Problem B
Binary Stirling numbers

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The Stirling number of the second kind $S(n, m)$ stands for the number of ways to partition a set of n things into m nonempty subsets. For example, there are seven ways to split a four-element set into two parts:

$$\{1,2,3\} \cup \{4\}, \{1,2,4\} \cup \{3\}, \{1,3,4\} \cup \{2\}, \{2,3,4\} \cup \{1\}$$
$$\{1,2\} \cup \{3,4\}, \{1,3\} \cup \{2,4\}, \{1,4\} \cup \{2,3\}.$$

There is a recurrence which allows to compute $S(n, m)$ for all m and n.

$$S(0,0) = 1; S(n,0) = 0 \text{ for } n > 0; S(0,m) = 0 \text{ for } m > 0;$$

$$S(n,m) = mS(n-1,m) + S(n-1,m-1), \text{ for } n, m > 0.$$

Your task is much "easier". Given integers n and m satisfying $1 \leq m \leq n$, compute the parity of $S(n, m)$, i.e. $S(n, m) \bmod 2$.

Example

$S(4,2) \bmod 2 = 1$.

Task

Write a program which for each data set:

- reads two positive integers n and m,
- computes $S(n, m) \bmod 2$,
- writes the result.

Input

The first line of the input contains exactly one positive integer d equal to the number of data sets, $1 \leq d \leq 200$. The data sets follow.

Line $i + 1$ contains the i-th data set — exactly two integers n_i and m_i separated by a single space, $1 \leq m_i \leq n_i \leq 10^9$.

Output

The output should consist of exactly d lines, one line for each data set. Line i, $1 \leq i \leq d$, should contain 0 or 1, the value of $S(n_i, m_i) \bmod 2$.

Example

For the input:

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1
4 2
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the correct answer is:

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1
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