Delivery Boxes

Time limit: 3 seconds

You work at a delivery company. There are N packages that you have to deliver ($1 <= N <= 100{,}000$). Package i, for $1 <= i <= N$, has integer weight W_i ($1 <= W_i <= 1{,}000{,}000$) and a safety code C_i ($1 <= C_i <= 100{,}000$). To ship the packages, you have to put them in delivery boxes. Packages with the same safety code cannot be placed in the same box. Also, the sum of weights of packages in a single box should not exceed the weight limit of the box.

Since packages are kept in the warehouse sequentially, you have to put them in boxes sequentially as well. That is the following conditions must be true: (1) box j should contains every package s_j to t_j, where $1 <= s_j <= t_j <= N$, (2) for boxes j and $j+1$, $s_{j+1} = t_j + 1$, and (3) if you use k boxes, $s_1 = 1$ and $t_k = N$.

A requirement from the environmental department of your company states that to deliver all packages, you should not use more than K boxes. To satisfy this requirement, you can choose appropriate box integer weight limit L, then order all needed boxes with weight limit L from the box supplier. The goal is to find the minimum weight limit L that guarantees that you need at most K boxes.

As an example, consider the following situation. You have $N = 5$ packages with weights and safety codes in the following table:

i	1	2	3	4	5
W_i	10	10	40	30	30
C_i	1	2	1	3	4

The environmental requirement $K = 3$.

If you set the limit to be less than 40, then you cannot deliver all packages (because package 3 has weight 40). You can set the weight limit to be 100. In that case, you need 2 boxes. But you can lower the weight limit to 60, and use 3 boxes. Lower weight limits requires 4 boxes. The following table shows the details.

L	# of boxes	Packages in box 1	Packages in box 2	Packages in box 3	Packages in box 4
100	2	1, 2	3, 4, 5		
70	3	1, 2	3, 4	5	
60	3	1, 2	3	4, 5	
59	4	1, 2	3	4	5
40	4	1, 2	3	4	5

Note that while box 1 usually has free space, you cannot put package 3 and package 1 in the same box because they have the same safety code..

In this example, the minimum weight limit L should be 60.

Your task

For each test case, read the package specifications and the requirement K, then find the minimum weight limit L. If you cannot satisfy the requirement, you should output -1.

Input

The first line of the input contains integer T, the number of test cases ($1 <= T <= 10$). Then T test cases follow in the format described next.

The first line of each test case contains integers N and K. ($1<=N<=100,000$; $1<=K<=100,000$) The next N lines specify package information. Each line i+1, for $1<=i<=N$, contains two integers W_i and C_i. ($1<=W_i<=1,000,000$; $1<=C_i<=100,000$; The sum $W_1+W_2+...+W_N <= 100,000,000$)

Output

For each test case, if you can find the weight limit L that satisfies the requirements, output L. If you cannot satisfy the requirements, output -1.

Example

Input	Output
2 5 3 10 1 10 2 40 1 30 3 30 4 5 3 10 1 10 2 10 1 10 1 10 1	60 -1