2431 - 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.

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

Your task is much "easier". Given integers n and m satisfying 1 <= m <= n, compute the parity of S(n, m), i.e. S(n, m) mod 2.

Example

S(4, 2) mod 2 = 1.

Task

Write a program which for each data set:

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

Input

The first line of the input contains exactly one positive integer d equal to the number of data sets, $1 \le d \le 200$. 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, $1 \le m_i \le n_i \le 10^9$.

Output

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

Sample Input

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1
4 2
```

Sample Output

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1
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