

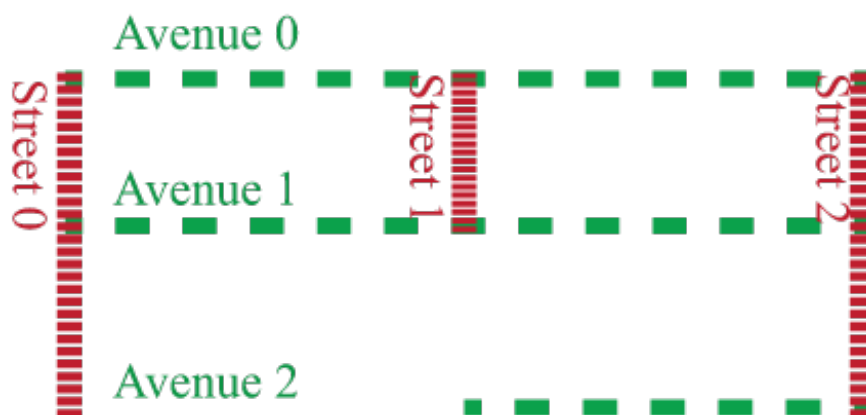
Distributing V-Energy

As you probably know there is a new kind of energy called V-energy which is more affordable than electricity, and has some really interesting properties. The Universal Company on V-Energy has just reached your city and is currently planning the location of the distribution centers. You are given a map of the city, the list of the location of the distribution centers, and they need you to report which is the minimum amount of energy that would reach a building of the city, and how many buildings share that amount of energy

V-Energy has the following properties:

- If a building has K units of V-Energy it will consume C units and distribute $K - C$ to every building it is connected to. If $K < C$ the building will consume K units and will not distribute any units of energy
- If a building receives V-Energy from different sources it will only consume and distribute the energy with maximum value. For example, if a building receives $K = 8$ units of energy, and $C = 3$ it will consume 3 and distribute 5. But, if later the same building receives $K = 6$ units of energy, it will not consume or distribute this energy since previously it received a larger amount of energy. If later on the same building receives $K = 15$ units of energy, it will consume 3 units, and distribute 12 units to its neighbors

As you know, your city is a grid, with buildings on every intersection of the streets. Since V-Energy propagates only through streets, the streets map of the city is perfect for your job. Avenues run horizontally while streets run vertically. Note that sometimes a street or avenue can be blocked. The next figure shows a possible view of a city where street 1 is blocked between avenues 1 and 2, and avenue 2 is blocked between streets 0 and 1.



Input

The input contains several test cases. Each case starts with a line containing the values K and C (amount of V-energy each distribution center has and amount of V-energy each building consumes). ($0 \leq C, K \leq 10000$). The next line contains two values N and M denoting the number of avenues and streets on the city ($1 \leq N, M \leq 1000$). The following line will have one value B which denotes the number of street and avenues segments that are blocked and cannot

distribute V-energy ($0 \leq B \leq N \cdot M - N - M$). The following B lines will have four values T I J1 J2. T indicates the type of the segment, can be either 'A' or 'S' to denote an avenue segment or a street segment. I denotes the street or avenue index ($0 \leq I < N$). If it is an avenue segment then J1, J2 are the indexes of the starting street and ending street where the avenue is blocked. If it is a street segment, J1, J2 are the indexes of the starting and ending avenues where the street is blocked ($0 \leq J1 < J2 \leq M$). The next line will have the number D of deposits ($0 \leq D \leq \min(1000, N \cdot M)$). The following D lines will have a pair $A_i S_i$ indicating that on the intersection of avenue A_i with street S_i there will be a distribution center. ($0 \leq A_i < N, 0 \leq S_i < M$).

The end of input is indicated by a test case with $K = C = 0$.

Output

For each test cases you have to print a line containing two numbers Q and P indicating the minimum amount of energy that reaches a building on the city, and the number of building with that amount of energy.

Example

Input:

```
2 1
2 3
0
2
0 0
0 2
12 2
3 3
2
A 2 0 1
S 1 1 2
1
2 0
0 0
```

Output:

```
0 1
2 1
```