



## The Dragon and the knights (CERC 2012)

The Dragon of Wawel Castle, following the conflict with local Shoemakers' Guild, decided to move its hunting grounds out of Kraków, to a less hostile neighborhood. Now it is bringing havoc and terror to peaceful and serene Kingdom of Bytes.

In the Kingdom of Bytes there are  $n$  rivers and each of them flows along a straight line (that is, you may think of the Kingdom as an Euclidean plane divided by infinite lines). No three rivers have a common point. The rivers divide the Kingdom into some *districts*.

Fortunately, there are  $m$  valiant knights in the Kingdom. Each of them has taken his post and swore an oath to protect his district. The Kingdom is thus protected for evermore...or is it?

It is known that Dragon will not attack a district which has at least one knight inside. The knights, however, are famous for their courage in battle, not for their intelligence. They may have forgotten to protect some of the districts.

Given a map of the Kingdom and the knights' positions, determine whether all the districts are protected.

### Input

First line of input contains the number of testcases  $T$ . The descriptions of the testcases follow:

Each testcase starts with a line with number of rivers  $n$  ( $1 \leq n \leq 100$ ) and number of knights  $m$  ( $1 \leq m \leq 50\,000$ ). Then follows  $n$  lines describing rivers, each with three integers of absolute values not exceeding 10 000. For  $j = 1, 2, \dots, n$ , the integers are the coefficients of the equation  $A_j \cdot x + B_j \cdot y + C_j = 0$  of the  $j$ -th river. After that, there are  $m$  lines with knights' positions: the  $i$ -th of these lines contains two integers  $X_i, Y_i$  ( $-10^9 \leq X_i, Y_i \leq 10^9$ ) – the coordinates of the  $i$ -th knight. You may assume that no knight is standing in a river (their shining armours would quickly rust if they did).

### Output

For each testcase, output a single line containing a single word **PROTECTED**, if all the districts are safe from the Dragon, and **VULNERABLE** otherwise.



## Example

For an example input	the correct answer is:
1 3 7 0 1 0 1 0 0 1 1 -3 1 1 5 -1 3 2 2 -2 -2 6 -1 -2 -8 4	PROTECTED