Problem B: Broken Borders
Time limit: 8 seconds

Bailey loves to solve puzzles. Currently, she is obsessed with BorderQuiz, where you are presented a piece of the border of some random country and have to find the name of the country. In this game, the border of each country is a simple polygon, so you do not have to worry about silly real-world stuff like curved border segments, enclaves, exclaves, second-order enclaves, condominiums and the like. As a single piece of a border is often not sufficient for identifying a country, you may request another piece of the border until you manage to solve the puzzle. Of course, the more guesses and pieces of the border you require the worse your score gets.

Bailey is very good at this game, to the point that it has started to bore her. As her thoughts wander off, she begins to envision a (perhaps more interesting) variant of (or sequel to) BorderQuiz: Is it possible to reconstruct the entire border of a country using only the border pieces you have seen so far? To make it even more interesting, you may use each border piece arbitrarily often and border segments and vertices have to match *exactly*.

More formally, can the border pieces be rotated, translated and optionally mirrored such that

- each vertex of a border piece lies on a vertex of the country border,
- each line segment of a border piece lies on a line segment of the country border, and
- each line segment of the country border lies on (at least) one line segment of a border piece.

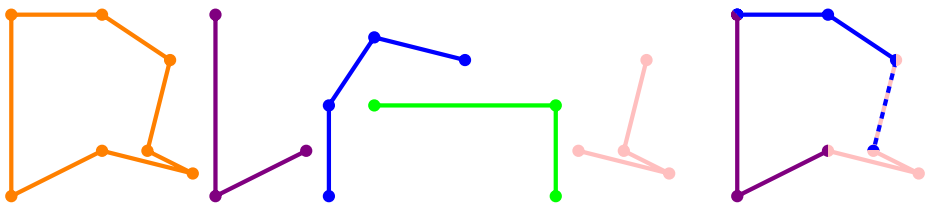

Figure B.1: Visualisation of Sample Input 1: The country border can be constructed by rotating the second border piece clockwise by 90°, not rotating the first and fourth piece, and translating them appropriately. The third piece is not required.

Figure B.2: Visualisation of Sample Input 5: Note that the border pieces can cover the country border, but the leftmost vertex of the second (blue) border piece would not coincide with a vertex of the country border.

Figures B.1 and B.2 illustrate Sample Inputs 1 and 5, respectively.

Input

The input consists of:

- One line with two integers n and m ($3 \leq n \leq 7 \cdot 10^5, 1 \leq m \leq 10^6$), the number of vertices of the country border and the number of border pieces.
- n lines, each with two integers x and y ($1 \leq x, y \leq 10^9$), describing the vertices of the country border.
- m descriptions of border pieces, the ith of which consists of:
  - One line with an integer k_i ($2 \leq k_i < n$), the number of vertices of the ith country border.
  - k_i lines, each with two integers x and y ($1 \leq x, y \leq 10^9$), describing the vertices of the ith country border.

Additionally, the input satisfies the following constraints:

- In total, the country borders have at most 10^6 vertices, i.e. $\sum_{i=1}^{m} k_i \leq 10^6$.
- The vertices of the country border are given in counter-clockwise order.
- No three consecutive vertices of the country border or a border piece are collinear.
- The country border and border pieces are simple, i.e. two non-incident line segments do not intersect and two incident line-segments intersect in exactly one vertex.

Output

Print either "YES" or "NO", depending on whether it is possible to reconstruct the country border from the border pieces.

Sample Input 1

```
7 4
1 1
5 3
9 2
7 3
8 7
5 9
1 9
3
1 9
1 1
5 3
4
7 7
3 8
1 5
1 1
3
9 1
9 5
1 5
4
5 3
9 2
7 3
8 7
```

Sample Output 1

```
YES
```

Sample Input 2

```
4 1
2 1
3 1
3 2
2 2
2
2 1
2 2
```

Sample Output 2

```
YES
```

Sample Input 3

```
4 1
1 1
2 1
2 2
1 2
3
1 1
2 1
2 2
```

Sample Output 3

```
YES
```

Sample Input 4

```
7 3
1 1
5 3
9 2
7 3
8 7
5 9
1 9
4
7 7
3 8
1 5
1 1
3
9 1
9 5
1 5
4
5 3
9 2
7 3
8 7
```

Sample Output 4

```
NO
```

Sample Input 5

```
4 3
1 1
5 1
4 3
2 2
3
6 1
7 2
9 3
3
10 1
11 1
10 3
3
16 1
12 1
15 3
```

Sample Output 5

```
NO
```