

Contest Duration: 2025-06-07(Sat) 22:00 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20250607T2100&p1=248>) - 2025-06-07(Sat) 23:40 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20250607T2240&p1=248>) (local time) (100 minutes)

[Back to Home \(/home\)](#)

[Top \(/contests/abc409\)](#)

[Tasks \(/contests/abc409/tasks\)](#)

[Clarifications \(/contests/abc409/clarifications\)](#)

[Results ▾](#)

[Standings \(/contests/abc409/standings\)](#)

[Virtual Standings \(/contests/abc409/standings/virtual\)](#)

[Editorial \(/contests/abc409/editorial\)](#)

[Discuss \(<https://codeforces.com/blog/entry/143567>\)](#)



E - Pair Annihilation

[Editorial \(/contests/abc409/tasks/abc409_e/editorial\)](#)



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 $1, 2, \dots, N$, and the edges are numbered $1, 2, \dots, N - 1$. 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

- $2 \leq N \leq 10^5$
- $|x_i| \leq 10^4$
- $\sum_{i=1}^N x_i = 0$
- $1 \leq u_j < v_j \leq N$
- $0 \leq w_j \leq 10^4$
- The given graph is a tree.
- All input values are integers.

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Input

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

```
N  
x1 x2 ... xN  
u1 v1 w1  
u2 v2 w2  
⋮  
uN-1 vN-1 wN-1
```

Output

Output the answer.

Sample Input 1

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

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Sample Output 1

[Copy](#)

```
9
```

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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 $x = (-1, 0, +1, 0)$.
- 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

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

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Sample Output 2

Copy

```
0
```

Copy

The condition may already be satisfied from the beginning.

Sample Input 3

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

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Sample Output 3

Copy

```
28
```

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