Codeforces Round #243 (Div. 1)

A. Sereja and Swaps

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

As usual, Sereja has array a, its elements are integers: $a[1], a[2], ..., a[n]$. Let's introduce notation:

$$f(a, l, r) = \sum_{i=l}^{r} a[i]; \quad m(a) = \max_{1 \le l \le r \le n} f(a, l, r).$$

A swap operation is the following sequence of actions:

- choose two indexes i, j $(i \neq j)$;
- perform assignments $tmp = a[i], a[i] = a[j], a[j] = tmp$.

What maximum value of function $m(a)$ can Sereja get if he is allowed to perform at most k swap operations?

Input

The first line contains two integers n and k $(1 \le n \le 200; 1 \le k \le 10)$. The next line contains n integers $a[1], a[2], ..., a[n]$ $(-1000 \le a[i] \le 1000)$.

Output

In a single line print the maximum value of $m(a)$ that Sereja can get if he is allowed to perform at most k swap operations.

Examples

input
10 2 10 -1 2 2 2 2 2 2 -1 10
output
32

input
5 10 -1 -1 -1 -1 -1
output
-1

B. Sereja and Table

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

Sereja has an $n \times m$ rectangular table a, each cell of the table contains a zero or a number one. Sereja wants his table to meet the following requirement: each connected component of the same values forms a rectangle with sides parallel to the sides of the table. Rectangles should be filled with cells, that is, if a component form a rectangle of size $h \times w$, then the component must contain exactly hw cells.

A connected component of the same values is a set of cells of the table that meet the following conditions:

- every two cells of the set have the same value;
- the cells of the set form a connected region on the table (two cells are connected if they are adjacent in some row or some column of the table);
- it is impossible to add any cell to the set unless we violate the two previous conditions.

Can Sereja change the values of at most k cells of the table so that the table met the described requirement? What minimum number of table cells should he change in this case?

Input

The first line contains integers n, m and k ($1 \le n, m \le 100$; $1 \le k \le 10$). Next n lines describe the table a: the i-th of them contains m integers $a_{i1}, a_{i2}, \ldots, a_{im}$ ($0 \le a_{i,j} \le 1$) — the values in the cells of the i-th row.

Output

Print -1, if it is impossible to meet the requirement. Otherwise, print the minimum number of cells which should be changed.

Examples

input
5 5 2 1 1 1 1 1 1 1 1 1 1 1 1 0 1 1 1 1 1 1 1 1 1 1 1 1
output
1

input
3 4 1 1 0 0 0 0 1 1 1 1 1 1 0
output
-1

input
3 4 1 1 0 0 1 0 1 1 0 1 0 0 1
output
0

C. Sereja and Two Sequences

time limit per test: 4 seconds
memory limit per test: 512 megabytes
input: standard input
output: standard output

Sereja has two sequences $a_1, a_2, \ldots, a_n$ and $b_1, b_2, \ldots, b_m$, consisting of integers. One day Sereja got bored and he decided two play with them. The rules of the game was very simple. Sereja makes several moves, in one move he can perform one of the following actions:

1. Choose several (at least one) first elements of sequence a (non-empty prefix of a), choose several (at least one) first elements of sequence b (non-empty prefix of b); the element of sequence a with the maximum index among the chosen ones must be equal to the element of sequence b with the maximum index among the chosen ones; remove the chosen elements from the sequences.
2. Remove all elements of both sequences.

The first action is worth e energy units and adds one dollar to Sereja's electronic account. The second action is worth the number of energy units equal to the number of elements Sereja removed from the sequences before performing this action. After Sereja performed the second action, he gets all the money that he earned on his electronic account during the game.

Initially Sereja has s energy units and no money on his account. What maximum number of money can Sereja get? Note, the amount of Seraja's energy mustn't be negative at any time moment.

Input

The first line contains integers n, m, s, e ($1 \le n, m \le 10^5$; $1 \le s \le 3 \cdot 10^5$; $10^3 \le e \le 10^4$). The second line contains n integers a_1, a_2, ..., a_n ($1 \le a_i \le 10^5$). The third line contains m integers b_1, b_2, ..., b_m ($1 \le b_i \le 10^5$).

Output

Print a single integer — maximum number of money in dollars that Sereja can get.

Examples

input
5 5 100000 1000 1 2 3 4 5 3 2 4 5 1
output
3

input
3 4 3006 1000 1 2 3 1 2 4 3
output
2

D. Sereja and Squares

time limit per test: 2 seconds
memory limit per test: 512 megabytes
input: standard input
output: standard output

Sereja has painted n distinct points on the plane. The coordinates of each point are integers. Now he is wondering: how many squares are there with sides parallel to the coordinate axes and with points painted in all its four vertexes? Help him, calculate this number.

Input

The first line contains integer n ($1 \le n \le 10^5$). Each of the next n lines contains two integers x_i, y_i ($0 \le x_i, y_i \le 10^5$), the integers represent the coordinates of the i-th point. It is guaranteed that all the given points are distinct.

Output

In a single line print the required number of squares.

Examples

input
5 0 0 0 2 2 0 2 2 1 1
output
1

input
9 0 0 1 1 2 2 0 1 1 0 0 2 2 0 1 2 2 1
output
5

E. Sereja and Sets

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

Let's assume that set S consists of m distinct intervals $[l_1, r_1]$, $[l_2, r_2]$, ..., $[l_m, r_m]$ ($1 \le l_i \le r_i \le n$; l_i, r_i are integers).

Let's assume that $f(S)$ is the maximum number of intervals that you can choose from the set S, such that every two of them do not intersect. We assume that two intervals, $[l_1, r_1]$ and $[l_2, r_2]$, intersect if there is an integer x, which meets two inequalities: $l_1 \le x \le r_1$ and $l_2 \le x \le r_2$.

Sereja wonders, how many sets S are there, such that $f(S) = k$? Count this number modulo 1000000007 ($10^9 + 7$).

Input

The first line contains integers n, k ($1 \le n \le 500$; $0 \le k \le 500$).

Output

In a single line, print the answer to the problem modulo 1000000007 ($10^9 + 7$).

Examples

input
3 1
output
23

input
3 2
output
32

input
2 0
output
1

input
2 2
output
2