Contest Duration: 2025-06-07(Sat) 08:00 (http://www.timeanddate.com/worldclock/fixedtime.html?iso=20250607T2100&p1=248) - 2025-06-07(Sat) 09:40 (http://www.timeanddate.com/worldclock/fixedtime.html?iso=20250607T2240&p1=248) (local time) (100 minutes) Back to Home (/home)

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E - Pair Annihilation

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Time Limit: 2 sec / Memory Limit: 1024 MiB

Score : 425 points

Problem Statement

You are given a tree with N vertices. The vertices are numbered $1, 2, \ldots, N$, and the edges are numbered $1, 2, \ldots, N-1$. Edge j bidirectionally connects vertices u_j and v_j and has weight w_j. Also, vertex i is given an integer x_i. If $x_i > 0$, then x_i positrons are placed at vertex i. If $x_i < 0$, then $-x_i$ electrons are placed at vertex i. If $x_i = 0$, then nothing is placed at vertex i. Here, it is guaranteed that $\sum_{i=1}^{N} x_i = 0$.

Moving one positron or electron along edge j costs energy w_j. Also, when a positron and an electron are at the same vertex, they annihilate each other in equal numbers.

Find the minimum energy required to annihilate all positrons and electrons.

Constraints

- $2 \leq N \leq 10^5$
- $|x_i| \leq 10^4$
- $\sum_{i=1}^{N} x_i = 0$
- $1 \leq u_j < v_j \leq N$
- $0 \leq w_j \leq 10^4$

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- The given graph is a tree.
- All input values are integers.

Input

The input is given from Standard Input in the following format:

$$
\begin{aligned}
&N \\
&x_1 \quad x_2 \quad \dots \quad x_N \\
&u_1 \quad v_1 \quad w_1 \\
&u_2 \quad v_2 \quad w_2 \\
&\vdots \\
&u_{N-1} \quad v_{N-1} \quad w_{N-1}
\end{aligned}
$$

Output

Output the answer.

Sample Input 1 Copy

```
4
-3 2 2 -1
1 2 2
1 3 1
1 4 3
```

Sample Output 1 Copy

```
9
```

Initially, $x = (x_1, x_2, x_3, x_4) = (-3, +2, +2, -1)$. By operating as follows, all positrons and electrons can be annihilated with energy 9:

- Move one electron at vertex 1 to vertex 2. This costs energy 2, and $x = (-2, +1, +2, -1)$.
- Move one positron at vertex 2 to vertex 1. This costs energy 2, and $x = (-1, 0, +2, -1)$.
- Move one electron at vertex 4 to vertex 1. This costs energy 3, and $x = (-2, 0, +2, 0)$.
- Move one electron at vertex 1 to vertex 3. This costs energy 1, and $x = (-1, 0, +1, 0)$.

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- Move one electron at vertex 1 to vertex 3. This costs energy 1, and $x = (0, 0, 0, 0)$.

It is impossible to annihilate all positrons and electrons with energy 8 or less, so the answer is 9.

Sample Input 2 Copy

```
2
0 0
1 2 1
```

Sample Output 2 Copy

```
0
```

The condition may already be satisfied from the beginning.

Sample Input 3 Copy

```
5
-2 -8 10 -2 2
3 5 1
1 3 5
2 5 0
3 4 6
```

Sample Output 3 Copy

```
28
```

Language

Python (CPython 3.11.4)

Source Code

Open File | Customize | Toggle Editor | Auto Height

```
1
```

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* at most 512 KiB

* Your source code will be saved as Main.*extension*.

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