Radiation

Nuclear power plants (NPP) are a blessing and curse of modern civilization. NPPs have some risks but still it is one of the cheapest ways to produce electricity in the developed world. In this problem we will discuss a situation related to two nuclear plants, which are not far away from each other.
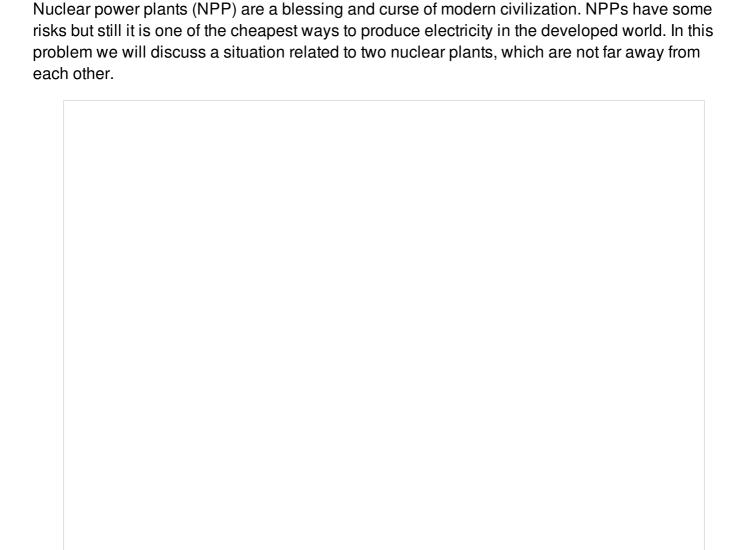

We will describe the entire scenario in a at land, so two-dimensional Cartesian coordinate system is used to denote each location. Lets assume that the coordinate of the two nuclear power plants are $(ax; ay)$ and $(bx; by)$. Houses that are located within distance R1 (inclusive) of the power plant at $(ax; ay)$ are under high risk of radiation. Similarly, houses that are located within distance R2 (inclusive) of the power plant at $(bx; by)$ are under high risk of radiation. So the authorities of power plant 1 and power plant 2 distribute special protective equipment to the houses that are within radius (inclusive) R1 and R2 of the respective power plants. As a result each of the houses that are endangered by both the plants actually receive two sets of equipment to protect their house.

Given the location of the houses and the values of ax; ay; bx; by and possible values of R1 and R2 your job is to find out the number of houses that are endangered by both the plants

Input

The input file contains at most 3 test cases. The description of each test case is given below:

A test case starts with a line containing a positive integer N (0 < N <= 200000) that denotes the number of houses that are under either low risk or high risk of radiation. Each of the next N lines

contains two integers xi, yi (0 <= xi, yi <= 20000) that denotes the coordinate of the i-th house.

No two houses are at the same location. The next line contains five integers ax, ay, bx, by and q (0 <= ax, ay, bx, by <= 20000, 0 < q <= 20000). The meaning of ax, ay, bx and by are given in the problem statement. Here q denotes the total number of query. Each of the next q lines contains two integers, which denote the values of R1 and R2 (0 < R1, R2 <= 13000) respectively.

A line containing a single zero terminates input. This line should not be processed.

Output

For each test case produce q+ 1 lines of output. The first line is the serial of output. For each query (given value of R1 and R2) determine the number of houses that are endangered by both the plants. You may consider using faster IO as judge input file is large.

Note: First query in the sample input corresponds to Figure 1.

Example

Input:
11
95 75
27 6
93 5
124 13
34 49
65 61
81 49
77 33
110 50
91 22
110 25
57 42 97 36 1
31 25
0

Output:
Case 1:
2