

Problem J. Nested Triangles

Time limit: 10 seconds

Jamilah is obsessed with nested triangles which share a common edge. Now she selects two points P and Q in the plane and calls them pivots. She also provides several other points A_1, A_2, \dots, A_{n-1} and A_n , none of which is lying on the line passing through the points P and Q .

As the one with the same interest, you are asked to find the largest size of a group of nested triangles, and a feasible solution of the largest group with the smallest lexicographical order.

A group of nested triangles, with pivots P and Q , is a list of selected points provided by Jamilah, denoted by $A_{v_1}, A_{v_2}, \dots, A_{v_k}$, such that for any $i \geq 2$ the point A_{v_i} is located inside the triangle $PQA_{v_{i-1}}$, excluding the border.

The solution v_1, v_2, \dots, v_k is the one with the smallest lexicographical order if, for any other feasible solution u_1, u_2, \dots, u_k , $v_1 < u_1$ or there exists an integer i ($1 \leq i < k$) such that $v_1 = u_1, v_2 = u_2, \dots, v_i = u_i$ but $v_{i+1} < u_{i+1}$.

Input

The input contains several test cases, and the first line is a positive integer T indicating the number of test cases which is up to 1000.

For each test case, the first line contains four integers x_P, y_P, x_Q, y_Q , which are the coordinates of points P and Q respectively. The second line contains an integer n ($1 \leq n \leq 10^5$), which is the number of other points provided by Jamilah. Each of the following n lines contains two integers, which in the i -th line are the coordinates of point A_i .

We guarantee that all points in a test case are distinct, all coordinates lie in the range of -10^9 to 10^9 , and the sum of n in all test cases is up to 10^6 .

Output

For each test case, output a line containing **Case #x:** y at first, where x is the test case number starting from 1, and y is the size of the largest group of nested triangles. Each of the following y lines contains an integer, which in the i -th line is the integer v_i .

Sample

standard input	standard output
3	Case #1: 6
0 0 10 0	6
6	5
5 1	4
5 2	3
5 3	2
6 4	1
6 5	Case #2: 3
6 6	1
0 0 10 10	3
9	2
1 6	Case #3: 1
2 3	1
4 7	
6 8	
8 2	
9 3	
7 6	
2 4	
2 7	
0 10 10 0	
9	
0 0	
0 2	
2 0	
0 4	
4 0	
0 6	
6 0	
0 8	
8 0	