Problem E - The Bookcase

Time limit: 5 seconds



No wonder the old bookcase caved under the massive piles of books Tom had stacked on it. He had better build a new one, this time large enough to hold all of his books. Tom finds it practical to have the books close at hand when he works at his desk. Therefore, he is imagining a compact solution with the bookcase standing on the back of the desk. Obviously, this would put some restrictions on the size of the bookcase, it should preferably be as small as possible. In addition, Tom would like the bookcase to have exactly three shelves for aesthetical reasons.

Wondering how small his bookcase could be, he models the problem as follows. He measures the height h_i and thickness t_i of each book i and he seeks a partition of the books in three non-empty sets S_1, S_2, S_3 such that

$$\left(\sum_{j=1}^{3} \max_{i \in S_j} h_i\right) \times \left(\max_{j=1}^{3} \sum_{i \in S_j} t_i\right)$$

is minimized, i.e. the area of the bookcase as seen when standing in front of it (the depth needed is obviously the largest width of all his books, regardless of the partition). Note that this formula does not give the exact area of the bookcase, since the actual shelves cause a small additional height, and the sides cause a small additional width. For simplicity, we will ignore this small discrepancy.

Thinking a moment on the problem, Tom realizes he will need a computer program to do the job.

Input

The input begins with a positive number on a line of its own telling the number of test cases (at most 20). For each test case there is one line containing a single positive integer N, $3 \leq N \leq 70$ giving the number of books. Then N lines follow each containing two positive integers h_i, t_i, satisfying $150 \leq h_i \leq 300$ and $5 \leq t_i \leq 30$, the height and thickness of book i respectively, in millimeters.

Output

For each test case, output one line containing the minimum area (height times width) of a three-shelf bookcase capable of holding all the books, expressed in square millimeters.

Sample Input

```
2
4
220 29
195 20
200 9
180 30
6
256 20
255 30
254 15
253 20
252 15
251 9
```

Sample Output

```
18000
29796
```

The 2006 ACM Northwestern European Programming Contest

Northwestern 2006-2007

Problemsetter: Andreas Bj