Round 1B 2017

A. Steed 2: Cruise Control
B. Stable Neigh-bors
C. Pony Express

Contest Analysis
Questions asked

Problem A. Steed 2: Cruise Control

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
11 points

Download A-small-practice.in

your output file: Choose file No file chosen

source file(s): not needed for the practice contest

Submit file Hide

Large input
14 points

Download A-large-practice.in

your output file: Choose file No file chosen

source file(s): not needed for the practice contest

Submit file Hide

Problem

Annie is a bus driver with a high-stress job. She tried to unwind by going on a Caribbean cruise, but that also turned out to be stressful, so she has recently taken up horseback riding.

Today, Annie is riding her horse to the east along a long and narrow one-way road that runs west to east. She is currently at kilometer 0 of the road, and her destination is at kilometer **D**; kilometers along the road are numbered from west to east.

There are **N** other horses traveling east on the same road; all of them will go on traveling forever, and all of them are currently between Annie's horse and her destination. The i-th of these horses is initially at kilometer $\mathbf{K_i}$ and is traveling at its maximum speed of $\mathbf{S_i}$ kilometers per hour.

Horses are very polite, and a horse H_1 will not pass (move ahead of) another horse H_2 that started off ahead of H_1. (Two or more horses can share the same position for any amount of time; you may consider the horses to be single points.) Horses (other than Annie's) travel at their maximum speeds, except that whenever a horse H_1 catches up to another slower horse H_2, H_1 reduces its speed to match the speed of H_2.

Annie's horse, on the other hand, does not have a maximum speed and can travel at any speed that Annie chooses, as long as it does not pass another horse. To ensure a smooth ride for her and her horse, Annie wants to choose a single constant "cruise control" speed for her horse for the entire trip, from her current position to the destination, such that her horse will not pass any other horses. What is the maximum such speed that she can choose?

Input

The first line of the input gives the number of test cases, **T**; **T** test cases follow. Each test case begins with two integers **D** and **N**: the destination position of all of the horses (in kilometers) and the number of other horses on the road. Then, **N** lines follow. The i-th of those lines has two integers $\mathbf{K_i}$ and $\mathbf{S_i}$: the initial position (in kilometers) and maximum speed (in kilometers per hour) of the i-th of the other horses on the road.

Output

For each test case, output one line containing `Case #x: y`, where `x` is the test case number (starting from 1) and `y` is the maximum constant speed (in kilometers per hour) that Annie can use without colliding with other horses. `y` will be considered correct if it is within an absolute or relative error of 10^{-6} of the correct answer. See the FAQ for an explanation of what that means, and what formats of real numbers we accept.

Limits

$1 \le \mathbf{T} \le 100$.
$0 < \mathbf{K_i} < \mathbf{D} \le 10^9$, for all i.
$\mathbf{K_i} \ne \mathbf{K_j}$, for all $i \ne j$. (No two horses start in the same position.)
$1 \le \mathbf{S_i} \le 10000$.

Small dataset

$1 \le \mathbf{N} \le 2$.

Large dataset

$1 \le \mathbf{N} \le 1000$.

Sample

Input	Output
3 2525 1 2400 5 300 2 120 60 60 90 100 2 80 100 70 10	Case #1: 101.000000 Case #2: 100.000000 Case #3: 33.333333

In sample case #1, there is one other (very slow!) horse on the road; it will reach Annie's destination after 25 hours. Anything faster than 101 kilometers per hour would cause Annie to pass the horse before reaching the destination.

In sample case #2, there are two other horses on the road. The faster horse will catch up to the slower horse at kilometer 240 after 2 hours. Both horses will then go at the slower horse's speed for 1 more hour, until the horses reach Annie's destination at kilometer 300. The maximum speed that Annie can choose without passing another horse is 100 kilometers per hour.