E. Distance Learning Courses in MAC

time limit per test: 2 seconds
memory limit per test: 256 megabytes
input: standard input
output: standard output

The New Year has arrived in the Master's Assistance Center, which means it's time to introduce a new feature!

Now students are given distance learning courses, with a total of n courses available. For the i-th distance learning course, a student can receive a grade ranging from x_i to y_i.

However, not all courses may be available to each student. Specifically, the j-th student is only given courses with numbers from l_j to r_j, meaning the distance learning courses with numbers $l_j, l_j + 1, \ldots, r_j$.

The creators of the distance learning courses have decided to determine the final grade in a special way. Let the j-th student receive grades $c_{l_j}, c_{l_j+1}, \ldots, c_{r_j}$ for their distance learning courses. Then their final grade will be equal to $c_{l_j} \mid c_{l_j+1} \mid \ldots \mid c_{r_j}$, where $\mid$ denotes the bitwise OR operation.

Since the chatbot for solving distance learning courses is broken, the students have asked for your help. For each of the q students, tell them the maximum final grade they can achieve.

Input

Each test consists of multiple test cases. The first line contains a single integer t ($1 \le t \le 2 \cdot 10^4$) — the number of test cases. The description of the test cases follows.

The first line of each test case contains a single integer n ($1 \le n \le 2 \cdot 10^5$) — the number of distance learning courses.

Each of the following n lines contains two integers x_i and y_i ($0 \le x_i \le y_i < 2^{30}$) — the minimum and maximum grade that can be received for the i-th course.

The next line contains a single integer q ($1 \le q \le 2 \cdot 10^5$) — the number of students.

Each of the following q lines contains two integers l_j and r_j ($1 \le l_j \le r_j \le n$) — the minimum and maximum course numbers accessible to the j-th student.

It is guaranteed that the sum of n over all test cases and the sum of q over all test cases do not exceed $2 \cdot 10^5$.

Output

For each test case, output q integers, where the j-th integer is the maximum final grade that the j-th student can achieve.

Example

input

```
3
2
0 1
3 4
3
1 1
1 2
2 2
4
1 7
1 7
3 10
2 2
5
1 3
3 4
```

```
2 3
1 4
1 2
6
1 2
2 2
0 1
1 1
3 3
0 0
4
3 4
5 5
2 5
1 2
```

output Copy

```
1 5 4
15 11 15 15 7
1 3 3 3
```

Note

In the first test case:

1. The maximum grade for the first student is 1:
   - On the first distance learning course, he will receive a grade of 1.

   Therefore, the final grade is 1.
2. The maximum grade for the second student is 5:
   - On the first distance learning course, he will receive a grade of 1.
   - On the second distance learning course, he will receive a grade of 4.

   Therefore, the final grade is $1 \mid 4 = 5$.
3. The maximum grade for the third student is 4:
   - On the second distance learning course, he will receive a grade of 4.

   Therefore, the final grade is 4.

In the second test case:

1. The maximum grade for the first student is 15:
   - On the first distance learning course, he will receive a grade of 7.
   - On the second distance learning course, he will receive a grade of 4.
   - On the third distance learning course, he will receive a grade of 8.

   Therefore, the final grade is $7 \mid 4 \mid 8 = 15$.
2. The maximum grade for the second student is 11:
   - On the third distance learning course, he will receive a grade of 9.
   - On the fourth distance learning course, he will receive a grade of 2.

   Therefore, the final grade is $9 \mid 2 = 11$.