Testing Round #11

A. Up the hill

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

Hiking club "Up the hill" just returned from a walk. Now they are trying to remember which hills they've just walked through.

It is known that there were N stops, all on different integer heights between 1 and N kilometers (inclusive) above the sea level. On the first day they've traveled from the first stop to the second stop, on the second day they've traveled from the second to the third and so on, and on the last day they've traveled from the stop $N - 1$ to the stop N and successfully finished their expedition.

They are trying to find out which heights were their stops located at. They have an entry in a travel journal specifying how many days did they travel up the hill, and how many days did they walk down the hill.

Help them by suggesting some possible stop heights satisfying numbers from the travel journal.

Input

In the first line there is an integer non-negative number A denoting the number of days of climbing up the hill. Second line contains an integer non-negative number B — the number of days of walking down the hill ($A + B + 1 = N$, $1 \le N \le 100\,000$).

Output

Output N space-separated distinct integers from 1 to N inclusive, denoting possible heights of the stops in order of visiting.

Examples

input
0 1
output
2 1

input
2 1
output
1 3 4 2

B. New York Hotel

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

Think of New York as a rectangular grid consisting of N vertical avenues numerated from 1 to N and M horizontal streets numerated 1 to M. C friends are staying at C hotels located at some street-avenue crossings. They are going to celebrate birthday of one of them in the one of H restaurants also located at some street-avenue crossings. They also want that the maximum distance covered by one of them while traveling to the restaurant to be minimum possible. Help friends choose optimal restaurant for a celebration.

Suppose that the distance between neighboring crossings are all the same equal to one kilometer.

Input

The first line contains two integers N и M — size of the city ($1 \le N, M \le 10^9$). In the next line there is a single integer C ($1 \le C \le 10^5$) — the number of hotels friends stayed at. Following C lines contain descriptions of hotels, each consisting of two coordinates x and y ($1 \le x \le N$, $1 \le y \le M$). The next line contains an integer H — the number of restaurants ($1 \le H \le 10^5$). Following H lines contain descriptions of restaurants in the same format.

Several restaurants and hotels may be located near the same crossing.

Output

In the first line output the optimal distance. In the next line output index of a restaurant that produces this optimal distance. If there are several possibilities, you are allowed to output any of them.

Examples

input
10 10 2 1 1 3 3 2 1 10 4 4
output
6 2

C. Deciphering

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

One day Maria Ivanovna found a Sasha's piece of paper with a message dedicated to Olya. Maria Ivanovna wants to know what is there in a message, but unfortunately the message is ciphered. Maria Ivanovna knows that her students usually cipher their messages by replacing each letter of an original message by some another letter. Replacement works in such way that same letters are always replaced with some fixed letter, and different letters are always replaced by different letters.

Maria Ivanovna supposed that the message contains answers to the final exam (since its length is equal to the number of final exam questions). On the other hand she knows that Sasha's answer are not necessary correct. There are K possible answers for each questions. Of course, Maria Ivanovna knows correct answers.

Maria Ivanovna decided to decipher message in such way that the number of Sasha's correct answers is maximum possible. She is very busy now, so your task is to help her.

Input

First line contains length of both strings N ($1 \le N \le 2\,000\,000$) and an integer K — number of possible answers for each of the questions ($1 \le K \le 52$). Answers to the questions are denoted as Latin letters `abcde...xyzABCDE...XYZ` in the order. For example for $K = 6$, possible answers are `abcdef` and for $K = 30$ possible answers are `abcde...xyzABCD`.

Second line contains a ciphered message string consisting of Latin letters.

Third line contains a correct answers string consisting of Latin letters.

Output

In the first line output maximum possible number of correct Sasha's answers.

In the second line output cipher rule as the string of length K where for each letter from the students' cipher (starting from `'a'` as mentioned above) there is specified which answer does it correspond to.

If there are several ways to produce maximum answer, output any of them.

Examples

input
10 2 aaabbbaaab bbbbabbbbb
output
7 ba

input
10 2 aaaaaaabbb bbbbaaabbb
output
6 ab

input
9 4 dacbdacbd acbdacbda
output
9 cdba