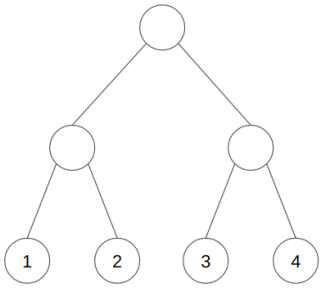
Task Netrpeljivost

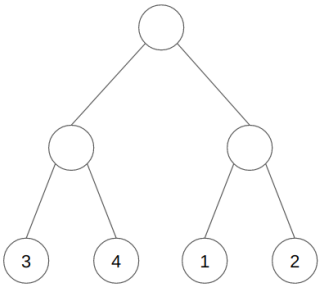
Midnight was approaching, time to hurry. After Margarita successfully greeted all the guests, they comfortably took their seats at a long table. We can label the guests with numbers from 1 to N, exactly in the order they sat at the table. Interestingly, the number of guests at the grand ball at Satan's was a perfect power of the number 2.

However, Margarita is now in trouble because there is a certain *antipathy* between each pair of guests, which we can represent with a non-negative number. The antipathy between guests i and j can be denoted as $netrp(i, j)$. Note that it always holds true that $netrp(i, j) = netrp(j, i)$ and $netrp(i, i) = 0$.

Since the guests have already settled (un)comfortably, Margarita must not drastically change their order. In fact, the guests are unaware that they are actually the leaves of a large Satan's complete binary tree, popularly known as VSPBS, which is depicted in the example picture for $N = 4$.



(a) Image 1: the tree initially



(b) Image 2: the tree after an operation

Margarita can choose a node and in one move swap its left and right child, thereby changing the order of guests located in the corresponding leaves. The images above show the state of the tree, and thus the table, after Margarita makes one move on the root of the tree. Margarita can make an arbitrary number of moves on arbitrary nodes.

The total `antipathy` of the table is defined as the sum of antipathies between adjacent guests at the table. Help Margarita determine the minimum possible antipathy of the table that she can achieve!

Input

The first line contains the integer N, the number of guests.

The i-th of the next N lines contains integers $netrp(i, j)$ which satisfy the conditions above.

Output

You should output the required number.

Scoring

In all subtasks, $1 \leq N \leq 2048$ and N is a power of 2, $0 \leq netrp(i, j) \leq 10^9$.

Subtask	Points	Constraints
1	10	$N \leq 16$
2	17	$N \leq 128$
3	32	$N \leq 512$
4	41	No additional constraints.

Example

input

```
2
0 2
2 0
```

output

```
2
```

input

```
4
0 2 3 1
2 0 4 5
3 4 0 3
1 5 3 0
```

output

```
6
```

input

```
8
0 2 5 8 5 9 2 6
2 0 8 4 3 7 5 3
5 8 0 3 8 4 3 3
8 4 3 0 2 2 7 7
5 3 8 2 0 7 3 3
9 7 4 2 7 0 6 7
2 5 3 7 3 6 0 4
6 3 3 7 3 7 4 0
```

output

```
25
```

Clarification of the second example

One of the possible orderings is 2 1 4 3.