Problem C: Close Trains

Advanced Algorithms for Programming Contests

Restrictions

Time: 2 seconds
Memory: 512 MB

Problem description

In consequence of a series of tragic events on the rails between the two cities of the small country of Dreamland, its government finally acknowledged that the train schedule needed to change. A detailed look on the rails' condition and environment showed that the optimal solution is the following schedule: Each train starts with pace v_1 meters per minute and holds it for T_1 minutes, the next T_2 minutes it travels at v_2 meters per minute and so on, until, finally, the last T_N minutes are traveled at v_N meters per minute. In some of those time intervals the train could stand still (pace 0).

In addition to the new schedule, the government also came up with a new safety guideline: The distance between two trains traveling one after another should be at least L meters at all times. Find the minimum amount of time a train has to wait after his predecessor's start in order to adhere to the safety guideline, assuming both trains meticulously follow the schedule described above.

Input

The input consists of

- one line containing two integers L ($100 \leq L \leq 10^4$) – the smallest permitted distance – and N ($1 \leq N \leq 10^3$) – the number of segments in the schedule
- N lines each containing a pair of integers T_i and v_i ($1 \leq T_i \leq 10^3$, $0 \leq v_i \leq 10^3$). The pairs are of course given in the order of indexation.

Output

Output the smallest permitted time difference between the starts of two successive trains with precision at least 10^{-3}.

Sample input and output

Input	Output
1000 4 10 0 30 80 15 0 20 100	27.500000