

Primes and XOR? Nonsense

Input file: standard input
Output file: standard output
Time limit: 2 seconds
Memory limit: 256 megabytes

Define $\mathbb{P}_{LR} = \mathbb{P} \cap [L; R]$, where \mathbb{P} is the set of prime numbers. In other words, \mathbb{P}_{LR} is the set of all primes between L and R inclusive.

Given L and R , find the number of integers that can be represented as XOR of some (possibly empty) subset of \mathbb{P}_{LR} .

Input

The first line of input contains one integer T ($1 \leq T \leq 100$) — the number of independent test cases you need to process. Descriptions of T test cases follow.

The description of one test case consists of two integers L and R ($2 \leq L \leq R \leq 10^{12}$).

Output

For each test case print the answer on a separate line.

Example

standard input	standard output
3	8
2 10	1
9999999940 1000000000	1099511627776
2 1000000000000	

Note

In the first example, $\mathbb{P}_{LR} = \{2, 3, 5, 7\}$.

- $0 = 2 \oplus 5 \oplus 7$
- $1 = 2 \oplus 3$
- $2 = 2$
- $3 = 3$
- $4 = 3 \oplus 7$
- $5 = 2 \oplus 7$
- $6 = 3 \oplus 5$
- $7 = 7$

In the second example, $\mathbb{P}_{LR} = \emptyset$, so only 0 can be represented as XOR of some subset.