TASK	ARHITEKT	DORUČAK
input	standard input	
output	standard output	
time limit (per test case)	1 second	3 seconds
memory limit (heap+stack)	64 MB	
points	**100**	**100**
	200	

The architect Mirko has given his three-year old son, Mirko, Jr., the task of creating the floor plan for the building he is currently working on.

The surface he will be working on is a huge piece of paper modeled by a coordinate plane, on which all points with integer coordinates are marked. Mirko, Jr. draws the floor plan by putting his pencil in the origin and making N fast and clumsy strokes. In each stroke, he moves the pencil (without lifting it off the surface) **straight** to one of the **8 neighbouring points** (horizontally, vertically or diagonally). The possible strokes are numbered 0 to 7 as shown in the image below.
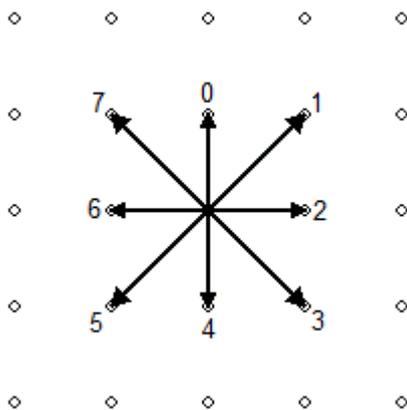
The 8 possible moves.   The third example. Three rooms can be identified.
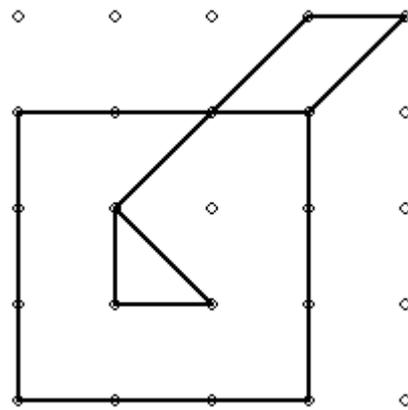
After several thousand strokes, Mirko, Jr. finally gets tired after which his father attempts to count the number of **rooms** in the floor plan. A room is an **empty space** in the floor plan, surrounded by pencil strokes on all sides. Note that it is possible for rooms to have "holes" i.e. to completely surround other rooms. Also, it is possible for that Mirko, Jr. draws the same wall segment more than once.

Write a program that, given the exact pencil strokes, calculates the number of rooms in the floor plan.

Input

The first line contains an integer N (1 ≤ N ≤ 100 000), the number of pencil strokes.

The second line contains a string of N digits between 0 and 7, the pencil strokes in order in which Mirko, Jr. makes them.

Output

Output the number of rooms in the floor plan.

Scoring

In a set of test cases, worth 60% of the points, Mirko, Jr. will not scribble outside the rectangle $(-100, -100) - (100, 100)$.

Example test data

input	input	input
5 27250	9 114466173	19 6664442220001655360
output	**output**	**output**
3	1	3

Mirko and Slavko like to eat [burek](#) for breakfast. This one time they bought one with cheese and another with meat. Watching the hot bureks on the table, teasing their nostrils with enticing aromas, they could not decide on who would get which burek so they decided to split both of them in halves.

Mirko boasted that he could **cut both bureks** in **two halves of equal areas** with just **one swift stroke** of his knife. Help Mirko accomplish this before the bureks get cold.
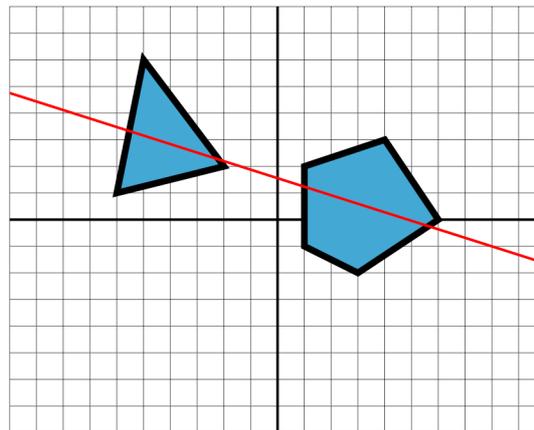

Image corresponds to first example.

Each of the bureks is a **convex polygon**. The bureks are positioned so that one of them is completely left of the y-axis, and the other completely right of it.

Write a program that, given the coordinated of the polygons, calculates the **equation of the line** that splits both bureks into two halves of equal areas.

Input

The first line contains an integer N ($3 \leq N \leq 5000$), the number of vertices in the first burek.

Each of the following N lines contains two real numbers X and Y in decimal format ($-1000 < X < 0$, $-1000 < Y < 1000$), the coordinates of one vertex in the burek.

The remainder of the input describes the second burek in the same format.

In both bureks, the vertices will be given in counter-clockwise order. The coordinates of the vertices will be given with exactly three digits after the decimal point. No three points in a polygon will be collinear.

Output

Output two numbers A and B so that $y = A \cdot x + B$ describes a line for Mirko to use to cut the bureks. Your output must be accurate to ± 0.001.

Note: the solution always exists and is unique.

Example test data

input	input
3	4
-6.000 1.000	-5.000 -1.000
-2.000 2.000	-3.000 -1.000
-5.000 6.000	-3.000 6.000
5	-5.000 6.000
1.000 -1.000	4
3.000 -2.000	3.222 2.000
6.000 0.000	5.000 1.000
4.000 3.000	5.000 4.000
1.000 2.000	3.222 3.000

output	output
-0.319961 1.556489	0.000000 2.500000