Problem J
Crane Delivery

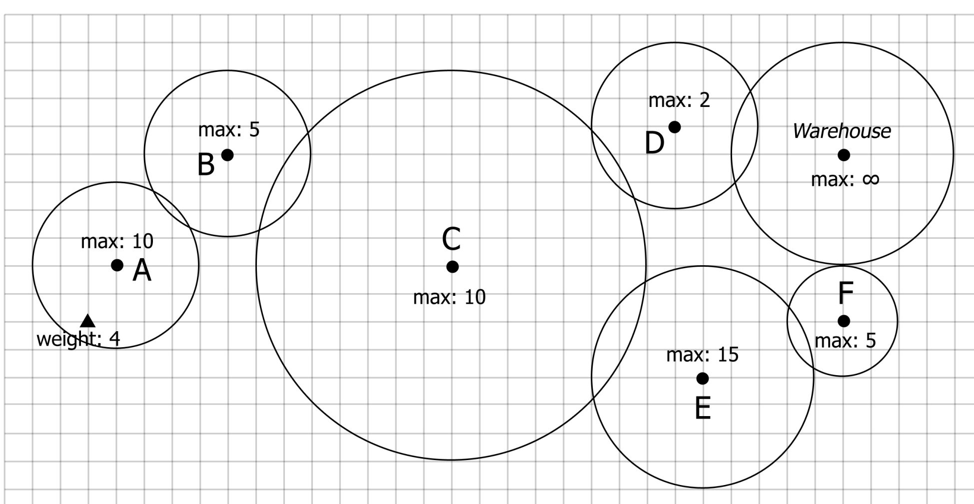
You are about to deliver Q goods to a warehouse that is located at (X, Y). Each good is located at (x_q, y_q) and has a weight of w_q. There are $N + 1$ cranes. N of those cranes, each located at (x_i, y_i), has an operating radius of r_i, and has a maximum weight limit of m_i. These N cranes are mass-produced by the International Crane Producer Company (ICPC), thus, there are only at most 5 different maximum weight limits. The remaining 1 crane is located exactly at the warehouse, has an operating radius of R, and has no maximum weight limit (or a maximum weight limit of ∞).

You can move a good of weight w from (x_1, y_1) to (x_2, y_2) with a crane at location (x_c, y_c) if and only if:

- The good's weight does not exceed the crane's weight limit, and
- Both (x_1, y_1) and (x_2, y_2) are no further than r_c from the crane, i.e. the distance from (x_1, y_1) to (x_c, y_c) is no larger than r_c and the distance from (x_2, y_2) to (x_c, y_c) is also no larger than r_c.

Your task is to determine the minimum number of crane that needs to be used to move each good from its location to the warehouse.

Consider the following example.



In this example, to move the good (of weight 4), we need to use 6 cranes: A, B, C, E, F, and the crane at the warehouse. Note that using D will reduce the number of used cranes, however, crane D has a maximum weight limit of 2 which cannot be used to carry the good.

Input

Input begins with three integers X Y R ($-10^6 \leq X, Y \leq 10^6$; $1 \leq R \leq 10^6$) representing the (x, y) location of the warehouse and the operating radius of the crane at the warehouse, respectively.

The next line contains an integer N ($0 \leq N \leq 2000$) representing the number of cranes excluding the one at the warehouse. The next N lines, each contain four integers x_i y_i r_i m_i ($-10^6 \leq x_i, y_i \leq 10^6$; $1 \leq r_i \leq 10^6$; $m_i \in M$; $1 \leq m_i \leq 1000$; $|M| \leq 5$) representing the (x, y) location of a crane, its operating radius, and its maximum weight limit, respectively. There might be several cranes at the same location.

The next line contains an integer Q ($1 \leq Q \leq 100\,000$) representing the number of goods to be delivered to the warehouse. The next Q lines, each contain three integers x_q y_q w_q ($-10^6 \leq x_q, y_q \leq 10^6$; $1 \leq w_q \leq 1000$) representing the (x, y) location of the good and its weight, respectively. You are guaranteed that the goods are not located at any crane or warehouse location.

Output

For each good, output in a line an integer representing the minimum number of cranes to be used, or −1 if the good cannot be delivered to the warehouse.

Sample Input #1

```
30 13 4
6
4 9 3 10
8 13 3 5
16 9 7 10
24 14 3 2
25 5 4 15
30 7 2 5
4
3 7 4
3 7 16
32 13 100
14 7 1
```

Sample Output #1

```
6
-1
1
3
```

Explanation for the sample input/output #1

The warehouse and cranes in this case correspond to the figure in the problem statement.

The 2^{nd} good cannot be delivered to the warehouse as the only crane that can reach it cannot move the good due to its maximum weight limit.

Cranes to be used to deliver the 3^{rd} good: crane at the warehouse.

Cranes to be used to deliver the 4^{th} good: C, D, crane at the warehouse.