Wonderland

СЕЗОН 10 – ПЪРВИ РУНД

In the Land of wonders there exist lovely places, which every person is longing to visit. That is why, tourists are constantly coming to this country in order to walk around it. Since the distances in the country are enormous, the tourists have to use buses for their trips.

In the Land of wonders there are ***N*** bus stops, which are represented by points in the plane with integer coordinates. The distance between two points ***P*** and ***Q*** is calculated with the following formula: ***dist(P, Q)*** = $abs(P_x - Q_x) + abs(P_y - Q_y)$.

The public transportation system has ***M*** buses and each of them is capable of servicing a particular route. The length of a route is determined as the sum of the distances between every two consecutive stops, until the final stop. The routes can be two types:

- linear route – begins at stop S_1, passes through stops $S_2, S_3, \ldots, S_{K-1}$ and reaches S_K ($S_1 \neq S_K$), which is its final stop and stays there some time. Every even course through the route is reversed, that is, during the second, fourth and so on course the bus starts from stop S_K and travels to stop S_1.
- cyclic route – begins at stop S_1, passes through stops $S_2, S_3, \ldots, S_{K-1}$ and reaches S_K ($S_1 = S_K$), which is its final stop and stays there some time. The routes cannot include one stop more than once (except for the first and the last stops of a cyclic route which coincide).

For every bus are known the longest length of a route L_i, which it can service effectively, and the minimal necessary time R_i the bus has to stay between the end and the beginning of two consecutive courses. All buses travel one unit of distance every minute and we assume that the buses can carry an infinite number of passengers.

It is known that in the Land of wonders every day continues exactly ***T*** minutes. Furthermore, the tourists are predictable creatures and there are ***F*** facts about their behavior. Every fact says that in minute A_i from the beginning of the day on stop B_i will arrive C_i tourists. It is important for them only to catch a bus as quickly as possible, without any meaning of the bus direction. Note that the tourists can get on a bus only if its arrival time on the bus stop is no sooner than the time of their own arrival. Similarly, the tourists cannot board a bus when it is on its final stop or during stay and have to wait until the moment when it begins the next course (if such exists).

Your task is to organize the transportation system in the Land of wonders so that the total time spent by the tourist waiting for a bus to arrive is as lower as possible. The president of the country, however, is highly concerned about ecology, and asks you to accomplish that with total distance travelled by all buses less than or equal to ***D*** units. It is guaranteed that this is always possible. Note that all buses must complete their last courses before the end of the day.

Input (wonderland.in)

The first line of the input contains the number ***N***. The following *N* lines contain two numbers X_i и Y_i, describing the coordinates of *i*-th stop. The following line contains the number ***M***. The following *M* lines contain two integers L_i и R_i, describing the parameters of the *i*-th bus. The following line contains the numbers ***T*** and ***F***. The following *F* lines contain three integers A_i, B_i и C_i. The last line contains the number ***D*** (which has a value of -1, if there is no restriction about the total mileage of the buses).

Output (wonderland.out)

For each bus output two lines. The first of them should contain one non-negative integer ***K*** – the number of the stops, included in the bus route, followed by their numbers $S_1, S_2, \ldots, S_K$. The second line should contain one non-negative integer ***Z*** – the number of the courses, which the bus does, and the minutes, in which the bus departs from the first stop in increasing order – $O_1, O_2, \ldots, O_Z$.

Example

Input	Output
6 1 1 6 2 4 4 6 5 5 6 2 3 3 20 10 7 1 2 2 240 7 1 1 5 2 2 10 3 5 20 100 4 1 120 6 2 125 3 3 128 4 4 42	4 5 2 1 5 1 3 3 4 3 6 3 100 122 129 0 0

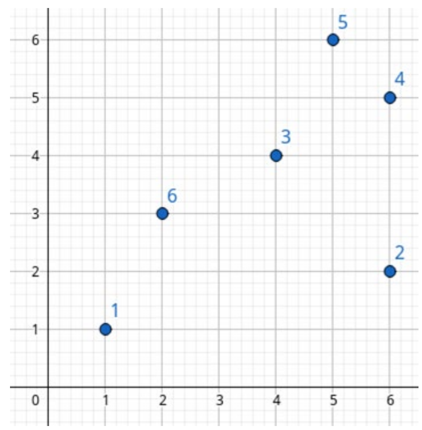
Explanation

The route of the first bus will be cyclic: (5, 6) → (6, 2) → (1, 1) → (5, 6) with a length of 20 units. The route of the second bus will be linear: (6, 5) ⇄ (4, 4) ⇄ (2, 3) with a length of 6 units. The third bus will not be servicing any route.

The first bus will make only one course over its route, beginning at 3rd minute from stop 5, passing through stop 2 and stop 1 respectively at 8th and 14th minute and reaching stop 3 at 23rd minute.

The second bus will make three courses and the second will be in reverse direction. The bus departs from stop 4 at 100th minute and one tourist gets on. The bus arrives on stop 6 at 106th minute and stays there for 16 minutes, after which sets off in reverse direction at 122nd minute when the two tourists, who arrived in 120th minute, get on. It passes through stop 3 at 125th minute where it collects 3 more tourists. It arrives on stop 4 at 128th minute, stays there for a minute and at 129th minute sets off again, collecting the four tourists, who have been waiting for 1 minute. Arrives on stop 6 at 135th minute.

Thus, the total time is 133 and the total bus mileage – 38. On the right is displayed a map of the stops in the country.



Constraints

$1 \le N, M, F \le 1\ 000$
$0 \le \sum(C_i), X, Y, \le 1\ 000\ 000$
$1 \le |D|, T, L_i, R_i \le 1\ 000\ 000\ 000$
$1 \le A_i \le T$
$1 \le B_i \le N$

Subtasks

Percentage of testcases	**Additional constraints**
10%	M = 1 (there is only one bus)
20%	$Y_i = 0$ (the points lie on X-axis)
30%	D = -1 (the bus mileage is not restricted)
40%	No additional constraints

Scoring

You will be awarded $100 * \frac{(minScore+1)}{(yourScore+1)}\%$ of the points for the corresponding test, where yourScore is the total waiting time when your model for transportation scheme is applied and minScore is the minimal such time among all submissions of the participants.