

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 $(1 \leq i \leq q)$: 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

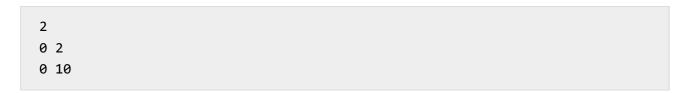
- $1 \le q \le 10^5$
- $ullet 0 \leq l[i] \leq r[i] \leq 10^9 ext{ (for all } 1 \leq i \leq q)$

Subtasks

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

Examples

Example 1



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).