Magnet

SEASON 6 – ROUND SIX – 250 points

In a Cartesian plane are placed metal particles. Each particle is staying still, has virtually no size (we represent it as a point) and has integer coordinates.

From the top of the plane ($y \to \infty$) descends a magnet rod with fixed girth, vertically toward the bottom (we can see it as a rectangle without its top side). If during the descent the lower surface of the rod reaches a particle, the rod pulls it and starts rising back to the top, removing it from the plane. Notice that the rod does not pull a particle if it touches it with its ends (the particle must be interior to the lower side of the rectangle in order to be pulled) but rather continues downwards.

Let us choose a concrete particle. We need to determine the maximal girth of the magnet rod that would be able to pull out the chosen particle (i.e. it can descend to the chosen particle without colliding with other particles on its way). We do not consider it a problem if the rod pulls out other particles simultaneously.

When removing particles we can use the fact that we know the temperature of melting of each particle. In this way, if we warm the rod to a temperature higher or equal to the temperature of melting of some particle, it will melt it on contact, which will enable it to continue downwards to the target particle. Nevertheless, the temperature must not be so high that it melts the target particle. When descending, the rod does not cool down.

For each particle find the desired maximal girth of the rod.

Clarification: For each particle the rod must descent exactly once. The determination of the answer for each particle is independent.

Input

The first line of the input file `magnet.in` contains an integer N – the number of particles. Next are N lines, each of which contains three integer values – the coordinates of the particle and its temperature of melting.

Output

In the output file `magnet.out` write N lines – on the i-th line write the desired maximal girth for the i-th particle from the input. If it is impossible to pull out one particle, output 0; if the rod can have unlimited girth, output “inf” without the quotes.

Constraints

$1 \leq N \leq 10^5$

The coordinates are positive integers not greater than 10^5

The temperatures are positive integers not greater than 10^6

Time limit: 1 sec

Memory limit: 256 MB

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Example

Input (magnet.in)	Output (magnet.out)
7 3 4 20 4 3 10 2 6 20 5 6 200 5 1 1 1 3 100 1 6 30	3 2 inf inf 0 inf inf