Codeforces Beta Round #79 (Div. 2 Only)

A. Clothes

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

A little boy Gerald entered a clothes shop and found out something very unpleasant: not all clothes turns out to match. For example, Gerald noticed that he looks rather ridiculous in a smoking suit and a baseball cap.

Overall the shop sells n clothing items, and exactly m pairs of clothing items match. Each item has its price, represented by an integer number of rubles. Gerald wants to buy three clothing items so that they matched each other. Besides, he wants to spend as little money as possible. Find the least possible sum he can spend.

Input

The first input file line contains integers n and m — the total number of clothing items in the shop and the total number of matching pairs of clothing items ($3 \le n \le 100, 0 \le m \le \frac{n(n-1)}{2}$).

Next line contains n integers a_i ($1 \le a_i \le 10^6$) — the prices of the clothing items in rubles.

Next m lines each contain a pair of space-separated integers u_i and v_i ($1 \le u_i, v_i \le n, u_i \ne v_i$). Each such pair of numbers means that the u_i-th and the v_i-th clothing items match each other. It is guaranteed that in each pair u_i and v_i are distinct and all the unordered pairs (u_i, v_i) are different.

Output

Print the only number — the least possible sum in rubles that Gerald will have to pay in the shop. If the shop has no three clothing items that would match each other, print "-1" (without the quotes).

Examples

input
3 3 1 2 3 1 2 2 3 3 1
output
6

input
3 2 2 3 4 2 3 2 1
output
-1

input
4 4 1 1 1 1 1 2 2 3 3 4 4 1
output
-1

Note

In the first test there only are three pieces of clothing and they all match each other. Thus, there is only one way — to buy the 3 pieces of clothing; in this case he spends 6 roubles.

The second test only has three pieces of clothing as well, yet Gerald can't buy them because the first piece of clothing does not match the third one. Thus, there are no three matching pieces of clothing. The answer is -1.

In the third example there are 4 pieces of clothing, but Gerald can't buy any 3 of them simultaneously. The answer is -1.

B. Sum of Digits

time limit per test: 2 seconds
memory limit per test: 265 megabytes
input: standard input
output: standard output

Having watched the last Harry Potter film, little Gerald also decided to practice magic. He found in his father's magical book a spell that turns any number in the sum of its digits. At the moment Gerald learned that, he came across a number n. How many times can Gerald put a spell on it until the number becomes one-digit?

Input

The first line contains the only integer n ($0 \le n \le 10^{100000}$). It is guaranteed that n doesn't contain any leading zeroes.

Output

Print the number of times a number can be replaced by the sum of its digits until it only contains one digit.

Examples

input
0
output
0

input
10
output
1

input
991
output
3

Note

In the first sample the number already is one-digit — Herald can't cast a spell.

The second test contains number 10. After one casting of a spell it becomes 1, and here the process is completed. Thus, Gerald can only cast the spell once.

The third test contains number 991. As one casts a spell the following transformations take place: $991 \to 19 \to 10 \to 1$. After three transformations the number becomes one-digit.

C. Homework

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

Once when Gerald studied in the first year at school, his teacher gave the class the following homework. She offered the students a string consisting of n small Latin letters; the task was to learn the way the letters that the string contains are written. However, as Gerald is too lazy, he has no desire whatsoever to learn those letters. That's why he decided to lose some part of the string (not necessarily a connected part). The lost part can consist of any number of segments of any length, at any distance from each other. However, Gerald knows that if he loses more than k characters, it will be very suspicious.

Find the least number of distinct characters that can remain in the string after no more than k characters are deleted. You also have to find any possible way to delete the characters.

Input

The first input data line contains a string whose length is equal to n ($1 \le n \le 10^5$). The string consists of lowercase Latin letters. The second line contains the number k ($0 \le k \le 10^5$).

Output

Print on the first line the only number m — the least possible number of different characters that could remain in the given string after it loses no more than k characters.

Print on the second line the string that Gerald can get after some characters are lost. The string should have exactly m distinct characters. The final string should be the subsequence of the initial string. If Gerald can get several different strings with exactly m distinct characters, print any of them.

Examples

input
aaaaa 4
output
1 aaaaa

input
abacaba 4
output
1 aaaa

input
abcdefgh 10
output
0

Note

In the first sample the string consists of five identical letters but you are only allowed to delete 4 of them so that there was at least one letter left. Thus, the right answer is 1 and any string consisting of characters "a" from 1 to 5 in length.

In the second sample you are allowed to delete 4 characters. You cannot delete all the characters, because the string has length equal to 7. However, you can delete all characters apart from "a" (as they are no more than four), which will result in the "aaaa" string.

In the third sample you are given a line whose length is equal to 8, and $k = 10$, so that the whole line can be deleted. The correct answer is 0 and an empty string.

D. Buses

time limit per test: 2 seconds
memory limit per test: 265 megabytes
input: standard input
output: standard output

Little boy Gerald studies at school which is quite far from his house. That's why he has to go there by bus every day. The way from home to school is represented by a segment of a straight line; the segment contains exactly $n + 1$ bus stops. All of them are numbered with integers from 0 to n in the order in which they follow from Gerald's home. The bus stop by Gerald's home has number 0 and the bus stop by the school has number n.

There are m buses running between the house and the school: the i-th bus goes from stop s_i to t_i ($s_i < t_i$), visiting all the intermediate stops in the order in which they follow on the segment. Besides, Gerald's no idiot and he wouldn't get off the bus until it is still possible to ride on it closer to the school (obviously, getting off would be completely pointless). In other words, Gerald can get on the i-th bus on any stop numbered from s_i to $t_i - 1$ inclusive, but he can get off the i-th bus only on the bus stop t_i.

Gerald can't walk between the bus stops and he also can't move in the direction from the school to the house.

Gerald wants to know how many ways he has to get from home to school. Tell him this number. Two ways are considered different if Gerald crosses some segment between the stops on different buses. As the number of ways can be too much, find the remainder of a division of this number by 1000000007 ($10^9 + 7$).

Input

The first line contains two space-separated integers: n and m ($1 \le n \le 10^9, 0 \le m \le 10^5$). Then follow m lines each containing two integers s_i, t_i. They are the numbers of starting stops and end stops of the buses ($0 \le s_i < t_i \le n$).

Output

Print the only number — the number of ways to get to the school modulo 1000000007 ($10^9 + 7$).

Examples

input
2 2 0 1 1 2
output
1

input
3 2 0 1 1 2
output
0

input
5 5 0 1 0 2 0 3 0 4 0 5
output
16

Note

The first test has the only variant to get to school: first on bus number one to the bus stop number one; then on bus number two to the bus stop number two.

In the second test no bus goes to the third bus stop, where the school is positioned. Thus, the correct answer is 0.

In the third test Gerald can either get or not on any of the first four buses to get closer to the school. Thus, the correct answer is $2^4 = 16$.

E. Vectors

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

At a geometry lesson Gerald was given a task: to get vector B out of vector A. Besides, the teacher permitted him to perform the following operations with vector A:

- Turn the vector by 90 degrees clockwise.
- Add to the vector a certain vector C.

Operations could be performed in any order any number of times.

Can Gerald cope with the task?

Input

The first line contains integers x_1 и y_1 — the coordinates of the vector A ($-10^8 \le x_1, y_1 \le 10^8$). The second and the third line contain in the similar manner vectors B and C (their coordinates are integers; their absolute value does not exceed 10^8).

Output

Print "YES" (without the quotes) if it is possible to get vector B using the given operations. Otherwise print "NO" (without the quotes).

Examples

input
0 0 1 1 0 1
output
YES

input
0 0 1 1 1 1
output
YES

input
0 0 1 1 2 2
output
NO