A C M   I C P C   2 0 1 4

Contest : REGIONAL
DEPARTMENT OF COMPUTER ENGINEERING
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B	# Combination	
	INPUT	**STANDARD INPUT**
	OUTPUT	**STANDARD OUTPUT**

The number of ways in which **r** objects can be chosen from **n** different objects can be found using the formula $\binom{n}{r} = \dfrac{n!}{r!(n-r)!}$. 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 $\sum_{n=low}^{high} \sum_{r=0}^{n} \binom{n}{r} \bmod 2$, 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.

Example

Input	Output
2 3 10 20 100 200 0 0	6 70 2510