

Algorithms Lab

Exercise – The notebook and the queries

You are tracking the outcome of experiments by adjusting k hyper-parameters, c_1, c_2, \dots, c_k . The outcome of your experiment, r , is an integer. The experiments are computationally costly so you write down the result of every experiment in a notebook. Your boss checks on you irregularly and queries you for the result of experiments which you have or have not done. With a backlog of queries you are getting tired of searching through your notebook so you finally decide to write a program to log your results and answer such queries more efficiently.

Input The first line of the input contains the number $t \leq 20$ of test cases. Each of the t test cases is described as follows.

- It starts with a line that contains three integers $k \ n \ q$, separated by a space. It denotes
 - k , the number of hyper-parameters ($1 \leq k \leq 10$).
 - n , the number of experiments you have recorded in your notebook.
 - q , the number of queries you need to check.
- The following k lines define the bounds on the hyper-parameters. The i -th line contains two integers $a_i \ b_i$, separated by a space. They denote
 - a_i , the lower bound on c_i ,
 - b_i , the upper bound on c_i .

You may assume that $a_i \leq b_i$ and that $\prod_{i=1}^k (b_i - a_i + 1) \leq 10^6$.

- The following n lines contain the records of your notebook. Each line has $k + 1$ integers, $c_1 \ c_2 \ \dots \ c_k \ r$, separated by a space. They denote
 - c_1, \dots, c_k the hyper-parameters of the experiment.
 - r , the result of the experiment.
- The following q lines contain your backlog of queries. Each line has k integers $c_1 \ c_2 \ \dots \ c_k$ separated by a space where $a_i \leq c_i \leq b_i$ for $i \in \{1, 2, \dots, k\}$.

Output For each query output one line with a single integer which denotes the result of the experiment. If the experiment has not yet been recorded then output -1 .

Points There are two test sets, worth 100 points in total.

1. For the first test set, worth 40 points, you may assume that $k \leq 2$.
2. For the second test set, worth 60 points, there are no additional assumptions.

Corresponding sample test sets are contained in `testi.in/out`, for $i \in \{1, 2\}$.

Sample Input

```
1
2 5 3
0 4
0 4
1 1 76
1 3 34
2 1 45
0 4 33
0 1 100
2 1
0 0
1 3
```

Sample Output

```
45
-1
34
```