4265 Lost Treasure

There is an old legend that there is a number of lost ships lay on the seafloor of the Taiwan Straight. Among them, the ship *General II* is one of the most famous ships, and people believe that *General II* was sunk with a tremendous amount of treasures. In the past few decades, tens of groups have tried to raise the treasures from *General II*, but all of the attempts are failed. The reason is simply because those treasures are too fragile to tolerate any impacts in the raising, and unfortunately there are many obstacles scattered inside the ship such that raising a treasure from *General II* becomes an extremely challenging task.

Being a senior underwater-raising analyst of the International Organization of Underwater Archaeology (IOUA), you are now assigned to raise an important treasure from *General II*. Before that, the Underwater Scene Investigation Department (USID) of IOUA will investigate the detail information (e.g., the locations, sizes, and shapes of the obstacles) of *General II*, as well as the information (e.g., location, size, and shape) of the treasure. Then, they will give you a ship map of *General II* that can help you raise the treasure. Figure 1 shows an example of the ship map.

In the ship map, the obstacles are represented by K non-overlapping rectangles that are filled with the grid pattern, and the treasure is composed of R connected rectangles that are colored in black. A destination location for the treasure is also given on the map (filled with the white color). The destination location is an exit of *General II*, and it is very important to move the treasure from its initial location to the destination location without conflicting with any obstacles. Once a treasure is moved to the destination location, it can be raised easily to the sea level through the exit then.

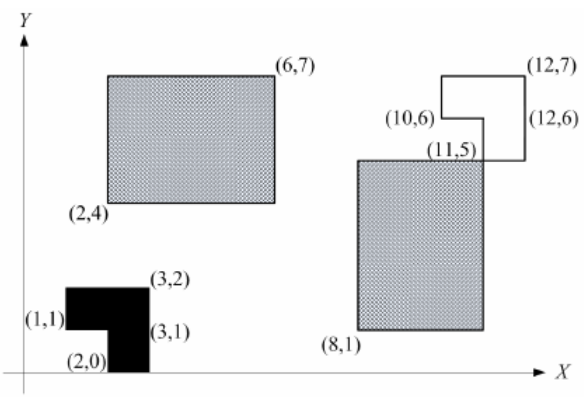

Figure 1: The sample ship map.

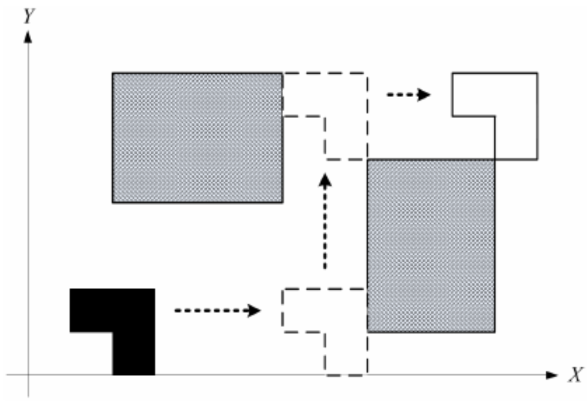

Figure 2: The sample solution.

Note that, the R treasure rectangles must be moved altogether without rotation and/or flipping; moreover, the treasure must be moved only in one of the four directions: upward, downward, leftward, and rightward. The cost of the movement in each direction is:

1. The cost for moving the treasure upward is \$10 per meter.
2. The cost for moving the treasure downward is \$2 per meter.
3. The cost for moving the treasure leftward is \$5 per meter.
4. The cost for moving the treasure rightward is \$5 per meter.

For simplicity, in this problem, we only consider a 2D map that uses the rectangular coordinate system (one meter per unit in both x and y axis), and the origin of the rectangular coordinate system is on the left-bottom corner of the map. In addition, each obstacle/treasure rectangle is described by its left-bottom vertex and its right-top vertex; and the destination of the treasure is given by the position of the left-bottom vertex of the first treasure rectangle. For instance in Figure 1, there are two obstacles: (2,4)-(6,7) and (8,1)-(11,5), and the treasure is a combination of the two rectangles: (1,1)(3,2) and (2,0)-(3,1). The destination is indicated by (10,6), which is the destined position of the left-bottom vertex of the first treasure rectangle.

Figure 2 illustrates a sample solution of this example. In the solution, the treasure is moved rightward 5 meters first, and then moved upward 5 meters. Finally, it is moved rightward 4 meters to arrive the destination location. Therefore, the total cost for the movement is $5 \times 5 + 5 \times 10 + 4 \times 5 = 95$. Note that, it is likely to have multiple solutions that has the same minimum cost.

Technical Specification

1. M is an integer, and $10 \leq M \leq 1,000,000$.
2. N is an integer, and $10 \leq N \leq 1,000,000$.
3. K is an integer, and $1 \leq K \leq 50$.
4. R is an integer, and $1 \leq R \leq 5$.
5. None of the obstacles are overlapped.
6. All of the obstacle/treasure rectangles are within the ship map.
7. The treasure can not be moved (even partially) outside the map.
8. The initial and destination locations of the treasure are different and not overlapped with any obstacles.
9. The minimum cost for moving the treasure from the initial location to the destination is guaranteed to be less than $2,000,000,000.

Input

The first line of the input file contains an integer indicating the number of test cases to follow. For each test case, the first line contains two positive integers, M and N, representing the width and height of the map (i.e., maximum x and y coordinates) respectively.

The third line is a positive integer K representing the number of obstacle rectangles on the map. In the following K lines, each line contains four nonnegative integers: x_1, y_1, x_2, and y_2, where (x_1, y_1) represents the position of the left-bottom vertex of the rectangle, and (x_2, y_2) represents the position of the right-top vertex of the rectangle.

The next line is a positive integer R representing the number of treasure rectangles on the map. In the following R lines, each line contains four positive integers: x_3, y_3, x_4, and y_4, where (x_3, y_3) represents the position of the left-bottom vertex of the rectangle, and (x_4, y_4) represents the position of the right-top vertex of the rectangle.

The last line contains two non-negative integers, x_5 and y_5, which represents the destined position of the left-bottom vertex of the first treasure rectangle.

Output

Please output one number in one line for each test case. The number represents the minimum cost to move the treasure from the initial location to the destination location. If there is no solution that can move the treasure to the destination location without conflicting with any obstacles, please output '`0`'.

Sample Input

```
2
100 100
2
2 4 6 7
8 1 11 5
2
1 1 3 2
2 0 3 1
10 6
12 8
2
2 4 6 7
7 1 10 5
2
1 1 3 2
2 0 3 1
9 6
```

Sample Output

```
95
0
```