Grid Filling Game

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	1024 megabytes

You are playing a grid filling game. On the game interface, several squares are arranged in a row, and you need to fill each square with a **positive integer**. The system will then calculate the score based on the numbers you fill in.

Before each round of the game starts, the system will provide you with constraints for filling the squares. Suppose there are n squares arranged in a row for the current game, the system will provide two positive integers l_i, r_i for the i-th square, indicating that the number x_i you fill in the i-th square must satisfy $l_i \le x_i \le r_i$. After you have filled in the numbers, the system will separate the sequence of squares into several segments based on adjacent squares with different numbers. The system will then calculate the sum of the squares of the lengths of each segment, which is referred to as the **continuity** of the filling scheme.

For example, for the filling scheme $x = [1, 1, 3, 3, 5, 5, 5, 3, 3]$, the segmentation result is $\underline{1,1}, \underline{3,3}, \underline{5,5,5}, \underline{3,3}$, and the continuity corresponds to $2^2 + 2^2 + 3^2 + 2^2 = 21$.

The goal of this game is to **minimize continuity**. You need to determine the minimum value of continuity under the optimal filling strategy.

Input

You need to answer for multiple rounds of the game. The first line contains an integer T ($1 \le T \le 10^5$), representing the number of game rounds.

For each round of the game:

The first line of input contains a positive integer n ($1 \le n \le 10^6$), representing the number of squares.

The next line contains n positive integers l_i ($1 \le l_i \le 10^9$), representing the lower bound constraints for each square.

The following line contains n positive integers r_i ($1 \le r_i \le 10^9, l_i \le r_i$), representing the upper bound constraints for each square.

It is guaranteed that the total sum of n across all games does not exceed 10^6.

Output

For each round of the game, output a single integer representing the minimum value of continuity.

Example

standard input	standard output
3 3 1 1 4 5 1 4 6 1 2 3 4 4 4 3 3 3 4 5 6 7 1 1 2 2 1 1 1 1 2 2 2 2 1 1	3 6 17

Note

For the first round of the game, one possible filling scheme is $x = [3, 1, 4]$, which corresponds to a continuity of $1^2 + 1^2 + 1^2 = 3$.

For the second round of the game, one possible filling scheme is $x = [1, 2, 3, 4, 5, 6]$, which corresponds to a continuity of $1^2 + 1^2 + 1^2 + 1^2 + 1^2 + 1^2 = 6$.

For the third round of the game, one possible filling scheme is $x = [1, 1, 2, 2, 2, 1, 1]$, which corresponds to a continuity of $2^2 + 3^2 + 2^2 = 17$.