Problem K. Wind of Change

Input file:	*standard input*
Output file:	*standard output*
Time limit:	12 seconds
Memory limit:	1024 mebibytes

The original title of this problem is "Tree Product Metric Voronoi Diagram Query Without One Point".

You are given two weighted trees T_1, T_2 of size N, where each vertex are labeled with numbers $1 \dots N$. Let $dist(T_1,\ i,\ j)$ be the total weight of the shortest path from node i to j in tree T_1, and define $dist(T_2,\ i,\ j)$ similarly.

Consider a point set of size N. Similar to Manhattan metric (in fact, this is a generalization of it), we can define the distance between two points $1 \le i,\ j \le N$: It is the sum of two distances, $dist(T_1,\ i,\ j) + dist(T_2,\ i,\ j)$. For each $1 \le i \le N$, please determine the "closest point" from the point i. Formally, for each i, you should find $min_{j \ne i} dist(T_1,\ i,\ j) + dist(T_2,\ i,\ j)$.

Input

In the first line, a single integer N denoting the number of vertices in both trees is given. $(2 \le N \le 250\,000)$

In the next $N - 1$ lines, description of the first tree is given. Each of the $N - 1$ lines contains three integers S_i, E_i, W_i, which indicates there is an edge connecting two vertices S_i, E_i with weight W_i $(1 \le S_i, E_i \le N, 1 \le W_i \le 10^9)$

In the next $N - 1$ lines, description of the second tree is given in the same format.

Output

Print N lines containing a single integer. In the i-th line, you should print a single integer denoting the answer for the point i.

Examples

standard input	standard output
5 1 2 10 2 4 20 3 4 30 4 5 50 1 2 15 1 3 25 1 4 35 1 5 25	25 25 85 65 105
9 5 7 6577 4 5 8869 5 9 9088 2 1 124 6 2 410 2 8 8154 4 8 4810 3 4 4268 3 9 763 6 2 8959 7 4 7984 3 8 504 8 6 9085 5 2 4861 1 9 8539 1 7 7834	18084 9369 9582 23430 26694 9369 23430 9582 22988