Problem F
Binary Classifier

Benny has just learnt from his work about a classifier technique called k-nearest neighbours. Basically, the class of a test data is determined by its k closest hints, usually with a majority rule decision (choose the majority class among those k hints).

In this problem, you are going to perform a binary classifier using k-nearest neighbours on 1-dimensional data.

You are given N hints, each in the form of $\langle x_i, c_i \rangle$ where x_i is the value and $c_i \in \{0, 1\}$ is the class of the hint.

You are also given Q test data, each in the form of $\langle x_j, k_j \rangle$ where x_j is the value and k_j is the classifier parameter for the j^{th} test data.

For each test data, you are to determine its class by finding k_j closest hints where the value difference between the test data and the hint is as minimum as possible. In case of a tie, choose the hint with a larger value. The class of that test data is equal to the majority class of those k closest hints. It is guaranteed that k_j is an odd integer, so the majority will always be strictly more than half of k_j.

For example, consider the following $N = 8$ hints: $\langle 7, 1 \rangle$, $\langle 11, 1 \rangle$, $\langle 17, 0 \rangle$, $\langle 3, 0 \rangle$, $\langle 20, 0 \rangle$, $\langle 10, 1 \rangle$, $\langle 25, 1 \rangle$, and $\langle 15, 0 \rangle$.

- Supposed we have a test data $\langle 12, 3 \rangle$, then the 3 closest hints are $\langle 11, 1 \rangle$, $\langle 10, 1 \rangle$, and $\langle 15, 0 \rangle$. There are 1 hint of class 0 and 2 hints of class 1, thus, the majority is class 1.
- Supposed we have a test data $\langle 19, 5 \rangle$, then the 5 closest hints are $\langle 11, 1 \rangle$, $\langle 17, 0 \rangle$, $\langle 20, 0 \rangle$, $\langle 25, 1 \rangle$, and $\langle 15, 0 \rangle$. There are 3 hints of class 0 and 2 hints of class 1, thus, the majority is class 0.
- Supposed we have a test data $\langle 3, 1 \rangle$, then the 1 closest hint is $\langle 3, 0 \rangle$. There are 1 hint of class 0 and no hint of class 1, thus, the majority is class 0.

Input

Input begins with an integer T $(1 \leq T \leq 100)$ representing the number of cases.

Each case contains two integers N Q $(1 \leq N \leq 100\,000;\ 1 \leq Q \leq 500)$ representing the number of hints and test data, respectively. The next N lines, each contains two integers x_i c_i $(0 \leq x_i \leq 10^9;\ c_i \in \{0, 1\})$ representing the value and the class of the i^{th} hint. It is guaranteed that there are no two hints with the same value. The next Q lines, each contains two integers x_j k_j $(0 \leq x_j \leq 10^9;\ 1 \leq k_j \leq \min(100, N))$ representing the value and the classifier parameter for the j^{th} test data. It is guaranteed that k_j is an odd number.

It is guaranteed that the sum of N over all cases does not exceed $500\,000$.

Output

For each case, output in a line "`Case #X: Y`" (without quotes) where `X` is the case number (starts from 1). For the next Q lines on each case, each contains an integer (0 or 1) in a single line representing the class of the respective test data.

Sample Input #1

```
3
8 3
7 1
11 1
17 0
3 0
20 0
10 1
25 1
15 0
12 3
19 5
3 1
3 1
100 1
200 1
1000 1
17 1
5 2
34 0
```

```
91 1
25 0
70 1
52 0
61 1
61 3
```

Sample Output #1

```
Case #1:
1
0
0
Case #2:
1
Case #3:
1
0
```

Explanation for the sample input/output #1

For the 2^{nd} case,

- the closest hints are $\langle 100, 1\rangle$. There are no hint of class 0 and 1 hint of class 1, thus, the majority class is 1.

For the 3^{rd} case,

- The closest hints for the 1^{st} test data are $\langle 70, 1\rangle$. There are no hint of class 0 and 1 hint of class 1, thus, the majority class is 1.
- The closest hints for the 2^{nd} test data are $\langle 34, 0\rangle$, $\langle 70, 1\rangle$ $\langle 52, 0\rangle$. There are 2 hints of class 0 and 1 hint of class 1, thus, the majority class is 0.