

# Beer Circuits

Input file:            **standard input**  
Output file:           **standard output**  
Time limit:            4 seconds  
Memory limit:         256 megabytes

There are  $n$  pubs in the beautiful city of Delft, marked on a two-dimensional map as points (the pubs are far enough apart that this simplification makes sense). A common thing for college freshmen is to do a Beer Circuit, where they plan out a route to go to some pubs and drink a beer in each one.

They decide on some order of their selected pubs, visit the pubs one after another, drink a beer in each one, and after visiting all pubs in their circuit return back to the starting pub. It is boring to only visit 2 pubs, so it is customary to visit at least 3 pubs, but not more than  $k$  different pubs can be in a route.

After having multiple beers, walking for a long time is tiring. So the Beer Circuit organizers want to make a circuit, such that the longest distance (euclidean distance) between two adjacent pubs in the circuit, is as small as possible. Note that after having a beer in the next pub, the students feel refreshed, so the total walking distance is not super important.

After minimizing this maximum distance between two adjacent pubs in the Beer Circuit, over all Beer Circuits that are left, the organizers decide to only pick Beer Circuits with the least amount of pubs in them (of course this amount is not smaller than 3).

How many options do the organizers have for choosing their desired Beer Circuit? Two Beer Circuits are different if they visit a different set of pubs or the order of visiting the pubs is different. Note that if two Beer Circuits starts at a different starting pub but are otherwise the same, they are also considered different.

## Input

The first line of input contains two integers,  $n$  and  $k$  ( $3 \leq n \leq 200\,000$ ,  $3 \leq k \leq 30$ ) — the number of points in the input and the maximum size of a Beer Circuit.

Each of the next  $n$  lines contains the coordinates of a pub. Each line contains two integers  $x$  and  $y$  ( $0 \leq x, y \leq 10^9$ ) — the coordinates of the pub, as marked on the map.

It is guaranteed that no two pubs are in the exact same location.

## Output

On the first line, print a single integer, the minimum possible euclidean distance squared of the longest adjacent distance in a Beer Circuit. The squared euclidean distance can be calculated using the formula  $(\Delta x)^2 + (\Delta y)^2$

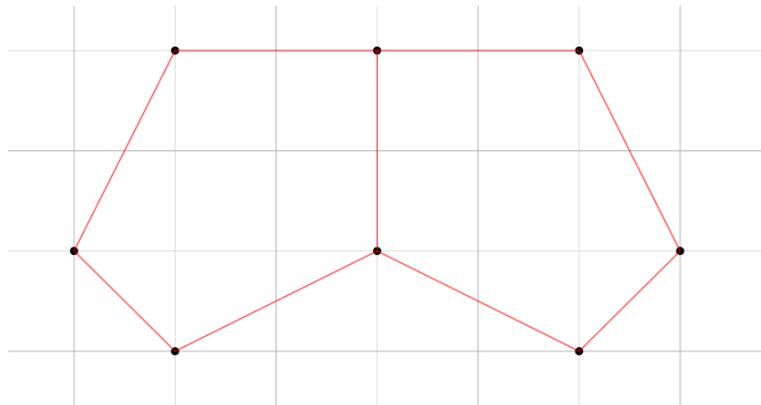
On the second line, print another integer, after minimizing the maximum adjacent euclidean distance of a Beer Circuit, what is the minimum number of pubs in such a Beer Circuit.

On the third line, print the number of Beer Circuits, that fulfill all the criteria of the organizers.

## Examples

standard input	standard output
3 3 0 0 2 2 1000000000 1000000000	20000000000000000000 3 6
8 5 5 5 5 7 7 7 3 7 2 5 8 5 3 4 7 4	5 5 20

## Note



Visualization of example 2. The red edges show the two Beer Circuits which the organizers want. The circuits both use the middle 2 pubs, but one traverses the left half of the pubs, and the other circuit uses the right half. They are of length 5. Each one can be traversed in 10 different orders, so in total this gives 20 different possibilities.

Note that in example 2, there is also a Beer Circuit which uses all 8 vertices, and has the same maximum euclidean distance, but the number of pubs in it is not the minimum possible.