DWITE '11 R4 #5 - Comet Vomit

DWITE, January 2012, Problem 5

Comets have recently passed through your region of space, leaving behind a trail of dust. You would like to get a rough idea of the extent of this pollution, by finding the two most distant dust particles. Here, we define distance as the sum of differences between the x, y, and z coordinates. For example, the distance between two particles at (1, 4, 9) and (4, 4, 4) is $3 + 0 + 5 = 8$.

There are N comets, and we describe each comet with 11 numbers: (A, B, C), (D, E, F), (G, H, I), and (U, V). A comet's position at time t is given by ($At^2 + Bt + C$, $Dt^2 + Et + F$, $Gt^2 + Ht + I$). A comet leaves behind a particle of dust at every integer time t between U and V, inclusive.

For example, consider a comet described by $(1, 0, 0)$, $(0, -2, 1)$, $(0, 0, 6)$, and $(1, 5)$. It leaves behind 5 dust particles, at $(1, -1, 6)$, $(4, -3, 6)$, $(9, -5, 6)$, $(16, -7, 6)$, and $(25, -9, 6)$. The first and last points are the most distant pair, with distance $24 + 8 + 0 = 32$.

Pay close attention to the bounds. You may assume that there will be fewer than $100\,000$ dust particles, and that all positions will fit within a signed 32-bit integer.

$1 \leq N \leq 100$

$-500 \leq A, D, G, U, V \leq 500$

$-100\,000 \leq B, C, E, F, H, I \leq 100\,000$

$U \leq V$

The input will contain 5 test cases. Each will begin with a single integer N. N lines will follow, each containing 11 integers, in the order described above.

The output will contain 5 lines of output, one integer for each test case: the distance between the most distant pair of dust particles. There will be at least 2 dust particles.

Sample Input

```
1
1 0 0 0 -2 1 0 0 6 1 5
3
3 1 4 1 5 9 2 6 5 3 58
2 7 1 8 2 8 1 8 2 8 45
1 6 1 8 0 3 3 9 8 8 74
```

Sample Output

```
32
66726
```

 Problem Resource: DWITE