Problem E. Brushing King

Description

Mr. Big is one of students of Brushing King. He is always sleepy when the course begins. But Brushing King will punish the students who sleep in the class. In order not to be brushed by Brushing King, Big wants to know if there is a safe place for him to sleep through the whole class.

The Brushing King could be considered as a point. His sight is considered as a circular sector with angle θ and radius R.

Big selected several positions to sleep and he wants to know which one will not be seen by Brushing King during the course.

Brushing King always walks towards a direction at a speed of 1 and the direction vector of his movement will be given. He may rotate his sight or his speed direction at some moment. The course ends right after his last action.

Note that once the position is in the sight of Brushing King (even when Brushing King just rotates his head), Mr. Big will be caught by Brushing King. Hitting on the edge of the sight will be also considered as being seen.

Input

The first line of the input gives the number of test cases, T. T test cases follow.

For each test case, the first line contains n, m, θ, R ($1 \le n, m, R \le 1000$, $0 < \theta < 180$) means the number of position Mr. Big selected and the number of Brushing King's actions. The angle will be given in degree.

The second line contains six integers p_x, p_y, v_x, v_y, d_x, d_y.

(p_x, p_y) is the initial position of Brushing King, (v_x, v_y) indicates the initial direction vector from the initial position of Brushing King to the midpoint of the arc of his sight sector (Note that it's **NOT** guaranteed $|(v_x, v_y)|, |(d_x, d_y)|$ equals to 1 or R.). (d_x, d_y) is the **direction vector** of Brushing King's movement. ($-2000 \le p_x, p_y \le 2000$, $1 \le |(v_x, v_y)|, |(d_x, d_y)| \le 2000$).

Then n lines follow, each of which contains two integers x, y ($-2000 \le x, y \le 2000$) means the coordinate of position selected by Mr.Big.

Then m lines follow, each of which contains three integers, p, t, α ($0 \le t \le 2000$, $0 \le \alpha \le 180$). There are two types of actions:

1. $p = 1$ means that at time t, Brushing King rotates the direction vector of his sight (i.e. the direction vector from his position to the midpoint of the arc of the sight sector) by α degrees clockwise.
2. $p = 2$ means that at time t, Brushing King rotates the direction vector of his movement by α degrees clockwise.

All the t will be given in strictly increasing order. Brushing King's actions are incredibly fast and they could be treated as finished in no time.

Output

For each test case output one line containing "Case #x:", where x is the test case number (starting from 1), followed by n numbers, each number is 0 or 1. The i-th number is 1 means that Mr. Big can survive in i-th position, otherwise 0.

Samples

Sample Input	Sample Output
1 3 2 90 3 0 0 0 1 0 1 50 1 -1 0 -100 0 1 1 180 1 100 0	Case #1: 101