

Round 2 2008

[A. Cheating a Boolean Tree](#)

[B. Triangle Areas](#)

C. Star Wars

[D. PermRLE](#)

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Submissions

Cheating a Boolean Tree

5pt	Not attempted 1495/1706 users correct (88%)
10pt	Not attempted 1313/1435 users correct (91%)

Triangle Areas

5pt	Not attempted 1177/1733 users correct (68%)
15pt	Not attempted 163/518 users correct (31%)

Star Wars

10pt	Not attempted 192/398 users correct (48%)
20pt	Not attempted 128/206 users correct (62%)

PermRLE

5pt	Not attempted 1322/1388 users correct (95%)
30pt	Not attempted 83/322 users correct (26%)

Top Scores

Eryx	100
bmerry	100
austrin	100
ACRush	100
darnley	100
mystic	100
Ahyangyi	100
halyavin	100
tourist	100
misof	100

Problem C. Star Wars

This contest is open for practice. You can try every problem as many times as you like, though we won't keep track of which problems you solve. Read the [Quick-Start Guide](#) to get started.

Small input
10 points

Solve C-small

Large input
20 points

Solve C-large

Problem

Near the planet Mars, in a faraway galaxy eerily similar to our own, there is a fight to the death between the imperial forces and the rebels. The rebel army has **N** ships which we will consider as points $\langle x_i, y_i, z_i \rangle$. Each ship has a receiver with power **p_i**. The rebel army needs to be able to send messages from the central cruiser to all the ships, but they are tight on finances, so they cannot afford a strong transmitter.

If the cruiser is placed at $\langle x, y, z \rangle$, and one of the other ships is at $\langle x_i, y_i, z_i \rangle$ and has a receiver of power **p_i**, then the power of the cruiser's transmitter needs to be at least:

$$(|x_i - x| + |y_i - y| + |z_i - z|) / p_i$$

Your task is to find the position for the cruiser that minimizes the power required for its transmitter, and to output that power.

Input

The first line of input gives the number of cases, **T**. **T** test cases follow.

Each test case contains on the first line the integer **N**, the number of ships in the test case.

N lines follow, each line containing four integer numbers **x_i**, **y_i**, **z_i** and **p_i**, separated by single spaces. These are the coordinates of the i-th ship, and the power of its receiver. There may be more than one ship at the same coordinates.

Output

For each input case, you should output:

Case #X: Y

where **X** is the number of the test case and **Y** is the minimal power that is enough to reach all the fleet's ships. Answers with a relative or absolute error of at most 10^{-6} will be considered correct.

Limits

$$1 \leq T \leq 10$$

$$0 \leq x_i, y_i, z_i \leq 10^6$$

$$1 \leq p_i \leq 10^6$$

Small dataset

$$1 \leq N \leq 10$$

Large dataset

$$1 \leq N \leq 1000$$

Sample

Input	Output
3	Case #1: 3.500000
4	Case #2: 0.000000
0 0 0 1	Case #3: 2.333333
1 2 0 1	
3 4 0 1	
2 1 0 1	
1	
1 1 1 1	
3	

```
1 0 0 1
2 1 1 4
3 2 3 2
```

In the first test case, the four ships have coordinates (0, 0, 0), (1, 2, 0), (3, 4, 0), (2, 1, 0) and powers 1, 1, 1, 1 respectively. We can place a cruiser with the power 3.5 at the coordinates (1.5, 2, 0) which will be able to reach all the ships.

In the second case we can place the cruiser right on top of the ship, with transmitter power 0.

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