

# Good Matrix

Input file:            **standard input**  
Output file:           **standard output**  
Time limit:            1 second  
Memory limit:         1024 megabytes

For a  $n \times m$  binary matrix  $A$ , if for all  $1 \leq i \leq n, 1 \leq j \leq m$ , the XOR of all elements in the  $i$ -th row and all elements in the  $j$ -th column equals  $A_{i,j}$  (note that  $A_{i,j}$  is counted twice), then the matrix is called a good matrix.

Formally, the definition of a good matrix is:

$$\forall i, j \quad (1 \leq i \leq n, 1 \leq j \leq m), \quad \left(\bigoplus_{k=1}^m A_{i,k}\right) \oplus \left(\bigoplus_{k=1}^n A_{k,j}\right) = A_{i,j}$$

Given  $n$  and  $m$ , you need to find the number of good matrices. Since the answer can be very large, output the result modulo 998 244 353.

## Input

The first line contains an integer  $T$  ( $1 \leq T \leq 2 \times 10^5$ ), denoting the number of testcases.

For each test case,

Only one line contains two integers  $n$  and  $m$  ( $1 \leq n, m \leq 10^{18}$ ), denoting the number of rows and columns of the matrix.

## Output

For each test case, output a single integer in a line, denoting the number of good matrices modulo 998 244 353.

## Example

standard input	standard output
5	16
1 5	2
2 5	64
3 5	16
3 3	400944928
123 456	