Time Limit Exceeded

Given integers N ($1 \le N \le 50$) and M ($1 \le M \le 15$), compute the number of sequences a_1, ... a_N such that:

- $0 \le a_i < 2^M$
- a_i is not divisible by c_i ($0 < c_i \le 2^M$)
- a_i & $a_{i+1} = 0$ (that is, a_i and a_{i+1} have no common bits in their binary representation)

Input

The first line contains the number of test cases, T ($1 \le T \le 10$). For each test case, the first line contains the integers N and M, and the second line contains the integers c_1, ... c_N.

Output

For each test case, output a single integer: the number of sequences described above, modulo 1,000,000,000.

Example

Input:
1
2 2
3 2

Output:
1

The only possible sequence is 2, 1.