4257 Hubble Space Telescope

An astrophysicist makes observations of a spiral galaxy known as the Andromeda Galaxy using the Hubble space telescope. In particular, he is interested in the motion of n stars in the galaxy. Each star moves with a constant velocity along a straight line in the picture of the Hubble space telescope. Among the n stars there is a special star named *alpha*. He wants to know when the maximum distance from *alpha* to the remaining $n-1$ stars is minimized.

The picture screen of the Hubble space telescope can be represented by a 2-D Cartesian coordinate system and let $S = \{s_0, s_1, \ldots, s_{n-1}\}$ be a set of n stars in the plane. Assume that the s_0 is the star *alpha*. A star s_i of S moves along the trajectory $p_i + tv_i$ over time t, where $p_i = (x_i, y_i)$ is the initial position of s_i in the 2-D coordinate system and $v_i = (a_i, b_i)$ is the velocity vector of s_i. We assume that there is no actual collision of two stars, i.e. the two stars pass through each other when they meet a point in 2-D space. Given a set of stars and their velocity, compute the time when the maximum distance from *alpha* to the remaining stars is minimized within 10^5 time units. If there is more than one such time, then output the earliest time.

Following figure 1 shows an example with 4 stars. The arrow of a star indicates its velocity vector. In this example, when the time is 3, the maximum distance from *alpha* to the remaining 3 stars is minimized.

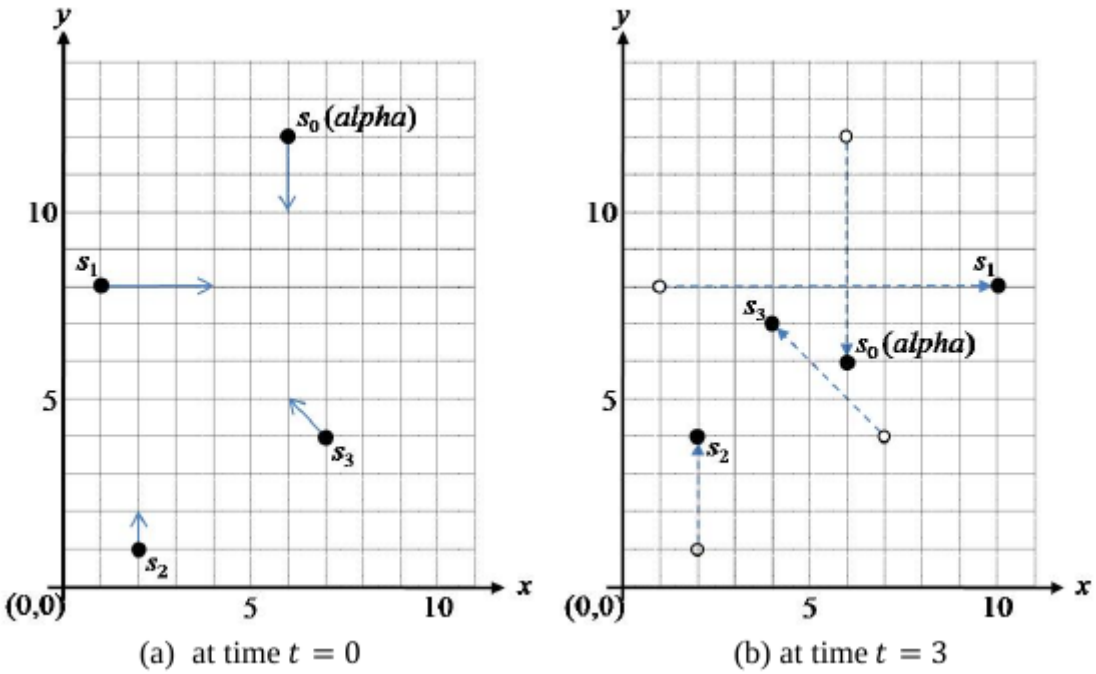

Figure 1. An Example.

Input

The input consists of T test cases. The number of test cases T is given in the first line of the input. Each test case starts with a line containing an integer n ($2 \le n \le 50,000$), the number of stars of S. Each of the next n lines contains four integers x_i, y_i and a_i b_i; (x_i, y_i) is the position of a star s_i at time zero and (a_i, b_i) is the velocity vector of the star s_i ($-200,000 \le x_i, y_i \le 200,000, -500 \le a_i, b_i \le 500$). Two or more stars of S may have the same coordinates at time zero.

Output

For each test case, print the time when the maximum distance is minimized from s_0 (*alpha*) to the remaining $n-1$ stars $\{s_1, s_2, \ldots, s_{n-1}\}$ within 10^5 time units, rounded to 4 fractional digits, on a line by itself.

Sample Input

```
5
4
6 12 0 -2
1 8 3 0
2 1 0 1
7 4 -1 1
2
1000 1000 -1 0
-1000 -1000 1 0
5
0 0 0 0
-20000 0 10 0
19990 0 -10 0
0 19900 0 -10
0 -19999 0 10
8
-621 -213 3 1
-875 782 1 -4
584 700 -5 -2
-12 -628 3 2
-771 -460 1 3
676 57 -1 -2
420 -864 -2 4
190 -950 -4 5
2
-200000 0 2 0
200000 0 -2 0
```

Sample Output

```
3.0000
1000.0000
1995.0000
196.4510
100000.0000
```