Array Partition

HackerRank

Given an array A consisting of N positive integers, split the array A into 2 non empty subsets P and Q such that an element from array A either belongs to subset P or to subset Q and $\gcd(\prod P_i, \prod Q_i) = 1$. Calculate the number of ways of splitting the array A into 2 subsets P and Q.

Since the answer can be quite large, print it modulo $10^9 + 7$.

Input Format

First line of input contains a single integer T denoting number of test cases.
First line of each test case contains a single integer N denoting size of array A.
Second line of each test case contains N space separated integer denoting elements of array A.

Constraints

- $1 \leq T \leq 5$
- $1 \leq N \leq 10^5$
- $1 \leq A_i \leq 10^6$

Scoring

- $1 \leq N \leq 15, 1 \leq A_i \leq 15$ for 20% test data.
- $1 \leq N \leq 1000, 1 \leq A_i \leq 10^6$ for 50% test data.
- $1 \leq N \leq 10^5, 1 \leq A_i \leq 10^6$ for 100% test data.

Output Format

Output consists of T lines, where i^{th} lines contains required answer for i^{th} test cases.

Sample Input 0

```
3
3
2 3 1
3
2 3 6
4
2 3 6 1
```

Sample Output 0

```
6
0
2
```

Explanation 0

- For 1^{st} test case, following paritions are possible
  - {1}, {2, 3} = $\gcd(1, 6)$ = 1
  - {1, 2}, {3} = $\gcd(2, 3)$ = 1
  - {1, 3}, {2} = $\gcd(3, 2)$ = 1
  - {2, 3}, {1} = $\gcd(6, 1)$ = 1
  - {3}, {1, 2} = $\gcd(3, 2)$ = 1
  - {2}, {1, 3} = $\gcd(2, 3)$ = 1
- For 2^{nd} test case, any partition will not result $\gcd$ = 1.