants to change the string s at such way, that it can be found in t as a substring. All the changes should be the following: Leha chooses one position in the string s and replaces the symbol in this position with the question mark "?". The hacker is sure that the question mark in comparison can play the role of an arbitrary symbol. For example, if he gets string s="ab?b" as a result, it will appear in t="aabrbb" as a substring.

Guaranteed that the length of the string s doesn't exceed the length of the string t. Help the hacker to replace in s as few symbols as possible so that the result of the replacements can be found in t as a substring. The symbol "?" should be considered equal to any other symbol.

Input

The first line contains two integers n and m $(1 \le n \le m \le 1000)$ — the length of the string s and the length of the string t correspondingly.

The second line contains n lowercase English letters — string s.

The third line contains m lowercase English letters — string t.

Output

In the first line print single integer k — the minimal number of symbols that need to be replaced.

In the second line print k **distinct** integers denoting the positions of symbols in the string s which need to be replaced. Print the positions in any order. If there are several solutions print any of them. The numbering of the positions begins from one.

Examples

input
3 5 abc xaybz
output
2 2 3

input
4 10 abcd ebceabazcd
output
1 2

C. Hacker, pack your bags!

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

It's well known that the best way to distract from something is to do one's favourite thing. Job is such a thing for Leha.

So the hacker began to work hard in order to get rid of boredom. It means that Leha began to hack computers all over the world. For such zeal boss gave the hacker a vacation of exactly x days. You know the majority of people prefer to go somewhere for a vacation, so Leha immediately went to the travel agency. There he found out that n vouchers left. i-th voucher is characterized by three integers l_i, r_i, $cost_i$ — day of departure from Vičkopolis, day of arriving back in Vičkopolis and cost of the voucher correspondingly. The duration of the i-th voucher is a value $r_i - l_i + 1$.

At the same time Leha wants to split his own vocation into two parts. Besides he wants to spend as little money as possible. Formally Leha wants to choose exactly two vouchers i and j ($i \neq j$) so that they don't intersect, sum of their durations is **exactly** x and their total cost is as minimal as possible. Two vouchers i and j don't intersect if only at least one of the following conditions is fulfilled: $r_i < l_j$ or $r_j < l_i$.

Help Leha to choose the necessary vouchers!

Input

The first line contains two integers n and x ($2 \le n, x \le 2 \cdot 10^5$) — the number of vouchers in the travel agency and the duration of Leha's vacation correspondingly.

Each of the next n lines contains three integers l_i, r_i and $cost_i$ ($1 \le l_i \le r_i \le 2 \cdot 10^5$, $1 \le cost_i \le 10^9$) — description of the voucher.

Output

Print a single integer — a minimal amount of money that Leha will spend, or print -1 if it's impossible to choose two disjoint vouchers with the total duration **exactly** x.

Examples

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

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

Note

In the first sample Leha should choose first and third vouchers. Hereupon the total duration will be equal to $(3 - 1 + 1) + (6 - 5 + 1) = 5$ and the total cost will be $4 + 1 = 5$.

In the second sample the duration of each voucher is 3 therefore it's impossible to choose two vouchers with the total duration equal to 2.

D. My pretty girl Noora

time limit per test: 1.5 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

In Pavlopolis University where Noora studies it was decided to hold beauty contest "Miss Pavlopolis University". Let's describe the process of choosing the most beautiful girl in the university in more detail.

The contest is held in several stages. Suppose that exactly n girls participate in the competition initially. All the participants are divided into equal groups, x participants in each group. Furthermore the number x is chosen arbitrarily, i. e. on every stage number x can be different. Within each group the jury of the contest compares beauty of the girls in the format "each with each". In this way, if group consists of x girls, then $\frac{x \cdot (x-1)}{2}$ comparisons occur. Then, from each group, the most beautiful participant is selected. Selected girls enter the next stage of the competition. Thus if n girls were divided into groups, x participants in each group, then exactly $\frac{n}{x}$ participants will enter the next stage. The contest continues until there is exactly one girl left who will be "Miss Pavlopolis University"

But for the jury this contest is a very tedious task. They would like to divide the girls into groups in each stage so that the total number of pairwise comparisons of the girls is as few as possible. Let $f(n)$ be the minimal total number of comparisons that should be made to select the most beautiful participant, if we admit n girls to the first stage.

The organizers of the competition are insane. They give Noora three integers t, l and r and ask the poor girl to calculate the value of the following expression: $t^0 \cdot f(l) + t^1 \cdot f(l+1) + \ldots + t^{r-l} \cdot f(r)$. However, since the value of this expression can be quite large the organizers ask her to calculate it modulo $10^9 + 7$. If Noora can calculate the value of this expression the organizers promise her to help during the beauty contest. But the poor girl is not strong in mathematics, so she turned for help to Leha and he turned to you.

Input

The first and single line contains three integers t, l and r ($1 \le t < 10^9 + 7$, $2 \le l \le r \le 5 \cdot 10^6$).

Output

In the first line print single integer — the value of the expression modulo $10^9 + 7$.

Example

input
2 2 4
output
19

Note

Consider the sample.

It is necessary to find the value of $(2^0 \cdot f(2) + 2^1 \cdot f(3) + 2^2 \cdot f(4)) \mod (10^9 + 7)$.

$f(2) = 1$. From two girls you can form only one group of two people, in which there will be one comparison.

$f(3) = 3$. From three girls you can form only one group of three people, in which there will be three comparisons.

$f(4) = 3$. From four girls you can form two groups of two girls each. Then at the first stage there will be two comparisons, one in each of the two groups. In the second stage there will be two girls and there will be one comparison between them. Total $2 + 1 = 3$ comparisons. You can also leave all girls in same group in the first stage. Then $\frac{4 \cdot 3}{2} = 6$ comparisons will occur. Obviously, it's better to split girls into groups in the first way.

Then the value of the expression is $(2^0 \cdot 1 + 2^1 \cdot 3 + 2^2 \cdot 3) \mod (10^9 + 7) = 19$.

E. Liar

time limit per test: 4 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

The first semester ended. You know, after the end of the first semester the holidays begin. On holidays Noora decided to return to Vičkopolis. As a modest souvenir for Leha, she brought a sausage of length m from Pavlopolis. Everyone knows that any sausage can be represented as a string of lowercase English letters, the length of which is equal to the length of the sausage.

Leha was very pleased with the gift and immediately ate the sausage. But then he realized that it was a quite tactless act, because the sausage was a souvenir! So the hacker immediately went to the butcher shop. Unfortunately, there was only another sausage of length n in the shop. However Leha was not upset and bought this sausage. After coming home, he decided to cut the purchased sausage into several pieces and number the pieces starting from 1 from left to right. Then he wants to select several pieces and glue them together so that the obtained sausage is equal to the sausage that Noora gave. But the hacker can glue two pieces together only when the number of the left piece is less than the number of the right piece. Besides he knows that if he glues more than x pieces, Noora will notice that he has falsified souvenir sausage and will be very upset. Of course Leha doesn't want to upset the girl. The hacker asks you to find out whether he is able to cut the sausage he bought, and then glue some of the pieces so that Noora doesn't notice anything.

Formally, you are given two strings s and t. The length of the string s is n, the length of the string t is m. It is required to select several pairwise non-intersecting substrings from s, so that their concatenation in the same order as these substrings appear in s, is equal to the string t. Denote by $f(s, t)$ the minimal number of substrings to be chosen so that their concatenation is equal to the string t. If it is impossible to choose such substrings, then $f(s, t) = \infty$. Leha really wants to know whether it's true that $f(s, t) \leq x$.

Input

The first line contains single integer n ($1 \leq n \leq 10^5$) — length of sausage bought by Leha, i.e. the length of the string s.

The second line contains string s of the length n consisting of lowercase English letters.

The third line contains single integer m ($1 \leq m \leq n$) — length of sausage bought by Noora, i.e. the length of the string t.

The fourth line contains string t of the length m consisting of lowercase English letters.

The fifth line contains single integer x ($1 \leq x \leq 30$) — the maximum number of pieces of sausage that Leha can glue so that Noora doesn't notice anything.

Output

In the only line print "YES" (without quotes), if Leha is able to succeed in creating new sausage so that Noora doesn't notice anything. Otherwise print "NO" (without quotes).

Examples

input
9 hloyaygrt 6 loyyrt 3
output
YES

input
9 hloyaygrt 6 loyyrt 2
output
NO

Note

Let's consider the first sample.

In the optimal answer, Leha should cut the sausage he bought in the following way: `hloyaygrt = h + loy + a + y + g + rt`. Then he numbers received parts from 1 to 6:

- `h` — number 1
- `loy` — number 2
- `a` — number 3
- `y` — number 4
- `g` — number 5
- `rt` — number 6

Hereupon the hacker should glue the parts with numbers 2, 4 and 6 and get sausage `loyygrt` equal to one that is given by Noora. Thus, he will have to glue three pieces. Since $x = 3$ you should print "`YES`" (without quotes).

In the second sample both sausages coincide with sausages from the first sample. However since $x = 2$ you should print "`NO`" (without quotes).

F. Madness

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

The second semester starts at the University of Pavlopolis. After vacation in Vičkopolis Noora needs to return to Pavlopolis and continue her study.

Sometimes (or quite often) there are teachers who do not like you. Incidentally Noora also has one such teacher. His name is Yury Dmitrievich and he teaches graph theory. Yury Dmitrievich doesn't like Noora, so he always gives the girl the most difficult tasks. So it happened this time.

The teacher gives Noora a tree with n vertices. Vertices are numbered with integers from 1 to n. The length of all the edges of this tree is 1. Noora chooses a set of simple paths that pairwise don't intersect in edges. However each vertex should belong to at least one of the selected path.

For each of the selected paths, the following is done:

1. We choose **exactly** one edge (u, v) that belongs to the path.
2. On the selected edge (u, v) there is a point at some selected distance x from the vertex u and at distance $1 - x$ from vertex v. But the distance x chosen by Noora arbitrarily, i. e. it can be different for different edges.
3. One of the vertices u or v is selected. The point will start moving to the selected vertex.

Let us explain how the point moves by example. Suppose that the path consists of two edges (v_1, v_2) and (v_2, v_3), the point initially stands on the edge (v_1, v_2) and begins its movement to the vertex v_1. Then the point will reach v_1, then "turn around", because the end of the path was reached, further it will move in another direction to vertex v_2, then to vertex v_3, then "turn around" again, then move to v_2 and so on. The speed of the points is 1 edge per second. For example, for 0.5 second the point moves to the length of the half of an edge.

A stopwatch is placed at each vertex of the tree. The time that the stopwatches indicate at start time is 0 seconds. Then at the starting moment of time, all points simultaneously start moving from the selected positions to selected directions along the selected paths, and stopwatches are simultaneously started. When one of the points reaches the vertex v, the stopwatch at the vertex v is automatically reset, i.e. it starts counting the time from zero.

Denote by res_v the maximal time that the stopwatch at the vertex v will show if the point movement continues infinitely. Noora is asked to select paths and points on them so that res_1 is as minimal as possible. If there are several solutions to do this, it is necessary to minimize res_2, then res_3, res_4, ..., res_n.

Help Noora complete the teacher's task.

For the better understanding of the statement, see the explanation for the example.

Input

The first line contains single integer n ($2 \le n \le 100$) — number of vertices in the given tree.

Each of next $n - 1$ lines contains two integers u and v ($1 \le u, v \le n$, $u \ne v$) — vertices connected by an edge.

Guaranteed that input defines a valid tree.

Output

In the first line print single integer $paths$ — number of paths you want to choose.

In the next $paths$ lines print path's descriptions:

1. Single integer len — number of edges in the current path.
2. len integers — indices of the edges in the path. The edges are numbered from 1 to $n - 1$ in order they are given in input.
3. Two integers u and v — means that you put point on the edge between vertices u and v (obviously the edge should belong to the path) and a point will start moving to the vertex v. Note that **order of printing of the edge's ends is important**. For example if you print "`1 2`" (without quotes), then point will start moving to vertex 2; but if you print "`2 1`" (without quotes), then point will start moving to vertex 1.
4. Single real number x ($0 \le x \le 1$) — distance between point and vertex u **(the same vertex that you print first in the third paragraph)**.

Scoring

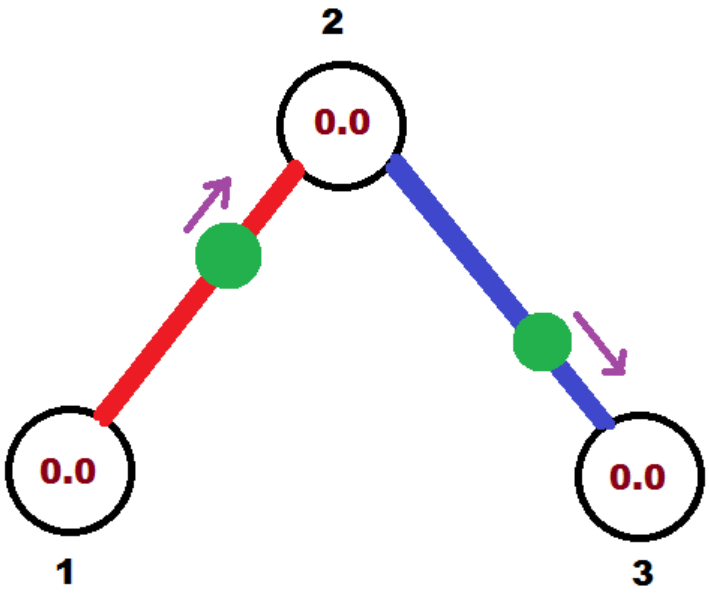
Judge system will generate array res using the output data provided by the participant. Also system will generate array $resOptimal$ by the jury answer. Your answer will be accepted if only for each i ($1 \le i \le n$) the following is satisfied: $\frac{|res_i - resOptimal_i|}{max(1, resOptimal_i)} \le 10^{-6}$.

Example

input
3 1 2 2 3
output
2 1 1 1 2 0.6666666666 1 2 2 3 0.6666666666

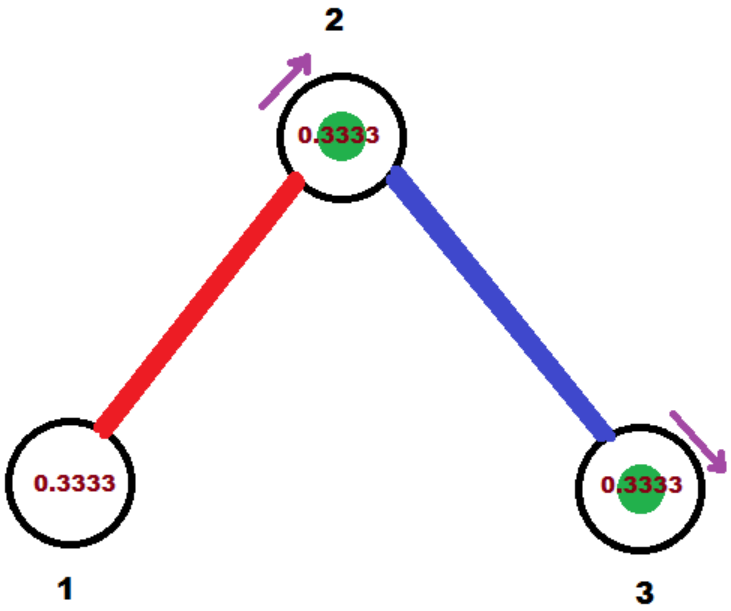
Note
Consider an example.

In starting moment of time points are located as following:

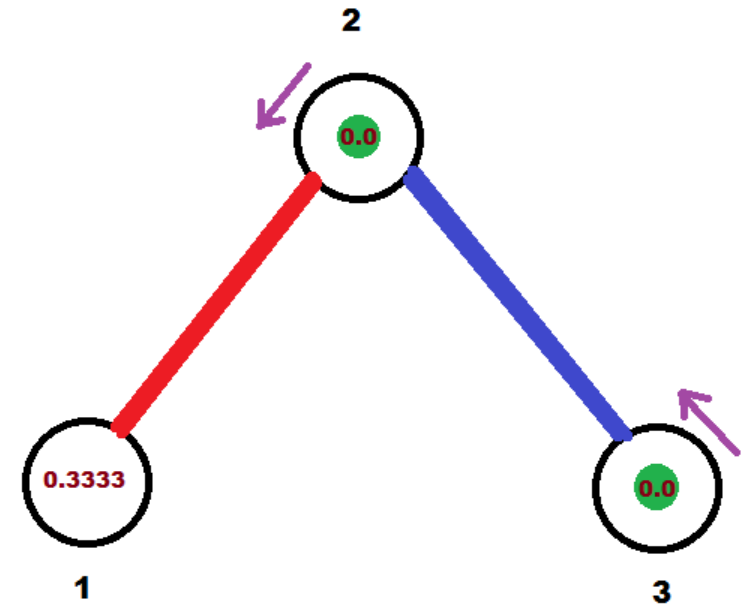


The first path is highlighted in red, the second in blue, green circles represent chosen points, and brown numbers inside vertices — current time at stopwatch. Purple arrows represent direction in which points will move.

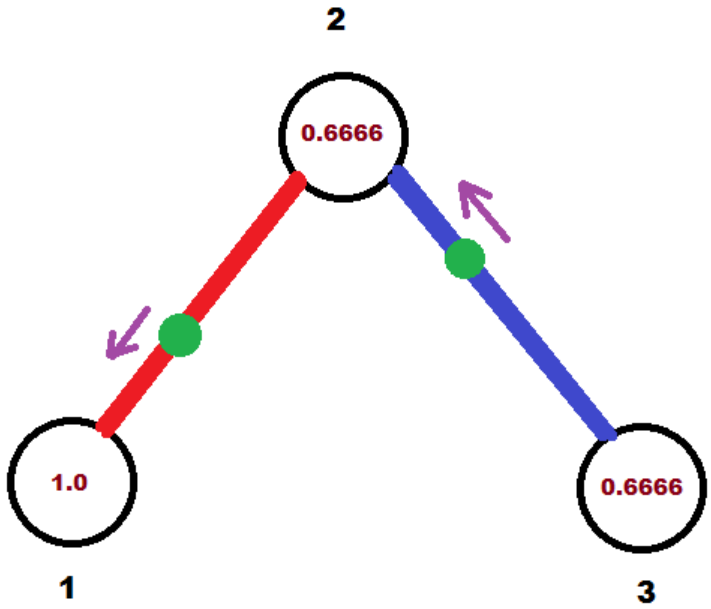
In $0.(3)$ seconds points will be located in following way (before stopwatch reset):



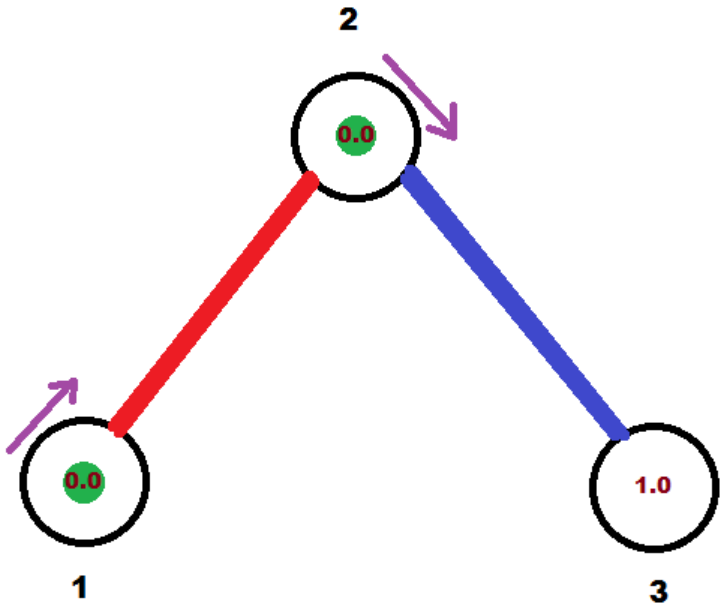
After stopwatch reset:



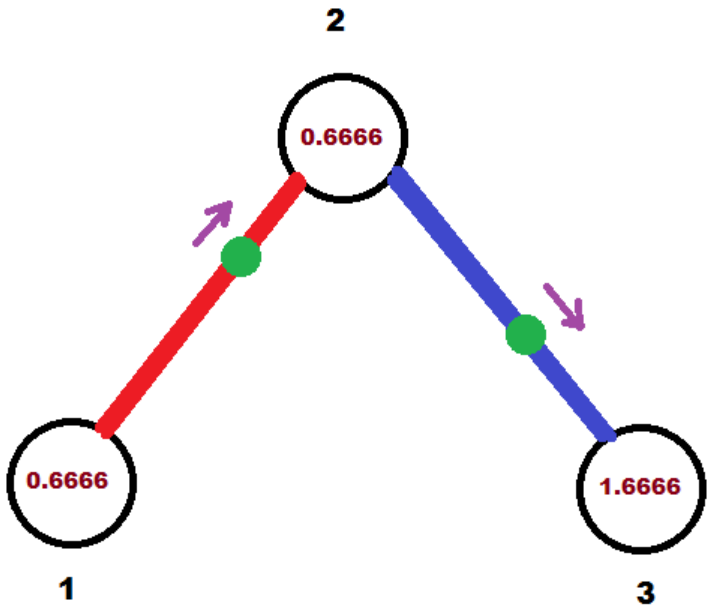
In 1.0 second after the start of moving:



In $1.(3)$ seconds after the start of moving (after stopwatch reset):



Finally, in 2 seconds after the start of moving points return to their initial positions.



This process will continue infinitely.
