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Algorithms Lab

Exercise – *Even pairs*

You are part of a team to develop a new kind of pseudorandom number generator (PRNG). To gauge how good your algorithm is at producing random sequences of bits, you are running several different statistical tests.

For example, if $x_1, \ldots, x_n$ was a truly random sequence of bits, then it would have the property that the sum $x_i + \cdots + x_j$ is even for about half of the pairs $1 \leq i \leq j \leq n$ (and odd for the other half).

To check whether this is the case if $x_1, \ldots, x_n$ are generated by your PRNG, you need to be able to count the number of pairs $1 \leq i \leq j \leq n$ for which the sum is even.

Input   The first line of the input contains the number $1 \leq t \leq 30$ of test cases. Each of the t test cases is described as follows:

- It starts with a line that contains an integer n such that $1 \leq n \leq 50000$.

- The next line contains n values $x_1, \ldots, x_n$, separated by spaces. Each value x_i is either 0 or 1.

Output   For each test case output a line containing the number of pairs $1 \leq i \leq j \leq n$ such that the sum $x_i + \cdots + x_j$ is even.

Points   There are three test sets, worth 100 points in total.

1. For the first test set, worth 40 points, you may assume that $1 \leq n \leq 200$.

2. For the second test set, worth 30 points, you may assume that $1 \leq n \leq 5000$.

3. For the third test set, worth 30 points, there are no additional assumptions.

Corresponding sample test sets are contained in test$i$.in/out, for $i \in \{1, 2, 3\}$.

Sample Input

```
2
4
0 1 1 1
3
0 0 0
```

Sample Output

```
4
6
```