Nutty Conflict

squ1rrel CTF 2024

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1 The Battle of the Acorn Armies

The time has finally come. The United Squirrel Alliance (USA) is about to go on the offensive.

The United Squirrel Syndicate of Rogues (USSR) has established a series of bases where they store their collective acorn stashes. Embracing their communal philosophy, the USSR insists that all acorns are shared among the squirrel collective, with each base acting as a central depot for redistribution. The leaders of the USSR preach the virtues of a communal acorn economy, where each squirrel contributes and receives according to their needs. However, this ideology has made the USSR an adversary of the USA, who believe in the freedom to hoard acorns and compete for resources. The tension between these two squirrel factions has escalated into a full-blown "Nutty Conflict," where the opposing forces vie for control of the valuable acorn stashes.

General Nuttenhower, the ambitious leader of the USA, has devised a cunning plan to raid the acorn-laden bases of the USSR. With their staunch belief in "nutritional communism," the USSR's bases share their acorns generously with each other, and Nuttenhower wants to exploit this to the advantage of the USA.

Nuttenhower has obtained vital intel about the intricate defense mechanisms of the USSR bases. Each base is supported by exactly one other base, which comes to its aid whenever the first base is engaged in battle, bringing their acorns along. This second base also has an ally that assists when it goes to battle, forming a "nutwork" of mutual assistance and shared resources, perfectly embodying their communal ideals.

Armed with this knowledge, General Nuttenhower wants to select a single base to launch his attack. He is aware that for each base he attacks, a chain reaction will occur, pulling more and more bases into the fray, along with their precious acorns. However, Nuttenhower's forces can only handle so many engagements before they are overwhelmed.

To maximize his gains, Nuttenhower must carefully choose an initial base that will yield the maximum number of acorns while staying within the limits of how many bases his forces can engage. Your mission, should you choose to accept, is to help General Nuttenhower identify the optimal base to launch his assault.

2 Input-Output

Input:	Output:
The first line contains a single integer T, indicating the number of test cases that will be given. Each individual test case will be formatted as follows. The first line of the test case contains two space-separated integers n ($2 \leq n \leq 10^5$) and m ($1 \leq m \leq n$), where n is the number of USSR bases and m is the maximum number of bases that the USA forces can engage. Each base is identified by a number 1 to n. Each of the next n lines containes two space-separated integers y ($1 \leq y \leq n$) and C ($1 \leq C \leq 10^5$). This indicates that base x has C acorns stored at the base, and base y will come to the support of base x should base x engage in battle, where $x = 1$ for the first such line, $x = 2$ for the next line, and so on. It is guaranteed that $x \neq y$, i.e. a base is always supported by another base distinct from itself.	Output two space-seperated integers, the first being the optimal base x^* at which General Nuttenhower should launch his initial attack, and C^* the maximum number of acorns that General Nuttenhower will gain from his campaign. If there are multiple initial attack locations that give the same optimal number of acorns C^*, print the one with the lowest index. If no attack can be succesful (i.e. no matter which base an attack is launched at, the USA forces will face stricly greater than m total bases, and hence be overwhelmed and lose), simply print -1.

3 Sample Inputs

Sample Input 1:	Output:
1 4 4 2 12 4 7 2 5 1 3	3 27

Sample Input 2:	**Output:**
1 5 4 3 10 3 7 4 10 2 9 1 14	1 36

Sample Input 3:	**Output:**
1 6 6 5 3 3 2 5 5 6 15 2 7 4 23	4 38

Sample Input 4:	**Output:**
1 7 3 3 2 7 7 7 10 6 9 1 8 3 6 5 3	−1