Problem PE
Slabstones Rearrangement

Time limit: 3 seconds
Memory limit: 1024 megabytes

Problem Description

Babara has a garden. She has bought some rectangular slabstones and worked out an initial placement of all slabstones in the garden. The shape of the garden is rectangular. An edge of a slabstone should be either parallel or orthogonal to an edge of the garden. There exists a slabstone touching the left, right, bottom, and top edges of the garden, respectively. All the slabstones are contained in the garden. Meanwhile, none of the slabstones overlap in the initial placement. Babara enjoys stepping slabstones from one to another every day. However, Babara would like to redesign her garden to make room for some other purposes. She is wondering how tight the slabstones can be packed together if they can only be shifted horizontally (i.e., left or right) without changing their vertical coordinates. Furthermore, if the vertical dimensions of any two slabstones overlap (not including touching of their ends), their relative locations in the horizontal direction should be maintained. That is, if the vertical dimensions of slabstones R and Q overlap and, before shifting, slabstone Q is on the right of slabstone R, Q should be still on the right of R after shifting or vice versa. Besides, there is a minimal horizontal spacing between two slabstones during slabstone rearrangement if their vertical dimensions overlap. The slabstones should remain non-overlapping after shifting. Nevertheless, their horizontal edges may touch. Now you are asked to help Babara calculate the largest area that can be spared for other purposes.

Input Format

The first line holds an integer specifying the number of test cases. It is then followed by the input data of the test cases. The first line of the input for each test case gives two integers. The first one specifies the number of rectangular slabstones whereas the second one gives the minimal horizontal spacing between two slabstones. Then, each of the following lines contains four integers. The first two integers specify the initial x and y coordinates of the bottom-left corner of a slabstone in the garden. The remaining two integers specify the initial x and y coordinates of the top-right corner of a slabstone. Two adjacent numbers are separated by a whitespace.

Output Format

The output of a test case takes a line. It contains the largest area saved by shifting the slabstones. If no area can be saved, just output zero.

Technical Specification

- The number of test cases is not more than 32.
- All the coordinates are 32-bit unsigned integers.
- A garden's area is not larger than the maximal 32-bit unsigned integer.
- The width and length of a slabstone are 32-bit unsigned integers. They should be larger than zero.
- The minimal horizontal spacing between any two slabstones is a 32-bit unsigned integer and should be greater than zero.
- The number of slabstones is from 4 to 100.

Sample Input 1

```
2
4 2
2 6 4 12
8 4 16 8
7 10 11 16
18 4 20 18
6 4
2 5 4 11
2 14 6 17
7 10 10 16
9 4 16 7
11 11 16 14
18 4 20 18
```

Sample Output 1

```
28
0
```