

#### 4. Seven Lambs (1ambad)

1 sec / 3 sec

60 points

Juku has seven lambs grazing on a pasture. The lambs do not get along, because all of them are greedy and try to eat all the grass. Thus, Juku needs to build fences to separate the lambs so that no two of them could meet. Juku can only build three straight fences, but all of them are infinitely long. Help Juku decide if it is possible to separate the lambs with these fences, and if it is possible, find a way to do this.

**Input.** The locations of the lambs at the time of building of the fences are known. The input consists of exactly 7 lines. The  $i$ -th line contains two space-separated integers  $X_i$  and  $Y_i$  ( $-10^4 \leq X_i, Y_i \leq 10^4$ ), the  $x$ - and  $y$ -coordinate of the  $i$ -th lamb. It is known that the locations of the lambs are distinct (that is, there is no pair  $i \neq j$  such that  $X_i = X_j$  and  $Y_i = Y_j$ ).

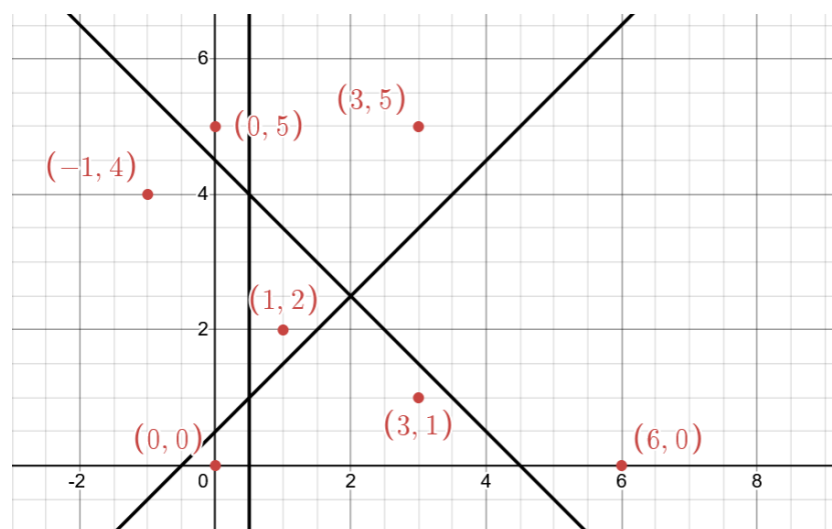
**Output.** The first line should contain the word ‘JAH’ if it is possible for Juku to separate the lambs with three straight fences, or the word ‘EI’ if this is not possible. If the answer is ‘EI’, there should be no more output lines.

If it is possible to separate the lambs, the output should contain 3 more lines. The  $i$ -th line should contain three space-separated integers  $A_i$ ,  $B_i$  and  $C_i$  ( $-10^{14} \leq A_i, B_i, C_i \leq 10^{14}$ ): the coefficients of the equation  $A_i \cdot x + B_i \cdot y + C_i = 0$  defining the  $i$ -th fence (this representation of a line is sometimes called the *general form*).

Note that a horizontal line can be defined with  $A_i = 0$  and a vertical line with  $B_i = 0$ . Equations with both  $A_i = 0$  and  $B_i = 0$  are not allowed, because these do not define lines. Also, no line may pass through a lamb’s location.

Example.	Input	Output
	0 0	JAH
	1 2	2 0 -1
	0 5	2 2 -9
	3 1	2 -2 1
	6 0	
	3 5	
	-1 4	

The following figure illustrates the example. Note that the solution contains a vertical line.



Example.	Input	Output
	0 0	EI
	0 1	
	0 5	
	3 0	
	8 0	
	5 8	
	6 6	

No solution exists in this example.

**Grading.** In this task, tests are divided into groups. Only the solutions that solve **all** the tests in a group correctly will get points for that group. In the test groups, the following additional conditions hold:

0. (0 points) The examples from the task statement.
1. (20 points) In test cases of this group, it is known that  $Y_i \geq 0$  for all lambs and  $Y_i = 0$  for at least 4 of the lambs.
2. (40 points) No additional constraints.