The way home

|  |  |
| --- | --- |
| Time limit | 2 seconds |
| Memory limit | 256Mb |
| Input | majorhouse.in |
| Output | majorhouse.out |

When planning the new district of M, it was decided that the roads in the new district would form a rectangular grid: all streets would be of one of two types – directed from South to North or directed from East to West. In this case, parallel streets will run through each kilometer, and each quarter will have a size of exactly one kilometer by one kilometer, forming a grid of squares. Each road is allowed to travel in any of two directions. After some time after the construction of roads, it turned out that this layout is not always convenient, because for the construction of large factories or other structures and the organization of parks is not enough one quarter. City hall M decided to give each large project a rectangular block of several neighboring blocks. Unfortunately, after the implementation of the project, all roads within such a block will be closed for travel, but travel along the border of the blocks will still be possible. Touching two blocks does not close the passage between them.

When the Mayor of the city of M brought to the approval of the plan of distribution of territories for large projects, he wondered how diﬃcult the route from the city hall to his future home would be. The city hall is located in the center of the new district, at the intersection of zero street, directed from South to North, and zero street, directed from East to West. With the ﬁnal location of the house, the Mayor has not yet decided and he has k options to choose from.

Each of the options is at the intersection of xi-th street, directed from South to North (positive x means that the street is East of the city hall, negative-West) and yi-th street, directed from East to West (positive y means that the street is North of the city hall, negative value-South).

The mayor considers that the route to the house is diﬃcult if it on this route should make more than two turns to the right or to the left. The Mayor’s car cannot make more than one turn at an intersection, for example, to turn around. The length of the route does not matter, and the house can be approached from either side. The Mayor’s car always stands at the city hall in the North direction, can turn right or left at once, but can’t turn around.

You want to write a program that, based on the information about blocks of blocks closed for travel and possible locations of the Mayor’s house, for each possible location of the Mayor’s house, will ﬁnd a simple route from the city hall to the house, determine the shortest of them, or report that such a route does not exist. The number of turns is not required to minimize.

Input format

The ﬁrst line of the input ﬁle contains two integers n and k (0≤n≤100000, 1≤k≤10) – the number of blocks of blocks, which according to the plan will be given to large projects and the number of options for the location of the Mayor’s house, respectively.

The next n lines contain four integers according to the description of blocks quarters u1, v1, u2, v2 (−109≤u1<u2≤109, −109≤v1<v2≤109) - numbers of streets at the intersection of which are opposite corners of the block of blocks, given for construction and closed for travel.

The next last k lines contain two integers xi and yi (∣∣xi∣∣≤109, ∣∣yi∣∣≤109, xi≠0 or yi≠0) - possible locations of the Mayor’s house.

The mayor’s oﬃce and none of the possible locations of the Mayor’s house are inside blocks of blocks given for development, on blocks of blocks given for development can intersect.

Output format

In the output ﬁle for each of the possible locations of the Mayor’s house in the order of appearance in the input ﬁle, you need to display a message whether there is a simple route from the city hall to the Mayor’s house and, if there is, where you need to make turns.

If there is no simple route, then the message must contain the word NO on one line. Otherwise, the ﬁrst line must contain the word YES, in the second line - one number t (0≤t≤2) number of turns, and in the following t lines - descriptions of turns in the order of their Commission: in each line three numbers x, y and d numbers of streets on which the intersection where it is necessary to turn is located, and the direction of turn, thus d = -1 means turn to the left and d = 1 means turn to the right.

Coordinates of intersections where it is necessary to make turns, should not exceed 109. If there are several shortest simple paths, it is necessary to deduce any of them.

Sample 1

| **Input** | **Output** |
| --- | --- |
| 1 2  -2 1 9 2  2 0  3 3 | YES  1  0 0 1  NO |

Sample 2

| **Input** | **Output** |
| --- | --- |
| 2 1  0 2 2 4  1 0 4 2  3 3 | YES  2  0 2 1  3 2 -1 |

Sample 3

| **Input** | **Output** |
| --- | --- |
| 0 2  0 -1  0 1 | NO  YES  0 |

Notes

Figure for the second example.

