12866 Combination

The number of ways in which r objects can be chosen from n different objects can be found using the formula $\binom{n}{r} = \frac{n!}{r!(n-r)!}$.

For example $\binom{5}{3} = 10$, $\binom{10}{0} = 1$, $\binom{15}{14} = 15$, etc. Now if n varies from low to $high$ and r varies from 0 to n, then you have to find out how many values of $\binom{n}{r}$ are odd. In other words you will have to find out the value of $\sum_{n=low}^{high} \sum_{r=0}^{n} \binom{n}{r}$ mod 2, here mod is the standard modulus or reminder operation.

Input

The input file contains at most 50,000 lines of inputs. Each line contains two positive integers low and $high$ ($0 \le low \le high \le 16 * 10^{11}$). Input is terminated by a line containing two zeroes.

Output

For each line of input, produce one line of output. This line contains an integer D which prints the desired value. You can safely assume that this output will fit in a 64-bit unsigned integer.

Note:

Illustration for Sample input 1: $\binom{2}{0} = 1$, $\binom{2}{1} = 2$, $\binom{2}{2} = 1$, $\binom{3}{0} = 1$, $\binom{3}{1} = 3$, $\binom{3}{2} = 3$, $\binom{3}{3} = 1$, and of these seven values, six (6) are odd.

Sample Input

```
2 3
10 20
100 200
0 0
```

Sample Output

```
6
70
2510
```