Problem K

2-ME Set

A bitwise AND operator takes two integers with equal-length binary representations and performs the logical AND operation on each corresponding bits, i.e. it is 1 if and only if both bits are 1, otherwise 0. In C/C++ and Java programming language, bitwise AND operator is represented by operator &. For example: (10 & 6) = 2, (8 & 7) = 0, and (17 & 23) = 17.

```
10 = 1010        8 = 1000        17 = 10001
 6 = 0110        7 = 0111        23 = 10101
     ---- &          ---- &           ----- &
 2 = 0010        0 = 0000        17 = 100001
```

In this problem, you are given a multiset of integers A, and your task is to determine how many submultisets of A which are 2-ME sets. A multiset M is a 2-ME set if and only if |M| ≥ 2, and (p & q) = 0 is satisfied for every pair of integers p and q in M.

All elements in the multiset are considered different although some may have the same values, e.g. $A_{1..2}$ = (7, 7), the first 7 and the second 7 are considered different although they have the same value. Two multisets are considered different if there exists at least one element (not necessarily different value) which is included in one multiset and not included in the other.

For example, let $A_{1..5}$ = (5, 2, 2, 1, 4). There are 9 possible submultisets of A which are 2-ME sets: (5, 2), (5, 2), (2, 1), (2, 1, 4), (2, 4), (2, 1), (2, 1, 4), (2, 4), and (1, 4).

Input

The first line of input contains an integer T (T ≤ 100) denoting the number of cases. Each case begins with an integers N (2 ≤ N ≤ 20,000) in a line. The following line contains N integers A_i (1 ≤ A_i ≤ 20,000) representing the integers in the given multiset.

Output

For each case, output "`Case #X: Y`" (without quotes) in a line where `X` is the case number (starts from 1), and `Y` is the answer for this particular case modulo 1,000,000,007.

Sample Input	Output for Sample Input
4 5 5 2 2 1 4 6 1 2 4 8 16 32 4 1 3 7 15 7 15 6 13 9 2 1 4	Case #1: 9 Case #2: 57 Case #3: 0 Case #4: 10

Explanation for 1st sample case

This is the example given in the problem statement.

Explanation for 2nd sample case

Any pair of integers in the given multisets are mutually exclusive to each other (i.e. their AND is 0), thus any subset of size at least two will be a 2-ME set. There are 2^6 possible subsets with 1 empty set and 6 singletons, thus the output is $2^6 - 1 - 6 = 57$.

Explanation for 3rd sample case

Any pair of integers in the given multisets are not mutually exclusive to each other (i.e. their AND is not 0), thus there are no subset which is 2-ME set in this case.

Explanation for 4th sample case

There are 10 2-ME set in this case:

- of size 2: (6, 9), (6, 1), (13, 2), (9, 2), (9, 4), (2, 1), (2, 4), (1, 4);
- of size 3: (9, 2, 4), (2, 1, 4);
- of size larger than 3: none.