Meteor Shower

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Colin hears that there will be a meteor shower in a few days. Being a romantic boyfriend, he plans to take Eva to watch it.

We model the situation on a two-dimensional plane. The Earth is a circle centered at the origin O with radius r; its surface consists of the points satisfying $x^2 + y^2 = r^2$.

The meteor shower contains n meteors. Meteor i appears at the point (x_i, y_i) and then moves continuously along the ray starting at this point in the direction of the nonzero vector (dx_i, dy_i). It keeps moving in this direction unless it collides with the Earth. Meteors do not collide with one another, so their movements are independent.

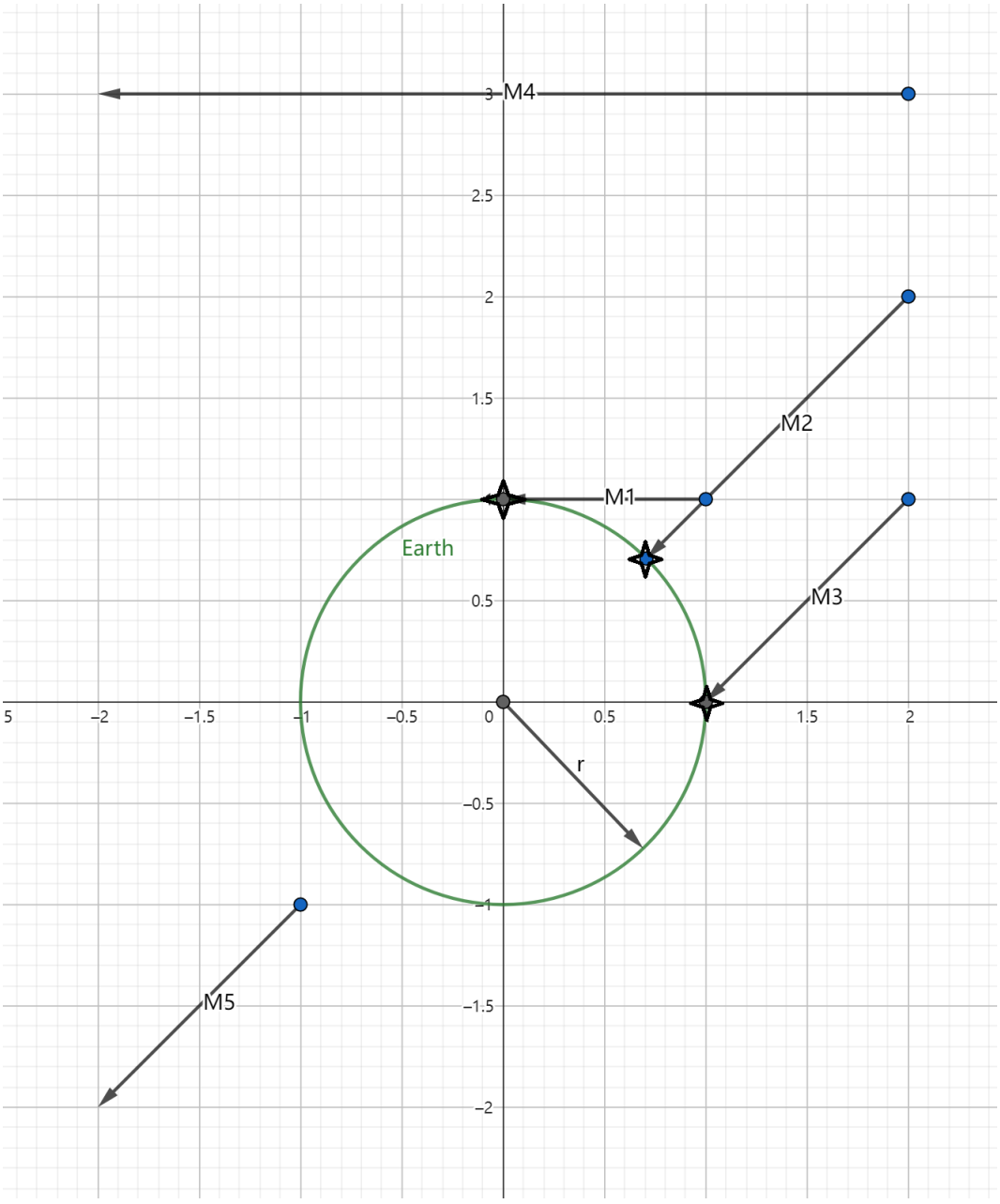


Illustration of the example.

For a meteor that never collides with the Earth, the optimal observation site is the point on the Earth's surface with minimum distance to the meteor's trajectory ray. If a meteor does collide with the Earth—touching the surface counts as a collision—Colin instead wants the first point at which it reaches the surface.

For every meteor, determine which case occurs:

- If it collides with the Earth, output "Crash at (x, y)", where (x, y) is its first collision point.
- Otherwise, output "Observe at (x, y)", where (x, y) is the optimal observation site.

Print every coordinate with exactly four digits after the decimal point.

Input

The first line contains two integers n and r ($1 \le n \le 10^5$, $1 \le r \le 10^9$): the number of meteors and the radius of the Earth.

Each of the next n lines contains four integers x_i, y_i, dx_i, and dy_i ($-10^9 \le x_i, y_i, dx_i, dy_i \le 10^9$). The pair (x_i, y_i) is meteor i's starting point, and (dx_i, dy_i) is its direction vector. It is guaranteed that $(dx_i, dy_i) \neq (0, 0)$.

It is also guaranteed that the distance from O to every meteor's starting point is at least $r + 0.1$.

Output

Output n lines. Line i must have one of the following forms:

- "Crash at (x, y)" if meteor i collides with the Earth, where (x, y) is its first collision point;
- "Observe at (x, y)" otherwise, where (x, y) is the optimal observation site.

Do not print the quotation marks. Print both coordinates with exactly four digits after the decimal point. A coordinate is accepted if its absolute error from the jury answer does not exceed 10^{-3}.

Example

standard input	standard output
5 1 1 1 -1 0 2 2 -1 -1 2 1 -1 -1 2 3 -1 0 -1 -1 -1 -1	Crash at (0.0000,1.0000) Crash at (0.7071,0.7071) Crash at (1.0000,0.0000) Observe at (0.0000,1.0000) Observe at (-0.7071,-0.7071)

Note

The answers for the example are illustrated in the figure in the statement.