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Sommersemester 2017

Week 14 – (Adv.) Competitive Programming

Abgabe 31.07.2017 23:59 Uhr, über das Judge-Interface

bridgesurveillance: (3 points - 1 second timelimit)

The new headteacher of Hogwarts has rebuilt the bridge from the school area to the grounds of Hogwarts (the bridge blown-up by Neville in the last fight against the dark lord). But now, a lot students are using this bridge to disappear from the school area.

So Argus Filch got the task to punish all of them. But he cannot control the whole bridge - so he decided to install surveillance cams at the bridge to have a total overview over the whole bridge. A surveillance cam can only be installed at a pylon of the bridge.

Because the new headteacher doesn't trust these muggle technologies, Argus Filch has only a very limited budget. With this budget it is too expensive to install a cam at every pylon.

Instead, he would rather use surveillance system from one pylon to monitor others (and the area between them) as well.

The bridge has n pylons, numbered from 1 to n. The distance from the pylon numbered with i to the pylon numbered with 1 is d_i. As the pylons are distributed in linear order, the distance between pylons with numbers i and j is $|d_i - d_j|$. For the i-th pylon, the cost of installing a surveillance cam on it is c_i (the costs differ because the pylons have different heights). The *quality* of a surveillance of a pylon is inversely proportional to the distance to the nearest surveillance cam. Your goal is to help Argus Filch to optimize the trade-off between the quality of surveillance and the budget. Formally, determine a set of pylons $S \in \{1, \ldots, n\}$ in which the surveillance should be installed, such that

$$\sum_{s \in S} c_s + \sum_{i=1}^{n} \min_{s \in S} |d_i - d_s|$$

is as small as possible. Of course, S cannot be the empty set!

Input The first line of the input contains the number $t \leq 20$ of test cases. Each of the t test cases is described as follows.

- It starts with a line containing an integer n, $1 \leq n \leq 2500$, the number of pylons.
- The second line contains n integers $c_1, \ldots, c_n$, separated by space and such that $0 \leq c_i \leq 10^5$. Number c_i is the cost of install a surveillance cam at the pylon with number i.
- The third line contains n integers $d_1, \ldots, d_n$, separated by space and such that $0 \leq d_i \leq 10^6$. Here, d_i denotes the distance from the pylon with number i to the pylon with number 1. It is guaranteed that $d_1 = 0$ and $d_i < d_{i+1}$.

Output For each test case output the minimum value of

$$\sum_{s \in S} c_s + \sum_{i=1}^{n} \min_{s \in S} |d_i - d_s|,$$

with the constraint that S cannot be the empty set.

Points There are three groups of test sets.

(a) easy: For the first test set worths 1 point you can assume that $n \leq 100$.

(b) medium: For the second test set worths 1 point you can assume that $n \leq 1000$.

(c) hard: For the third test set worths 1 point there are no additional assumptions.

Sample Input

```
1
5
4 3 2 4 2
0 1 2 3 4
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Sample Output

```
8
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Argus Filch would buy cams for the third and the last pylon.