



Problem F: Zone

Time limit: 1s; Memory limit: 256 MB

A research team is planning to build a large observation zone on a coordinate plane. The zone must be a square whose sides are parallel to the coordinate axes.

Several objects have already been placed on the map:

- There are n observation points, each represented by a single point.
- There are m buildings, each represented by a rectangle whose sides are parallel to the coordinate axes.
- There are q protected areas, each represented by a circle.

The observation zone must completely contain every object on the map. In other words, every point, every rectangle, and every circle must lie entirely inside the square.

Your task is to determine the minimum possible area of the observation zone.

Input

The first line of the input contains a single integer t ($1 \leq t \leq 10^4$) — the number of test cases. t test cases follow, each presented as below:

- The first line contains three integers n , m , and q ($1 \leq n, m, q \leq 10^5$), representing the number of observation points, rectangles, and circles.
- The next n lines each contain two integers x, y ($0 \leq x, y \leq 10^8$), describing an observation point at coordinates (x, y) .
- The next m lines each contain four integers x_1, y_1, x_2, y_2 ($0 \leq x_1, y_1, x_2, y_2 \leq 10^8$, $x_1 < x_2$, $y_1 < y_2$), describing a rectangular building whose bottom-left corner is (x_1, y_1) and top-right corner is (x_2, y_2) .
- The next q lines each contain three integers x, y, r ($0 \leq x, y, r \leq 10^8$), describing a circular protected area with center (x, y) and radius r .

It is guaranteed that the sum of n , the sum of m , and the sum of q over all test cases do not exceed 10^5 .

Output

For each test case, print a single integer — the minimum possible area of a square, with sides parallel to the coordinate axes, that completely contains all the given objects.

Sample

Sample Input	Sample Output
<pre> 3 2 2 2 8 4 5 7 1 1 5 3 3 0 8 5 3 5 2 7 2 1 1 1 1 5 5 4 4 6 6 5 5 1 1 1 1 3 6 1 2 5 6 3 4 1 </pre>	<pre> 49 4 16 </pre>

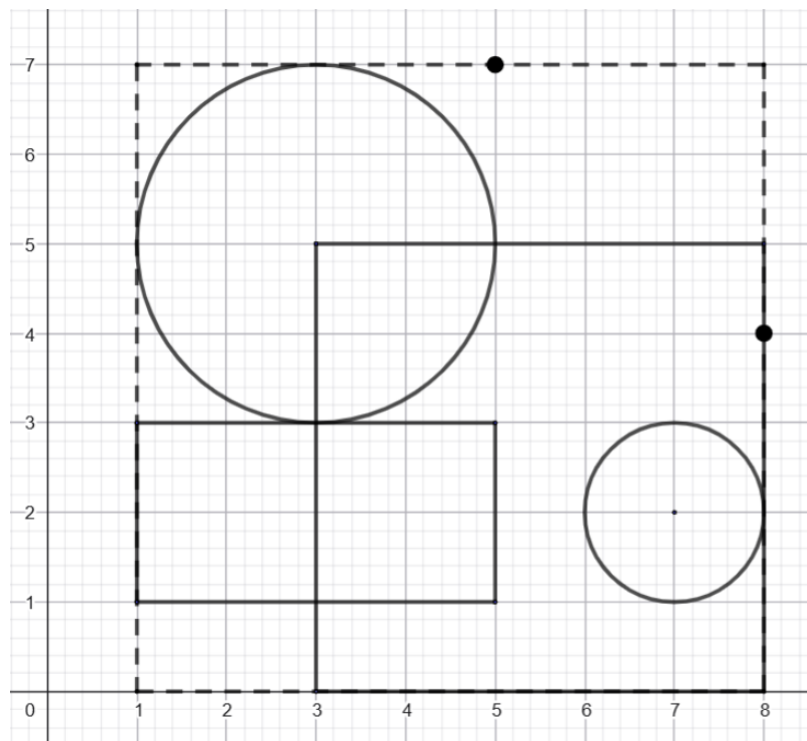


Figure 1: Illustration for the first test case

Sample Explanation

Figure 1 illustrates the first test case. The observation zone with the minimum possible area is indicated by dashed lines.