

Problem

Gungnir Fracture

Time limit: 2 seconds

Geopelia is collecting the fragments of *Gungnir*. *Gungnir* has 2^n types of fragments, numbered $0, 1, \dots, 2^n - 1$. To restore it, for every $0 \leq i < 2^n$, *Geopelia* needs exactly a_i fragments marked i .

To obtain these fragments, *Geopelia* may perform the following operation any number of times:

- Choose two integers m and k satisfying $0 \leq m < 2^n$ and $0 \leq k < 2^n$.
- Obtain one fragment marked with each of $0 \oplus k, 1 \oplus k, \dots, m \oplus k$.

Recall that $\oplus$ denotes the bitwise exclusive OR of two non-negative integers.

Help *Geopelia* find the minimum number of operations required to restore *Gungnir*. Note that *Geopelia* **cannot** remove any fragment she has obtained.

Input

The first line of the input contains an integer T ($1 \leq T \leq 10^4$) indicating the number of test cases. For each test case:

- The first line contains an integer n ($0 \leq n \leq 19$).
- The second line contains 2^n integers $a_0, a_1, \dots, a_{2^n-1}$ ($0 \leq a_i \leq 10^6$), where a_i is the required number of fragments marked i .

It is guaranteed that the sum of 2^n over all test cases does not exceed 2^{19} .

Output

For each test case, output one integer representing the minimum number of operations.

Sample Input 1

Sample Output 1

5	100000
0	514
100000	1
1	21
114 514	3
2	
1 1 1 1	
3	
0 13 0 0 0 7 2 1	
4	
1 2 2 1 3 3 3 3 1 0 0 0 0 0 0	

This page is intentionally left blank.