

Triolandia

Triolandia is a country in flatland. It has a lot of beautiful cities and the land between the cities is divided into triangle-shaped districts. Naturally, each district is controlled by the three cities located at its corners. Vice versa, each city controls all the surrounding districts. Find out which city controls the largest area.

Input

The first line of input contains two positive numbers, the number of cities, $m \leq 10^5$, and the number of districts, $n \leq 10^5$. Each of the following m lines contains the name of a city, a string C_i consisting of at most 10 capital letters, and its coordinates $-10^5 \leq x_i, y_i \leq 10^5$, for $i = 1, \dots, m$. The input continues with n lines of district data. For each district D_j , $j = 1, \dots, n$, the corresponding line contains the indices a_j, b_j, c_j of the three cities that control this district.

Output

The output contains the names of the cities that control the largest area, in alphabetical order.

Examples

Sample input 1

```
9 9
ALPHA -3 3
BETA 1 4
GAMMA 6 3
DELTA 0 0
EPSILON 4 -1
ZETA 7 0
ETA -4 -3
THETA -1 -4
IOTA 5 -3
4 2 5
2 3 5
3 5 6
1 2 4
7 1 4
4 8 7
8 5 4
5 6 9
8 9 5
```

Sample output 1

```
EPSILON
```

Limits

Time limit is 1 second.

Memory limit is 256 megabytes.