Problem C

Stress Factor

It is said that there is an optimal stress level for every person. Too much stress blocks creative thinking, but lack of stress may not propel someone to work hard enough. Knowing this fact, your boss wants to experiment with adjusting stress level in the office to speed up project delivery.

There are N employee in your office, in which everybody is doing different parts of the same project. The dependency between each other's work is represented by a directed graph of N nodes, where each node represents an employee. A directed edge from node p to node q indicates that in order for q to start working, q needs to wait for p to finish his/her work.

Normally, each employee p will finish his/her work in his/her *base time*: B_p time unit. Some people, however, are affected in different ways by the stress level in the office. An employee p has an associated *stress constant*: K_p. When the stress level is increased by x unit, employee p's productivity will decrease such that he/she will finish his/her work K_p * x time unit slower; in other word, the duration of work of p is B_p + K_p * x. Since K_p could be any (integer) number, either positive, negative, or zero, this indicates that p can be positively or negatively affected by the stress, or not at all.

Given the work dependency graph and each employee's duration of work, you can calculate the total duration of the project, which is the same as the total duration of the critical path, i.e. the longest sequence of work. There will be no cycle in the dependency graph.

In order to minimize the total duration of the project, your boss wants to apply some amount of stress or de-stress (negative level of stress) to the office in order to adjust some durations of work of some employees, hence affecting the total duration of the project. This amount of stress or de-stress can only be applied once, when the project starts, and lasts until the project is finished. Your task is to help your boss determine the minimum total duration of the project that can be achieved by applying some amount of stress or de-stress, which must be an integer.

The amount of stress you apply must not make any duration of work of any employee to go below 1 or above 50,000; otherwise the employee will go crazy and cause problems in the office, your boss want to avoid that at all cost.

Input

The first line of input contains an integer T ($T \le 50$) denoting the number of cases. Each case begins with two integers: N E ($1 \le N \le 10{,}000$; $1 \le E \le 20{,}000$) denoting the number of nodes and edges, respectively, in the dependency graph. The employees are numbered from 1 to N. The next N lines, each contains two integers: B_i K_i ($1 \le B_i \le 50{,}000$; $-10 \le K_i \le 10$) representing the base time and stress constant of the i^{th} employee for i = 1..N, respectively. The next E lines, each contains two integers: A B ($1 \le A, B \le N$) which indicates that there is a work dependency from A to B, i.e. B has to wait for A to finish his/her work before starting. It is guaranteed that there will be no cycle in the dependency graph.

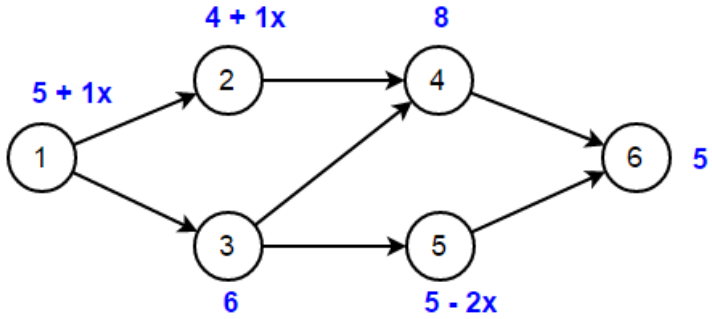
Output

For each case, output "`Case #X: Y`" (without quotes) in a line where `X` is the case number (starts from 1), and `Y` is the answer for this particular case.

Sample Input	Output for Sample Input
2 6 7 5 1 4 1 6 0 8 0 5 -2 5 0 1 2 1 3 2 4 3 4 3 5 4 6 5 6 3 3 1000 -1 1000 0 2000 -1 2 1 1 3 2 3	Case #1: 23 Case #2: 2002

Explanation for 1st sample case

The following is the graph dependency for 1st sample case.



The minimum total duration of 23 can be achieved by applying stress level (x) of -1 or -2. Note that if you apply stress level of 0, then the total duration of the project will be 24.

Explanation for 2nd sample case

The minimum total duration of 2002 can be achieved by applying stress level of 999.