



Problem K: Drone

Time limit: 1s; Memory limit: 256 MB

In the futuristic city of Da Nang, the aerial transit network is modeled as a directed acyclic graph (DAG) consisting of N transfer stations and M one-way flight routes. To ensure security, the operations center must deploy patrol drone teams. Each drone departs from any station with an in-degree of 0, traverses valid flight routes, and finishes its journey at any station with an out-degree of 0.

The system enforces strict safety regulations:

- For each flight route e , there must be at least L_e and at most R_e drones flying along it.
- For each transfer station v , the total number of drones visiting the station (i.e., the sum of drones arriving at and departing from the station) must lie within the range $[A_v, B_v]$.
- Constructing and operating drones is extremely expensive.

Your task is to calculate the minimum number of drones required to form a flight route system that satisfies all of the above regulations.

Input

- The first line contains two positive integers N and M ($1 \leq N \leq 1000$, $1 \leq M \leq 5000$). Stations are numbered from 1 to N .
- The next N lines, where the v -th line contains two integers A_v, B_v ($0 \leq A_v \leq B_v \leq 10^5$) describing the constraints of station v .
- The next M lines, each containing four integers u, v, L, R ($1 \leq u, v \leq N$; $0 \leq L \leq R \leq 10^5$) describing a one-way flight route from u to v with the constraint that the number of traversing drones must lie within the range $[L, R]$. The graph is guaranteed to be acyclic.

Output

- A single line containing an integer representing the minimum number of drones required.
- If no valid configuration exists, output -1.

Sample

Sample Input	Sample Output
4 4 1 5 1 2 1 2 0 5 1 2 1 2 1 3 0 5 2 4 1 2 3 4 0 5	2



Explanation

The graph has 4 vertices. Edges $1 \rightarrow 2$ and $2 \rightarrow 4$ require at least 1 drone, while vertex 3 requires 1 to 2 drones visiting it, so at least one drone must pass through vertex 3 (via edge $1 \rightarrow 3$ then $3 \rightarrow 4$).

We deploy 2 drones: one takes the route $1 \rightarrow 2 \rightarrow 4$ and the other takes the route $1 \rightarrow 3 \rightarrow 4$. Then, edge $1 \rightarrow 2$ has 1 drone and edge $2 \rightarrow 4$ has 1 drone (satisfying $[1, 2]$); edges $1 \rightarrow 3$ and $3 \rightarrow 4$ have 1 drone (satisfying $[0, 5]$); vertex 2 and vertex 3 each have 1 drone visiting (satisfying $[1, 2]$); vertex 1 has 2 drones, and vertex 4 has 2 drones.

Because at least 1 drone must traverse edge $1 \rightarrow 2$ and at least 1 drone must visit vertex 3 (two separate paths starting from vertex 1), fewer than 2 drones cannot be used. The minimum total number of drones is 2.