Problem 12. Give the Parabellum away

Input file:	input.txt
Output file:	output.txt
Time limit:	2 seconds
	3 seconds (for Java)
Memory limit:	256 megabytes

Ostap is strolling leisurely along the Yessentuki-Moscow route, and scuttling along him is Kislarsky, begging to take his Parabellum away. Kislarsky keeps distance to Ostap strictly constant. Also he keeps constant his speed relative to the ground. He is moving counterclockwise relative to Ostap. Ostap's velocity stays constant (both direction and magnitude-wise).

Help Kislarsky to get away from the Alliance of the Sword and Ploughshare. Find the coordinates of the points where he will be in the given time moments t_i.

Input

The first line of the input file contains eight integers: p_x, p_y, q_x, q_y, u_x, u_y, v, N, where:

- p_x, p_y — the location of Ostap in the initial moment ($|p_x|, |p_y| \le 10^4$),
- q_x, q_y — the location of Kislarsky in the initial moment ($|q_x|, |q_y| \le 10^4$),
- u_x, u_y — the projections of Ostap's velocity upon the coordinate axes OX and OY respectively ($|u_x|, |u_y| \le 10$),
- v — the speed of Kislarsky relative to the ground ($\sqrt{u_x^2 + u_y^2} + \frac{1}{2} < v \le 10$),
- N — the number of time moments when the location of Kislarsky is of interest ($1 \le N \le 100\,000$).

The second line contains N real numbers t_i – the moments in time for which the location of Kislarsky must be found ($0 \le t_i \le 1000$). All numbers t_i are provided with at most five digits after decimal point.

It is guaranteed that initial locations of Ostap and Kislarsky are different.

Output

The output file must contain N pairs of real numbers (two per line): X and Y coordinates of Kislarsky's location at the time moment t_i.

The absolute or relative error of each number must not exceed 10^{-5}.

Example

input.txt	output.txt
2 3 4 5 1 1 2 10 1 2 3 4 5 6 7 8 9 10.00	3.311667781 6.811203158 1.618058050 6.525238521 2.396313856 4.895093459 4.356603786 4.697990251 6.268584256 5.267779107 8.050839947 6.172029827 9.724368272 7.265902232 11.304988035 8.490616365 12.800188718 9.818413289 14.210788762 11.235796766