Gang War (100 Marks)

After the murder of the famous Singer X in broad daylight, the state has gone into a situation of gang war between the two gangs - Moose and Lawren. Everyday, there is news of one gang killing the member of the other gang. Both the gangs have decided to go all out this time and are not thinking about making peace. Since the civilians were also at risk because of the gang war, an old person who is respected by both the gangs has requested that they fight it out on the red soil.

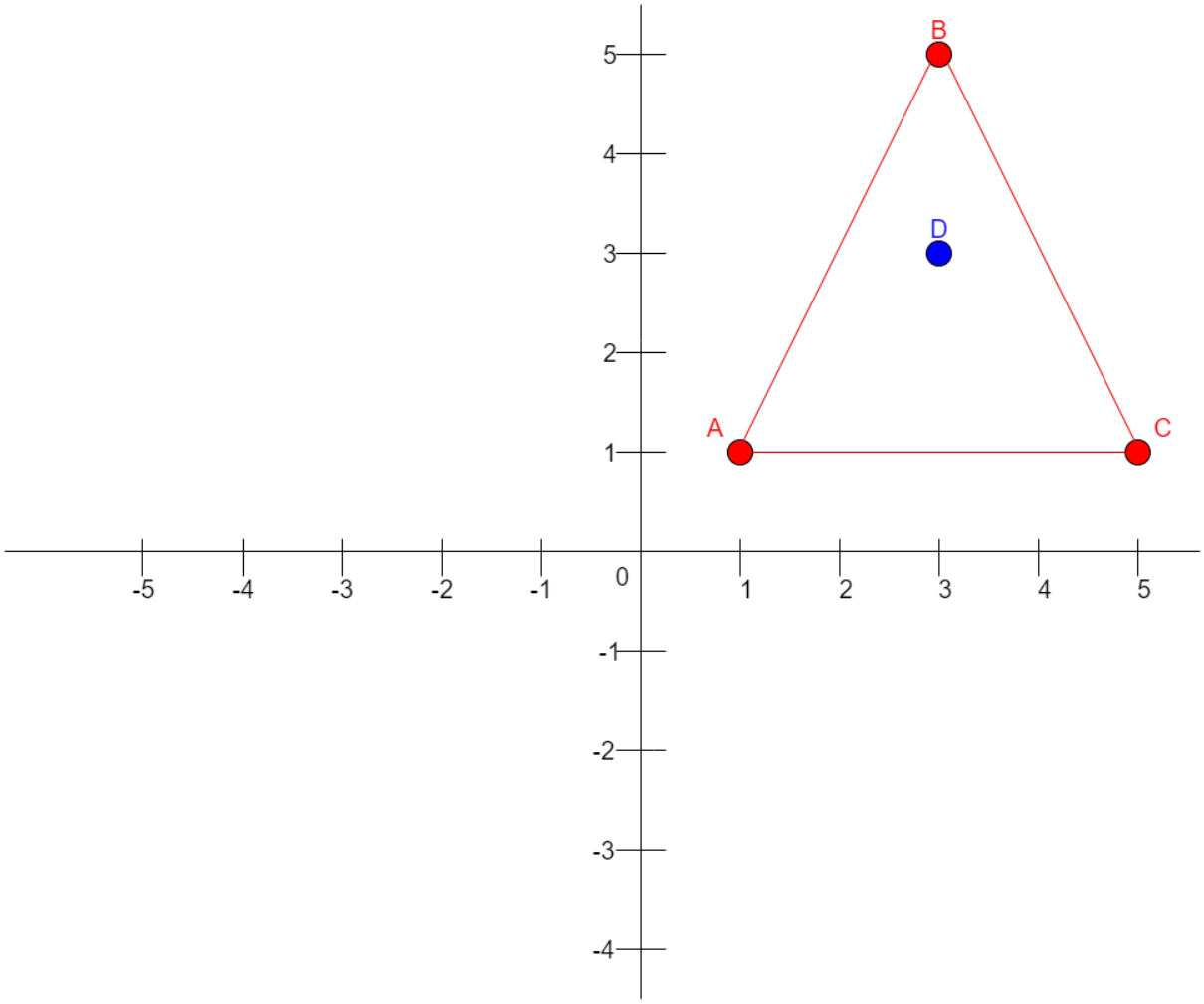
The red soil as the name goes is an area which has the soil of red color because of the blood of the millions of people who have fallen in the wars here. It is said to be the place where the wars have been fought from the old times. Consider it to be a 2D plane.

The gangs have agreed to this request and are bringing the deadliest of guns to eliminate the members of other gangs. There are **N** members in each gang and each gang has planned out the formations they would move in to eliminate the other members.

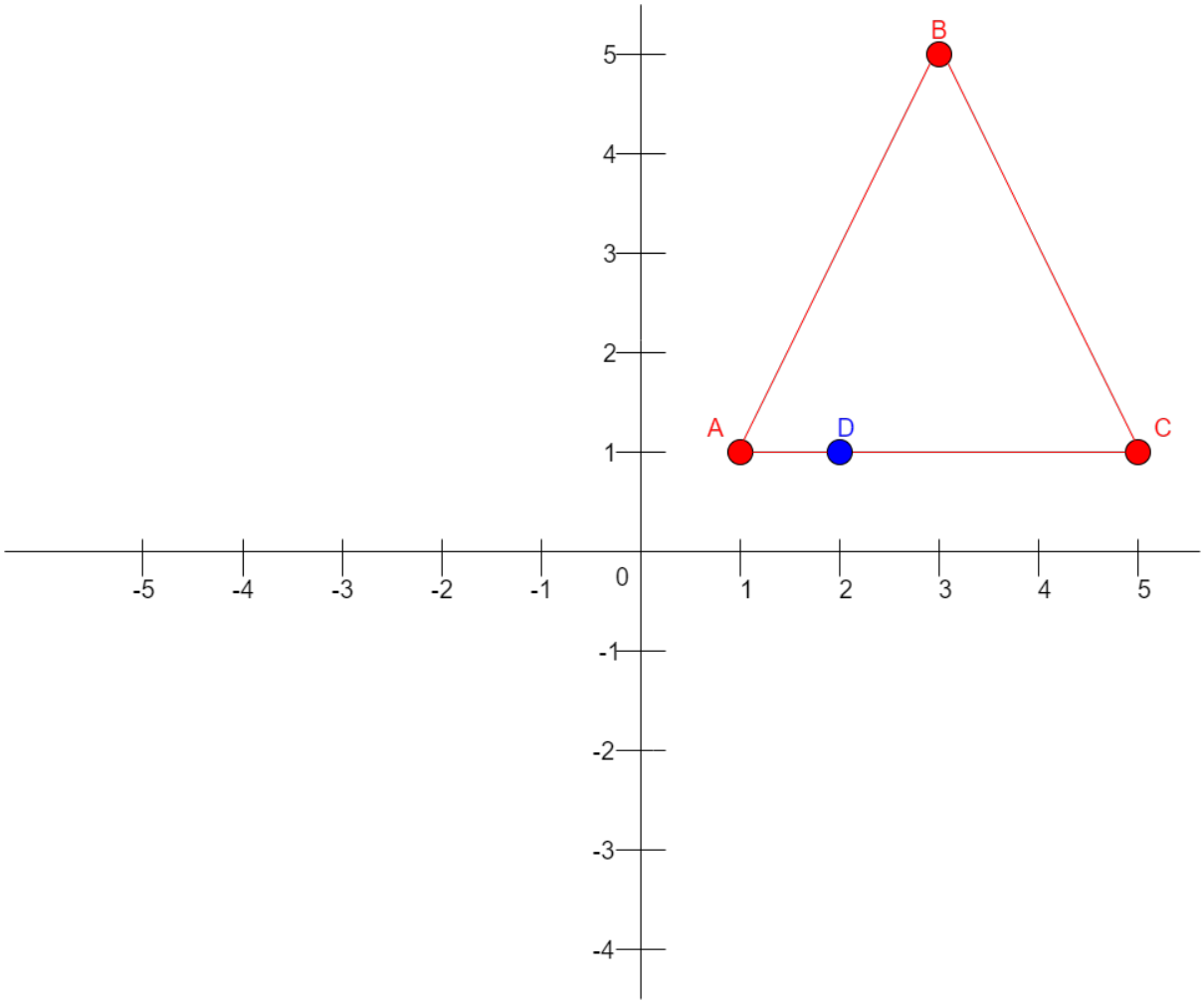
How can a person be killed?
Consider three members A, B, C from Moose Gang and one member D from Lawren gang.

Gang	Member Name	Position in 2D Plane (x, y)
Moose	A	(1,1)
Moose	B	(3,5)
Moose	C	(5, 1)
Lawren	D	(3, 3)

Case 1: A person will be killed if he/she is surrounded from the three sides by the opposite gang members.



Case 2: A person will be killed if he/she is in a direct line between the two members of another gang who are in a formation of three which means he is still surrounded from the three sides.
Assume the position of D to be (2, 1) for this case.



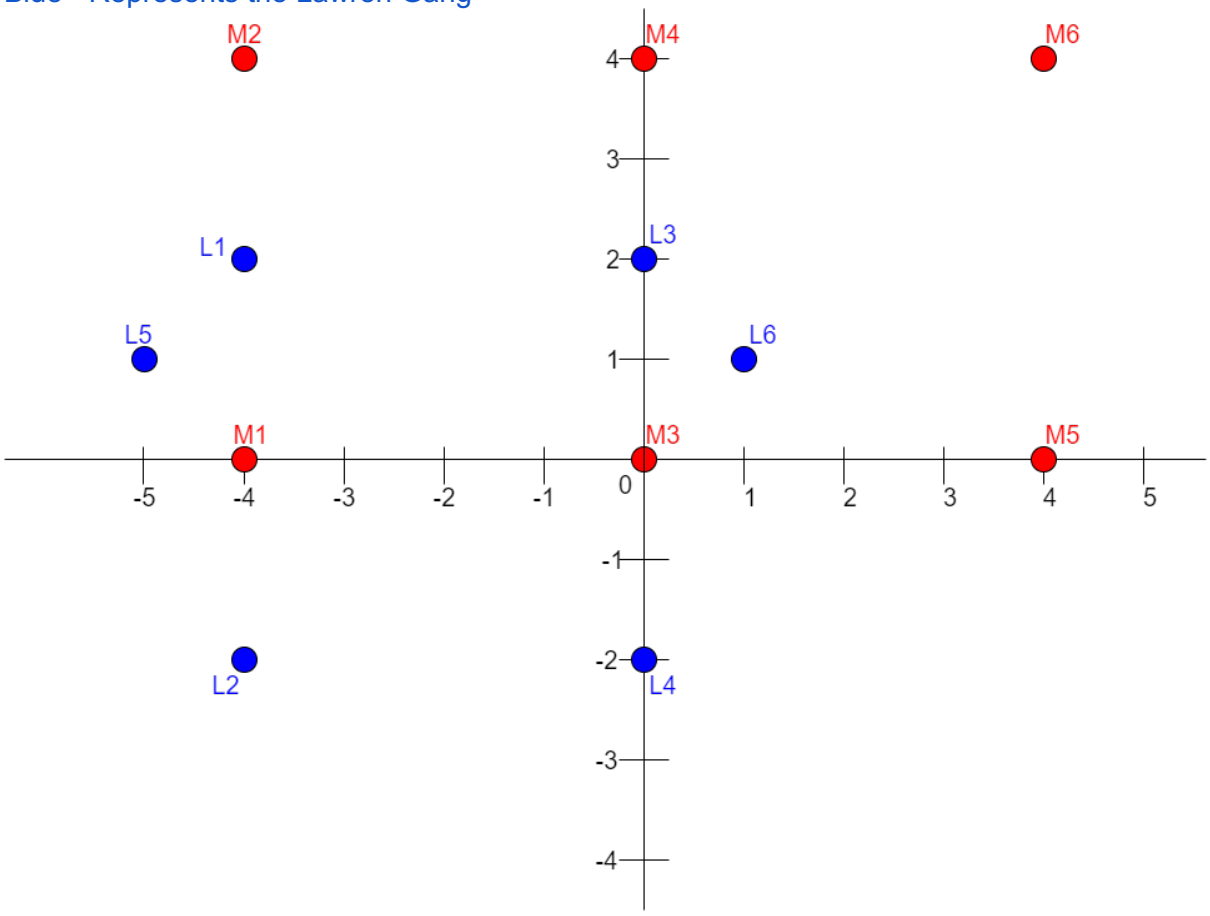
Example:
There are 6 members in each gang, N = 6

The table below shows the positions of the members of each gang in a 2D plane.

Gang	Member Name	Position in 2D Plane (x, y)
Moose	M1	(-4 ,0)
Moose	M2	(-4, 4)
Moose	M3	(0, 0)
Moose	M4	(0, 4)
Moose	M5	(4, 0)
Moose	M6	(4, 4)
Lawren	L1	(-4, 2)
Lawren	L2	(-4, 2)
Lawren	L3	(0, 2)

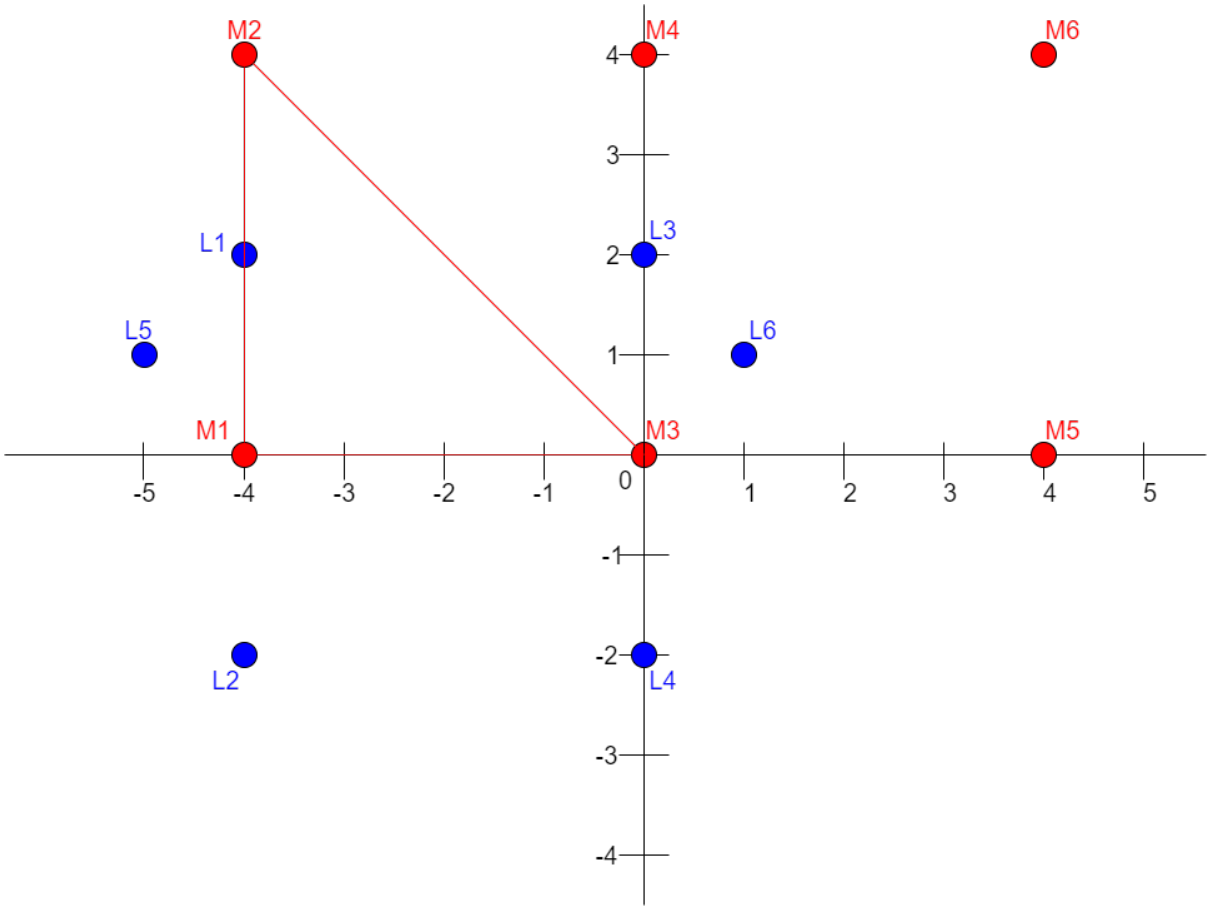
Lawren	L4	(0, -2)
Lawren	L5	(-5, 1)
Lawren	L6	(1, 1)

The representation of the gang members in the 2D plane is given below:
Color Coding:
Red - Represents the Moose Gang
Blue - Represents the Lawren Gang

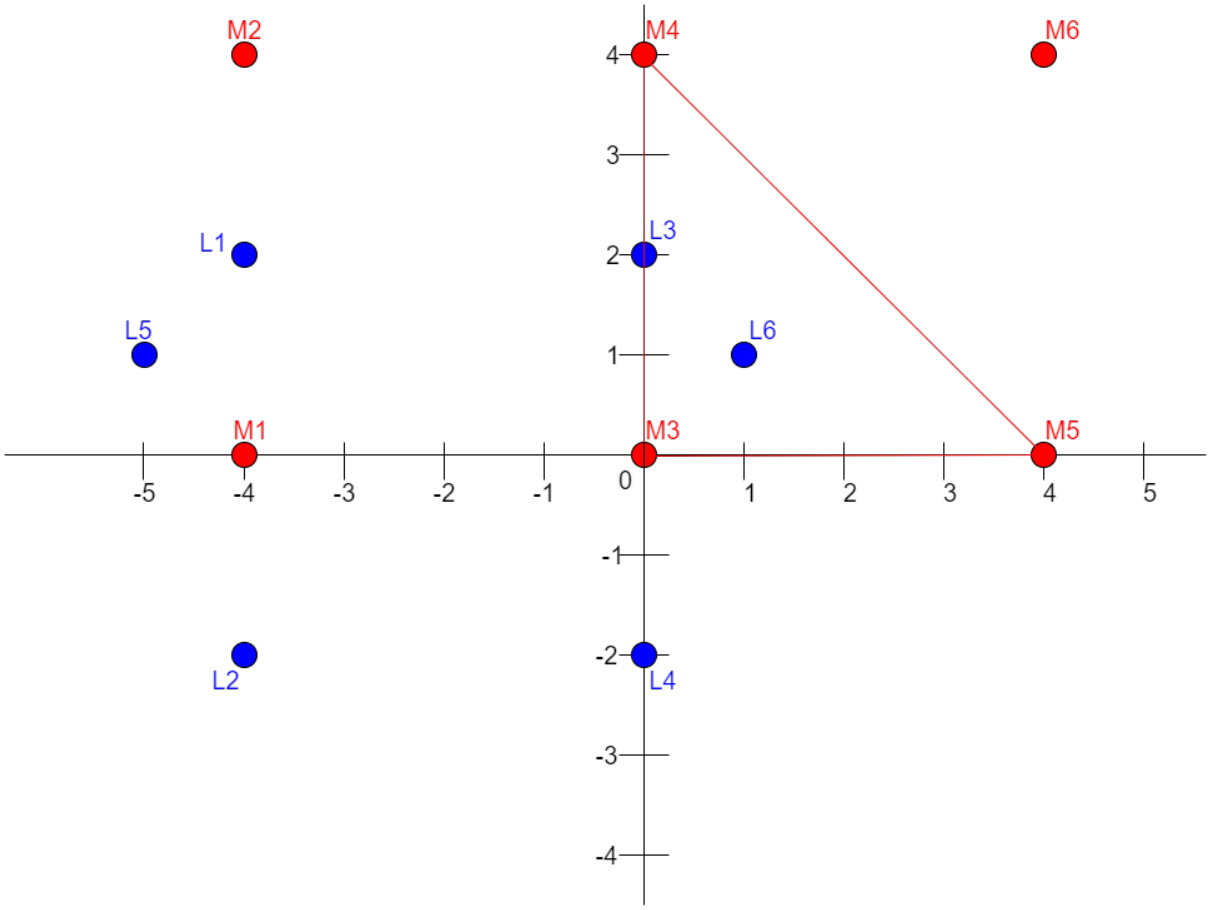


The Moose gang can kill three members of the Lawren's gang.

1. The member **L1** present at position **(-4, 2)** can be killed.

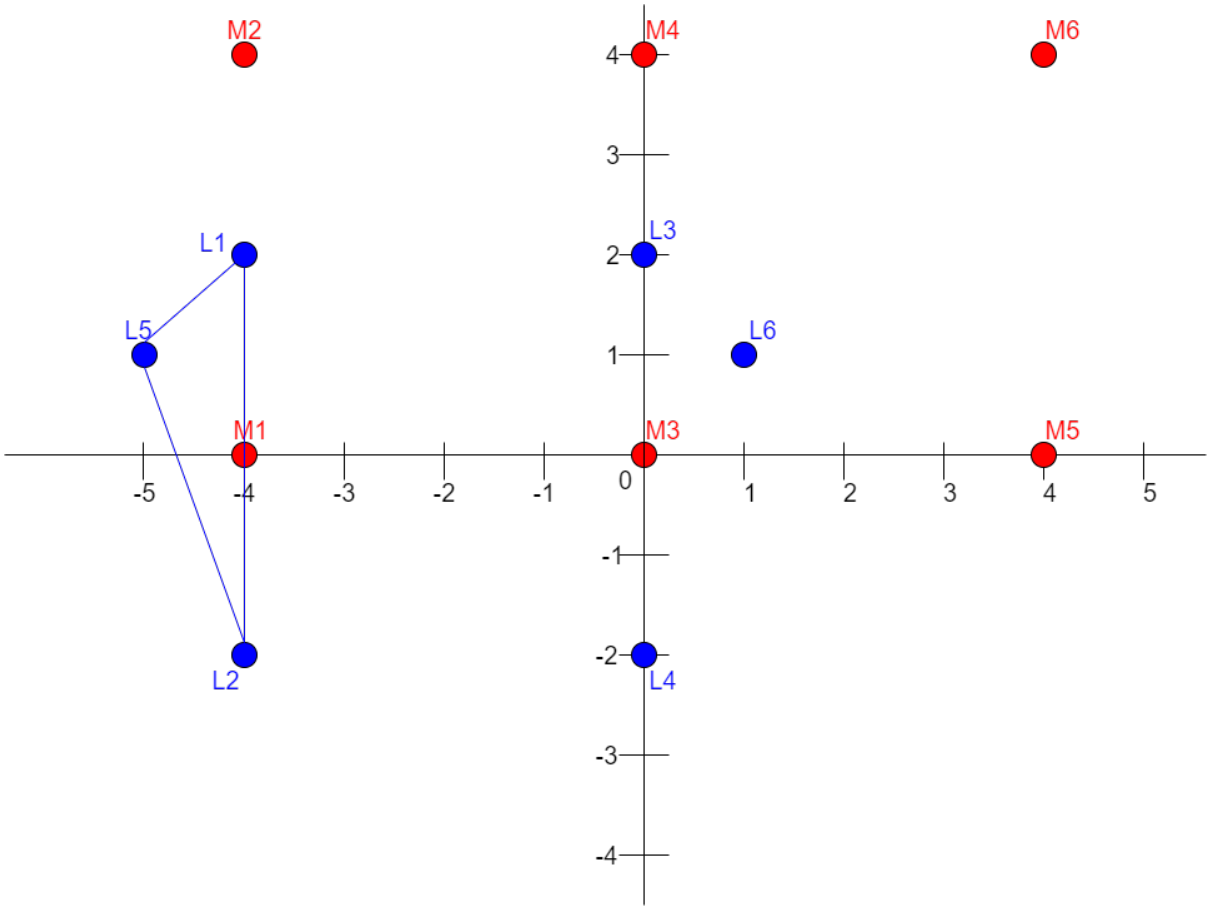


2. The member **L3** present at position **(0, 2)** and member **L6** present at the location **(1, 1)** can be killed.

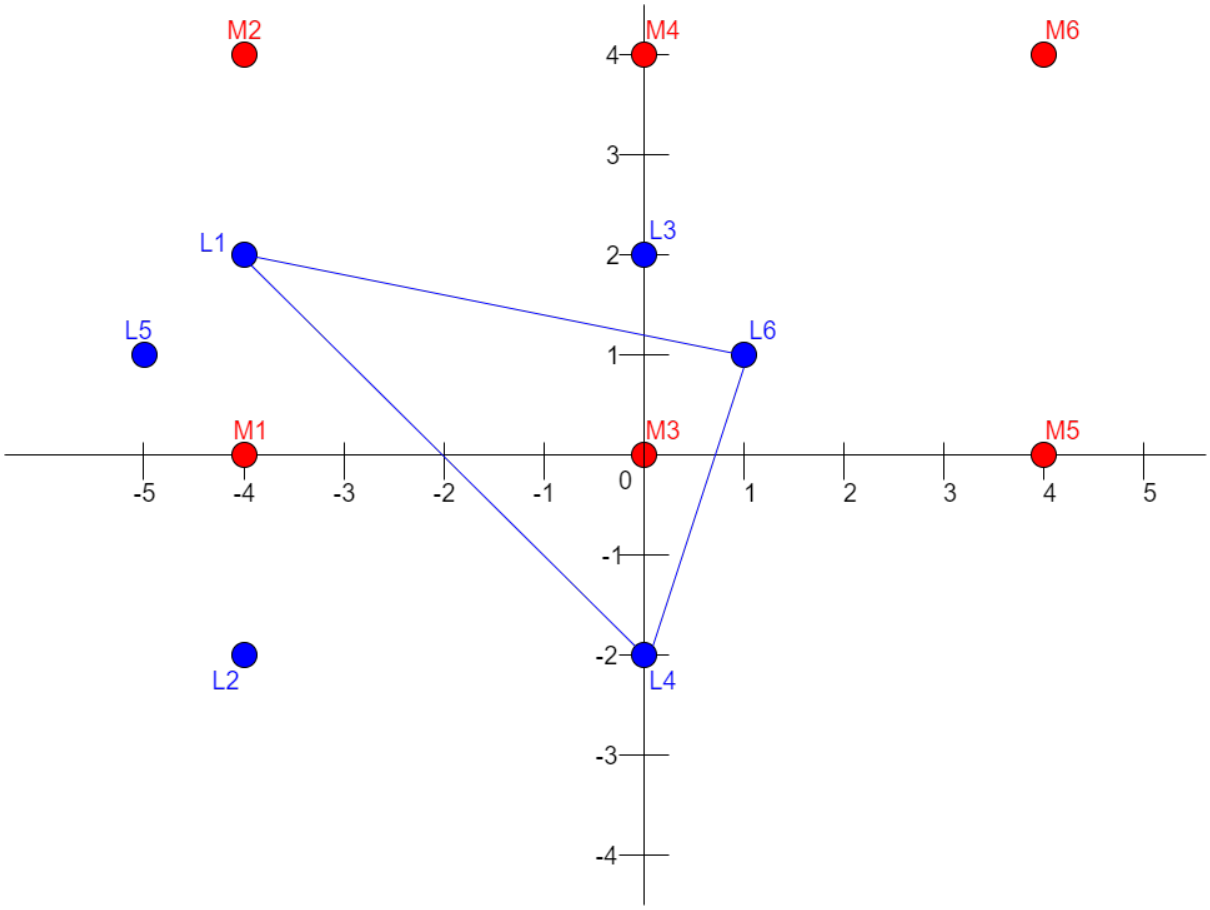


The Lawren Gang can kill two members of the Moose's gang.

1. The member **M1** present at position **(-4, 0)** can be killed.



2. The member **M3** present at position **(0, 0)** can be killed.



Your friend (good at mathematics) who works with a big name in the media industry has to give the updates of this bloodshed to the newsroom. He has two devices with him (one for each gang) which give him positions of the gang members present in the red soil at any point of time. Today is the day for war and he has fallen seriously ill. He asks you to help him and fill in his shoes and report the updates to the newsroom at any point of time. Can you help your friend?

Input Format

The first line of input consists of number of members each gang has, N
Next N lines follows. Each line consists of the position coordinates (x and y space-separated) of the ith member of the Moose Gang.
Next N lines follows. Each line consists of the position coordinates (x and y space-separated) of the ith member of the Lawren Gang.

Constraints

2< N <=50000
-50000< x, y <50000

Output Format

The output will consist of the detailed report.
The first line of output will consist of the total people killed.

The second and third line of the output will consist of three values space-separated.

Gang Name	Number of gang members killed	Number of gang members left

The second line of output should give the details of the Moose gang.
The third line of output should give the details of the Lawren gang.

Note: The gang name is case sensitive and should be in uppercase letters only.

Sample TestCase 1

Input

```
6
-4 0
-4 4
0 0
0 4
4 0
4 4
-4 2
-4 -2
0 2
0 -2
-5 -1
1 1
```

Output

```
5
MOOSE 2 4
LAWREN 3 3
```

Explanation

Numbers of MOOSE gang members killed = 2
Number of MOOSE gang members left = 4

Number of LAWREN gang members killed = 3
Number of LAWREN gang member left = 3

Total number of people killed = 5

Refer to the example explained above for representation and explanation.

Time Limit(X):

0.50 sec(s) for each input.

Memory Limit:

512 MB