

USA Computing Olympiad



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USACO 2023 DECEMBER CONTEST, GOLD PROBLEM 1. FLIGHT ROUTES

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Contest has ended.

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English (en) ▼

Bessie recently discovered that her favorite pop artist, Elsie Swift, is performing in her new Eras Tour! Unfortunately, tickets are selling out fast, so Bessie is thinking of flying to another city to attend the concert. The Eras tour is happening in N ($2 \leq N \leq 750$) cities labeled $1 \dots N$, and for each pair of cities (i, j) with $i < j$ there either exists a single direct flight from i to j or not.

A *flight route* from city a to city b ($a < b$) is a sequence of $k \geq 2$ cities $a = c_1 < c_2 < \dots < c_k = b$ such that for each $1 \leq i < k$, there is a direct flight from city c_i to city c_{i+1} . For every pair of cities (i, j) with $i < j$, you are given the parity of the number of flight routes between them (0 for even, 1 for odd).

While planning her travel itinerary, Bessie got distracted and now wants to know how many pairs of cities have direct flights between them. It can be shown that the answer is uniquely determined.

INPUT FORMAT (input arrives from the terminal / stdin):

The first line contains N .

Then follow $N - 1$ lines. The i th line contains $N - i$ integers. The j th integer of the i th line is equal to the parity of the number of flight routes from i to $i + j$.

OUTPUT FORMAT (print output to the terminal / stdout):

Output the number of pairs of cities with direct flights between them.

SAMPLE INPUT:

```
3
11
1
```

SAMPLE OUTPUT:

```
2
```

There are two direct flights: $1 \rightarrow 2$ and $2 \rightarrow 3$. There is one flight route from 1 to 2 and 2 to 3, each consisting of a single direct flight. There is one flight route from 1 to 3 ($1 \rightarrow 2 \rightarrow 3$).

SAMPLE INPUT:

```
5
1111
101
01
1
```

SAMPLE OUTPUT:

```
6
```

There are six direct flights $1 \rightarrow 2, 1 \rightarrow 4, 1 \rightarrow 5, 2 \rightarrow 3, 3 \rightarrow 5, 4 \rightarrow 5$. These result in the following numbers of flight routes:

Flight Route Counts:

	dest				
	1	2	3	4	5
source 1	0	1	1	1	3
source 2	0	0	1	0	1
source 3	0	0	0	0	1
source 4	0	0	0	0	1
source 5	0	0	0	0	0

which is equivalent to the sample input after taking all the numbers $\pmod{2}$.

SCORING:

- Inputs 3-4: $N \leq 6$
- Inputs 5-12: $N \leq 100$
- Inputs 13-22: No additional constraints.

Problem credits: Benjamin Qi

Contest has ended. No further submissions allowed.
