Problem M: Binary

Time limit: 1.5s; Memory limit: 256 MB

Binary is a base-2 number system that uses two states 0 (bit-0) and 1 (bit-1) to represent a number. Hieu is working on the topic of binary representation. Particularly, he wants to study the properties of numbers which the amount of bit-1 in its representation is odd. In order to understand that, he set up this problem.

Given n and m, calculate them sum $\sum_{x=0}^{2^n-1} x^m$ where the number of bit-1 in binary representation of x is odd.

This problem turns out to be harder than it looks, can you help him to solve it?.

Input

The input starts with T $(1 \leq T \leq 10^4)$ - the number of test cases.

Each test case consists of 2 integers n and m. $(1 \leq n \leq 10^6, m \leq n, 1 \leq m \leq 5000)$.

Output

For each test case, you should print the result modulo $10^9 + 7$.

Sample

Input	Output
1 3 3	416

Explaination

For $n = 3$, there are 4 numbers with odd number of bit 1 in its binary representation: 1, 2, 4, 7. Thus, the answer is $1^3 + 2^3 + 4^3 + 7^3 = 1 + 8 + 64 + 343 = 416$