6/7/25, 9:48 AM E - Pair Annihilation

> 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)

↑ Top (/contests/abc409) Tasks (/contests/abc409/tasks)

? Clarifications (/contests/abc409/clarifications)

✓ Submit (/contests/abc409/submit?taskScreenName=abc409 e) **≡** Results **▼**

↓ Standings (/contests/abc409/standings)

↓ Virtual Standings (/contests/abc409/standings/virtual)

Custom Test (/contests/abc409/custom test) Editorial (/contests/abc409/editorial)

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E - Pair Annihilation Editorial (/contests/abc409/tasks/abc409_e/editorial)

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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_i and v_i and has weight w_i . 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

- $2 < N < 10^5$
- $\begin{array}{l} \bullet \;\; |x_i| \leq 10^4 \\ \bullet \;\; \sum_{i=1}^N x_i = 0 \end{array}$
- $1 \le u_j < v_j \le N$
- $0 \le w_i \le 10^4$

2025-06-07 (Sat) 09:48:08 -04:00

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

Input

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

Output

Output the answer.

Sample Input 1 Copy

```
Copy

-3 2 2 -1

1 2 2

1 3 1

1 4 3
```

Sample Output 1 Copy

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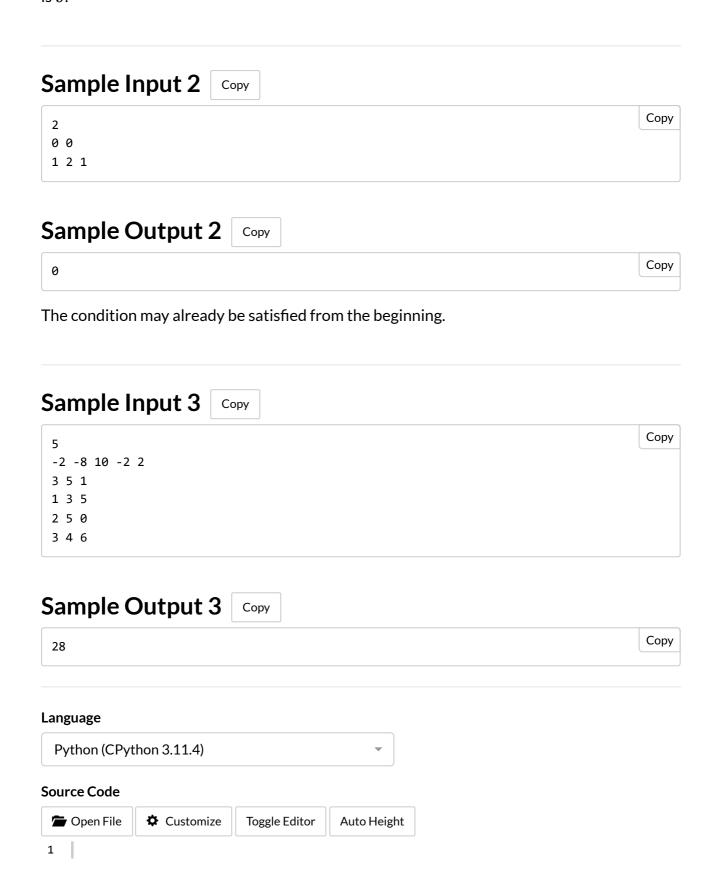
Initially, $x=(x_1,x_2,x_3,x_4)=(-3,+2,+2,-1)$. By operating as follows, all positrons and electrons can be annihilated with energy 9:

- 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 =2025-06-07 (Sat) (-1,0,+1,0).

6/7/25, 9:48 AM E - Pair Annihilation

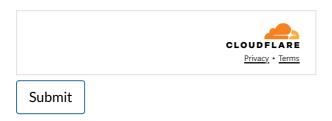
• Move one electron at vertex 1 to vertex 3. This costs energy 1, and x = (0, 0, 0, 0).

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



2025-06-07 (Sat) 09:48:08 -04:00

- * at most 512 KiB
- * Your source code will be saved as Main. extension.



'#telegram)

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2025-06-07 (Sat) 09:48:08 -04:00