Problem A. Two Plates

Input file:	*standard input*
Output file:	*standard output*
Time limit:	3 seconds
Memory limit:	256 mebibytes

It's not a secret that Zenyk loves food. One day he got his hands on a buffet table with lots of exotic fruits.

For simplicity, lets consider the table as a plane, and plates as a rectangles with sides parallel to the axes. There are N plates on the table. Please note that the plates might intersect.

Unfortunately, Zenyk has only two hands, so he's gonna pick two plates. Apart from that, the following two conditions must be fulfilled:

- The two plates must have non-zero area of intersection.
- There should be no other plate with non-zero area of intersection with any of the two plates.

Help Zenyk find out the number of pairs of plates that he can choose.

Input

The first line contains a single integers N ($2 \le N \le 10^5$) — the number of plates. The following N lines describe plates, one plate per line. The description consists of four integers x_1 y_1 x_2 y_2 ($0 \le x_1 < x_2 \le 10^6$, $0 \le y_1 < y_2 \le 10^6$) — the coordinates of lower-left and upper-right corners of the plate.

Output

Print a single integer — the number of ways to choose two plates.

Example

standard input	standard output
3 0 0 2 2 1 1 3 3 4 7 7 11	1

Problem B. Mushrooms

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	256 mebibytes

Last weekend Zenyk and Marichka went to a forest to find some mushrooms, and they got n buckets of those! Now they would like to share it with Andrew, who was unable to go with them.

As Zenyk and Marichka are huge fans of number 2, the weight of mushrooms in each bucket is an integer power of 2. Moreover, there are no two buckets that have the same weight of mushrooms in them. Zenyk and Marichka decided that they will give Andrew some non-nempty subset of the buckets, but only such that the total weight of mushrooms in the buckets does not exceed c. Note that they are not allowed to move mushrooms between buckets or change their weight in any way.

Andrew found out about his firends' plans, and now he's interested in the number of different total weights of mushrooms he can receive. And your task is to help him find this number.

Input

The first line contains two integers n and c ($1 \le n \le 50$, $1 \le c \le 10^{18}$) — the number of buckets and the maximum total weight, respectively. The second line contains n distinct space-separated integers p_i ($1 \le p_i \le 10^{18}$), which are the weights of the buckets. It's guaranteed that all the given weights are integer powers of 2.

Output

In the only line print a single integer — the answer to the problem.

Example

standard input	standard output
3 10 4 1 8	5

Note

There are 5 different weights that Andrew can receive: 1, 4, 5 ($1 + 4$), 8, 9 ($1 + 8$).

Problem C. Paint the Tree

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	256 mebibytes

Today Zenyk wants to present Marichka a tree. Tree is such connected graph that consists of N vertices and $N-1$ edges. Zenyk decided that tree will be much more interesting if he paints it. He has K colors and every vertex should be painted in one color.

Zenyk thought that the tree is the most interesting if the distance between 2 nearest vertices with same color is maximal possible. You should find this maximal distance and the number of such paintings modulo 10^9+7. Two paintings are considered different if there exist at least one vertex which has different colors.

Input

First line of the input contains 2 integers N ($2 \le N \le 2000$) and K ($1 \le K < N$). Each of the next $N-1$ lines contains 2 integers a_i, b_i, which means that vertices a_i and b_i are connected by an edge ($1 \le a_i, b_i \le N$).

Output

Print 2 integers – maximal distance between nearest vertices with same color and number of such paintings modulo 10^9+7.

Example

standard input	standard output
4 2 1 2 2 3 2 4	2 2

Problem D. Balls

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	256 mebibytes

There are N balls placed in a row and numbered from 1 to N from the left to the right. Also, there are N distinct colors. Initially, the i-th ball is colored in the i-th color. Then Zenyk performs the following process K times: take a random ball and repaint it in a random color. After the process is done, Zenyk wants to know the number of colors for which there is at least one ball colored in it.

So he wants to find this values for all N^{2K} ways (N choices of a ball and N choices of a color) and count their sum. As this number can be very huge output it modulo 1000000007 ($10^9 + 7$).

Input

One line contains 2 integers N and K ($1 \le N, K \le 2000$).

Output

Print one integer – value which Zenyk wants to find modulo $10^9 + 7$.

Example

standard input	standard output
4 2	760

Note

There are 4 colors in 40 ways.

There are 3 colors in 168 ways.

There are 2 colors in 48 ways.

Problem E. Boring Days

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	256 mebibytes

Sometimes Marichka and Zenyk get very bored. Thus they start to do some strange things. Today they decided to play with strings of lowercase English letters.

Marichka and Zenyk have two strings of lowercase English letters. Marichka badly wants her string to be lexicographically smaller than the Zenyk's string. In order to achieve the goal she can even sacrifice some of it's characters and delete them. Your task is to help her find the minimum number of characters she has to delete in order to achieve the goal.

A string s is considered to be lexicographically smaller than a string t if s is a prefix of t (but is not equal to t) or the string s contains smaller character (in terms of English alphabet) than the string t in the first position they differ.

Input

The two lines of the input contain two strings of lowercase English letters. The first one is the Marichka's string while the second one is the Zenyk's string. Both strings contain at least 1 and at most 10^5 characters.

Output

In the only line of the output print a single integer — the answer for the problem.

Example

standard input	standard output
abdcacabx abcabx	2

Problem F. Catch Them All!

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

Zenyk loves to play the pokemon game. But since he has to train for the ICPC finals, he and his team don't have time for that.

On a street where Zenyk lives there are N different pokemons. For simplicity, we consider the street as a straight line, and the i-pokemon can be cought if you are located in any point in range $[L_i; R_i]$.

Zenyk decided that he is going to catch pokemons during his next training with the team. After some negotiation he decided that the training will happen in one of M points $X_1, \ldots, X_M$.

Your task is to find the number of different non-empty sets of pokemons he can catch during the training (i. e. there exists a location that all the pokemons from the subset could be cought from). Note that once the place of the training is decied, it cannot be changed during. Since this number can be very big, output it modulo 1000000007.

Input

The first line contains two integers N and M ($1 \le N, M \le 10^5$) — the number of pokemons and possible location of the training. The next N lines contain N pairs of integers L_i and R_i ($1 \le L_i \le R_i \le 10^9$), which describe the positions where you can catch the corresponding pokemon. The next M lines contain M integers X_i ($1 \le X_i \le 10^9$) — the locations where the training can be held.

Output

In the only line print single integer — the answer to the problem modulo 1000000007.

Example

standard input	standard output
3 2 7 11 1 5 3 8 4 7	5

Problem G. Game with Strings

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	256 mebibytes

Today Zenyk and Marichka have a game night, and they decided to play the following interesting game. Marichka writes down on two long pieces of paper strings s and t, which consist of characters `A` and `B`. The goal for Zenyk is to cut out exactly $|t|$ characters from s in such a way that the following two conditions are fulfilled:

1. The cut out characters make up string t, if placed in the same order as in s.
2. The remaining parts of s must be of form `AA..A` or `BB..B`. In other words, there should be no part that contains both `A` and `B` at the same time.

You are given two string s and t. Help Zenyk achieve the goal of the game.

Input

The first line contains string s, and the second line contains string t ($1 \le |t| \le |s| \le 10^5$). Both strings consist only of `A` and `B` characters.

Output

On the first line print `"YES"` if it is possible to achieve the goal, and `"NO"` otherwise (without quotes). In case of a positive answer, on the next line print $|t|$ distinct integers in increasing order, which are the positions of characters that Zenyk will cut out from s (1-based index). If multiple answers exit, you may print any one of them.

Examples

standard input	standard output
AABBBAABBBABBB ABBA	YES 2 5 8 11
ABABABAB ABBA	NO

Note

In the first sample, after cutting out the given characters, the following parts are left out: `A`, `BB`, `AA`, `BB`, `BBB`. None of them contain both `A` and `B` at the same time.

Problem H. Things

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	256 mebibytes

Zenyk is a busy man, so he has a lot of things to do. There are n things he has to do, and the i-th thing is going to take time range from l_i to r_i, inclusive. Note that $r_i - l_i$ is an even number, and that the ranges can intersect in any way.

Zenyk decided to makes things easier — for each thing, he will choose either the first half of the time range or the second. But his is afraid that Marichka might notice the change, so for each time moment that he was busy before the change, he must be busy after it as well. Zenyk is considered busy at some point of time if he has at least one thing to do.

You task is to find out whether Zenyk is able make his life easier or not.

Input

The first line contains a single integer n ($1 \le n \le 200$) — the number of things. The next n lines describe each time range $[l_i, r_i]$ ($0 \le l_i < r_i \le 10^9$, $r_i - l_i$ is even), which are always integer.

Output

In a single line print "YES" if the answer is positive, or "NO" otherwise.

Examples

standard input	standard output
4 0 8 4 12 10 12 5 11	YES
3 48 78 2 4 47 77	NO

Problem I. More Things to Do

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	256 mebibytes

As you already know, Zenyk has a lot of tasks to do. In total, he has N tasks, i-th of them will last from the time l_i to r_i. Note that the tasks can overlap or intersect in any way.

This time, Zenyk decided that he could move some of the tasks to tomorrow. Zenyk does not like much when tasks overlap, so he wants to break more such tasks between different days. Suppose $intersect(a, b)$ is the length of the intersection of the tasks a and b. For example, $intersect([2, 7], [4, 10]) = 3$, $intersect([4, 7], [2, 10]) = 3$, $intersect([2, 4], [7, 10]) = 0$. Suppose the set of tasks that Zenyk performs today is A, tomorrow — B.

Then Zenyk wants to maximize

$$C = \sum_{a \in A} \sum_{b \in B} intersect(a, b)$$

.

Help him with this.

Input

The first line contains a single integer N ($1 \le N \le 10^5$). In the following N lines, there are given 2 integers l_i and r_i ($0 \le l_i < r_i \le 10^9$).

Output

In the first line, print the maximum value of C. In the second line, print N numbers 0 or 1. 1 means that Zenyk will do the task today, 0 — tomorrow.

Example

standard input	standard output
4 0 10 4 7 1 5 6 8	9 0 1 1 1

Problem J. Quicksort

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	256 mebibytes

Zenyk and Marichka found another challenge. They are given N stones placed in a row. All stones have distinct integer weights between 1 and N, inclusive. The challenge is to arrange these stones from the lightest to the heaviest. Zenyk invented a machine which in one operation can pull out any subset of stones from the row and put them back at the beginning of the row without changing their relative order.

For example, consider 5 stones in a row with weights $[3, 1, 5, 4, 2]$. If we select the second and the fifth stones we can transform our row to $[1, 2, 3, 5, 4]$ in one operation. Zenyk is interested in the minimum number of operations this machine needs to sort the given row of stones by weight and also he wants one of the possible ways of optimal sorting.

Input

The first line of the input contains the single integer N. The second line contains N integers where i-th integer is the i-th stone weight. All weights are distinct integers between 1 and N, inclusive.

Output

The first line should contain the integer M — the minimum number of operations. The following $M + 1$ lines should contain N numbers each: the first one represents the initial row and all others represent a row after the corresponding operation.

Examples

standard input	standard output
4 4 1 2 3	1 4 1 2 3 1 2 3 4
4 2 1 4 3	2 2 1 4 3 1 4 2 3 1 2 3 4

Note

In the second example during the first operation the machine moves the second and the third stones to the beginning of the row. During the second operation the first, the third and the fourth stones are selected.

Problem K. Password

Input file:	*standard input*
Output file:	*standard output*
Time limit:	1 second
Memory limit:	256 mebibytes

Zenyk wants to know the password to Marichka's Facebook account.

There are n digits (1 to 9) lying on the floor. Zenyk knows that he should form k integers using those digits, in such a way the greatest integer is minimum possible — that would be the password. Of course, you have to use all n digits.

Please help Zenyk to find out the password.

Input

The first line contains two integers n ($1 \le n \le 10^5$) and k ($1 \le k \le n$). The second line contains string of n digits 1 to 9.

Output

Print a single integer — the password.

Example

standard input	standard output
7 4 4412377	34

Problem L. Triangle

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

Marichka likes to play with triangles, especially creating them. She has only N sticks, the length of each i-th of which is L_i.

Marichka wants that out of any of her three sticks it would be possible to make a triangle with an area greater than 0. To do this, she can take any stick and break it into two pieces (not necessarily of integer length, but all L_i are integer).

Tell Marichka the minimum number of breaks that should be made to make triangles from any of the three sticks.

Input

The first line contains an integer N ($3 \le N \le 100$).

The second line contains N integers L_i ($1 \le L_i \le 10^9$).

Output

Output a single integer – the minimum number of breaks.

Example

standard input	standard output
3 2 4 7	1

Note

In the sample test, we can break the stick of length 7 to pieces with lengths 4.47 and 2.53. We get a set of sticks [2, 4, 4.47, 2.53]. From any three of them you can make a triangle.

Problem M. Lucky Numbers

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

It's well known that the lucky numbers are the numbers that consist of digits 4 and 7. For example, numbers 4, 7, 47, 7777 and 4744474 are lucky.

Zenyk says that a special lucky number is a number that can be composed as a sum of at most K lucky numbers. For example, if K is 3, than 4, 7, 8 $(4 + 4)$, 11 $(7 + 4)$, 12 $(4 + 4 + 4)$ and 121 $(44 + 77)$ are all special lucky numbers, and 3, 5, 16 and 28 are not.

Your task is to find the number of special lucky numbers between A and B, inclusive.

Input

The first line contains integer A. The second line contains integer B. The third line contains integer K. $(1 \le A \le B \le 10^{18}, 1 \le K \le 10^{18})$.

Output

The number of special lucky numbers between A and B, inclusive.

Examples

standard input	standard output
1 12 2	4
1 12 3	5
4777778 7444443 1	0