Elon Mask

An integer x is a submask of y if x can be obtained by replacing some (possibly none) number of 1s in the binary representation of y with 0s. For example, the binary representation of $9 = (1001)_2$ can be obtained from the binary representation of $13 = (1101)_2$ by replacing the second 1 from left with a 0. Thus 9 is a submask of 13.

You are given q queries. For query i $(1 \le i \le q)$, you will be given two integers $l[i]$ and $r[i]$. You have to count the number of integer pairs (x, y) such that $l[i] \le x, y \le r[i]$ and x is a submask of y.

Input

Read the input from the standard input in the following format:

- line 1: q
- line $1 + i$ $(1 \le i \le q)$: $l[i]$ $r[i]$

Output

Write the output to the standard output in the following format:

- line i $(1 \le i \le q)$: the answer to query i.

Constraints

- $1 \le q \le 10^5$
- $0 \le l[i] \le r[i] \le 10^9$ (for all $1 \le i \le q$)

Subtasks

1. (9 points) $q \le 5$ and $r[i] \le 10^5$ (for all $1 \le i \le q$)
2. (14 points) $l[i] = 0$ and $r[i] \le 10^6$ (for all $1 \le i \le q$)
3. (22 points) $l[i] = 0$ (for all $1 \le i \le q$)
4. (29 points) $q \le 100$
5. (26 points) No further constraints.

Examples

Example 1

```
2
0 2
0 10
```

The correct output is:

```
5
37
```

For the first query, the valid pairs are $(0, 1), (0, 2), (0, 0), (1, 1), (2, 2)$.

Example 2

```
2
2 4
10 20
```

The correct output is:

```
4
26
```

For the first query, the valid pairs are $(2, 2), (2, 3), (3, 3), (4, 4)$.