Counting bits

Time Limit: 1 Second
Memory Limit: 1024 MB

Define $Count(x)$ as the number of 1 bits in an integer x. For example $Count(13) = 3$ because $(13)_{10} = (1101)_2$ which has three 1s.

You need to answer q queries. For the i-th query, you will be given two integers l, r.

For each query, you need to output $\Sigma_{i=l}^{r} Count(i)\ mod\ (10^9 + 7)$.

Input

The first line contains an integer q ($1 \leq q \leq 5 \cdot 10^5$), the number of queries.

Each of the next q lines contains two integers l, r ($1 \leq l \leq r \leq 10^{18}$).

Output

For each query, output $\Sigma_{i=l}^{r} Count(i)\ mod\ (10^9 + 7)$ on an individual line.

Sample Inputs

```
4
4 9
1 1
1 15
1 1000000000000000000
```

Sample Outputs

```
11
1
32
100688975
```