

CEOI '17 P4 - Building Bridges

Time limit: 1.4s **Memory limit:** 128M

A wide river has n pillars of possibly different heights standing out of the water. They are arranged in a straight line from one bank to the other. We would like to build a bridge that uses the pillars as support. To achieve this we will select a subset of pillars and connect their tops into sections of a bridge. The subset has to include the first and the last pillar.

The cost of building a bridge section between pillars i and j is $(h_i - h_j)^2$ as we want to avoid uneven sections, where h_i is the height of the pillar i . Additionally, we will also have to remove all the pillars that are not part of the bridge, because they obstruct the river traffic. The cost of removing the i^{th} pillar is equal to w_i . This cost can even be negative—some interested parties are willing to pay you to get rid of certain pillars. All the heights h_i and costs w_i are integers.

What is the minimum possible cost of building the bridge that connects the first and last pillar?

Input

The first line contains the number of pillars, n . The second line contains pillar heights h_i in the order, separated by a space. The third line contains w_i in the same order, the costs of removing pillars.

Output

Output the minimum cost for building the bridge. Note that it can be negative.

Constraints

- $2 \leq n \leq 10^5$
- $0 \leq h_i \leq 10^6$
- $0 \leq |w_i| \leq 10^6$

Subtask 1 (30 points)

- $n \leq 1\,000$

Subtask 2 (30 points)

- optimal solution includes at most 2 additional pillars (besides the first and last)
- $|w_i| \leq 20$

Subtask 3 (40 points)

- no additional constraints

Sample Input 1

```
6
3 8 7 1 6 6
0 -1 9 1 2 0
```

Sample Output 1

```
17
```