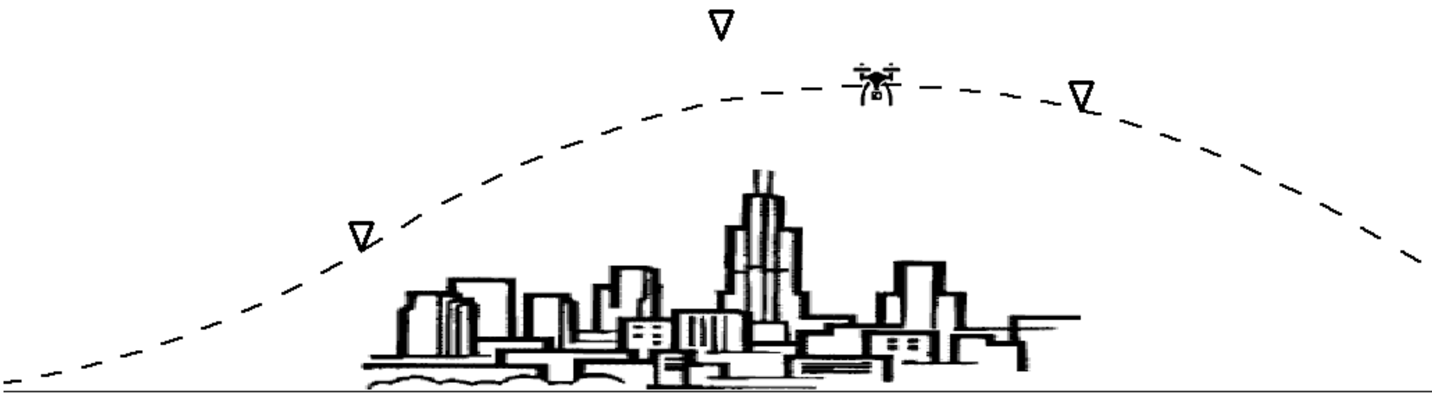
D • Magic Drone

For this problem, you're finally going to get a chance to use the drone you won a few years ago at the ICPC contest. The FAA is still cracking down on limiting the functionality of unmanned aircraft systems (UAS) so the waypoints (∇) impose legal regulations on the maximum altitude at which it is permitted to fly.



To be specific, you will fly your drone over a straight-line sidewalk which extends from **–∞** to **+∞**. At position $\mathbf{x}_i$ feet, the regulation forbids flying at any altitude above $\mathbf{y}_i$ feet. As a result, you may be led to think that at each $\mathbf{x}_i$ you can fly up and take a picture of the city from altitude $\mathbf{y}_i$. In reality, physical constraints may prevent you from doing so.

You may start your drone at rest from any point on the ground (**y**=0). While it is in the air, it will always move at a horizontal speed of exactly **V** *mph*. Its vertical acceleration is controllable within the range [$\mathbf{a}_{min}$, $\mathbf{a}_{max}$] *mph/s*, with zero response time, regardless of current altitude. It must eventually land smoothly, meaning that the vertical velocity must be zero at both takeoff and landing.

For each specified point $\mathbf{x}_i$, compute the maximum reachable altitude $\mathbf{y'}_i$ that can be achieved in a flight that meets all of the physical and legal constraints. Note that it is not necessary to reach all of the maxima in one continuous flight. Of course, it must be the case that $\mathbf{y'}_i$ <= $\mathbf{y}_i$.

Note that the regulations are point constraints. The drone must be at or below $\mathbf{y}_i$ at $\mathbf{x}_i$ but may have non-zero vertical velocity at $\mathbf{x}_i$.

Input

The input consists of multiple lines. The first line contains four space separated values: the number of points, ***N*** ($1 <= N <= 2000$), the horizontal speed **V**, ($0 < V <= 10$), in mph, and the vertical acceleration range, a_{min} and a_{max}, ($-5 <= a_{min} < 0 < a_{max} <= 5$) in mph/s.

The next ***N*** lines each specify a point, (x_i, y_i), ($x_i < x_{i+1}$ and $0 <= y_i <= 400$). (FAA ***Rule 14 CFR Part 107*** says that a UAS may not go higher than 400 feet.)

Output

Output consists of **N** lines. Each line contains a single floating point value which is the implied maximum altitude y'_i in feet (to 3 decimal places) for the corresponding x_i,.

Sample Input 1:

Input	Output
3 2 -2 2	30.000
20 30	284.316
70 400	250.000
80 250	

Sample Input 2

Input	Output
3 2 -2 2	350.000
60 350	350.758
70 400	250.000
90 250	

Sample Input 3:

Input	Output
3 2 -1 1	200.000
38 200	287.500
60 400	300.000
70 300	

Sample Input 4:

Input	Output
3 1 -1 1	300.000
21 300	213.336
35 400	150.000
40 150	