

E. Erik's Amazing Hull

Erik is a great programmer who has been entering in many programming contests over the course of his life. However, ironically, he now has to help some other guys complete their Team Contest Reference (a 25 page cheat sheet, although actually 24 if you don't count the title page). He does not think this is a problem, for he actually likes to help out. What a nice guy.

His friends recently requested for him to write an algorithm that computes the convex hull of a set of points. As they all know perfectly well how this can be done, it seems like a silly request, yet Erik's amazing programming skills make for much more reliable code than any other programmer can provide. Hence (as you are Erik) you are asked to come up with an algorithm that does so in a maximum of $\mathcal{O}(n \log(n))$ time. Moreover, the code should be readable and – preferably – short. Good luck!

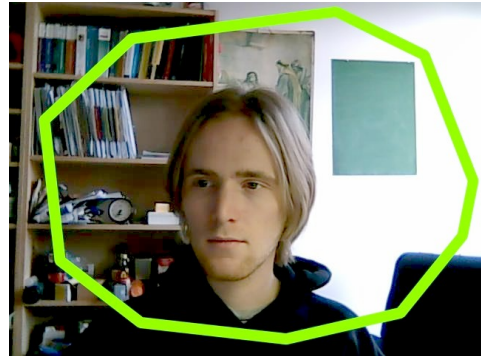


Figure 1: Erik and a convex hull

Input

The input consists of one line containing an integer T with $1 \leq T \leq 100$: the number of test cases. Then, for each test case:

- One line containing an integer N ($1 \leq N \leq 10000$): the number of points in the plane.
- For each point one line with two space-separated integers x_i and y_i ($-1\,000\,000 \leq x_i, y_i \leq 1\,000\,000$): the x and y -coordinates of the i -th point, respectively.

Output

The output should begin with one line containing the number of test cases. Then, for each test case:

- One line containing an integer H ($0 \leq H \leq N$): the number of points on the convex hull.
- For each point on the convex hull an integer i ($0 \leq i < N$), describing the index of that particular point.

The points need to be ordered in counter-clockwise direction (but it doesn't matter where you begin), and only vertices (i.e. corners) of the hull should be output. Different test cases need to be separated by an empty line.

Sample input and output

Input	Output
3	3
4	4
-778279 -534462	1
-701222 558237	0
295836 113749	3
-226023 -762571	2
4	
-720145 528228	4
-64889 -588583	3
-309125 542585	1
-778613 -155454	2
4	0
-777199 -382247	
-427688 -148044	3
-182285 330116	3
266134 920760	0
	1