最短路+差分约束系统：好多模板，但为了掌握好算法的技能，最好还是自己编一遍。

第 21 题：poj1860 Currency Exchange

Currency Exchange

Description

Several currency exchange points are working in our city. Let us suppose that each point specializes in two particular currencies and performs exchange operations only with these currencies. There can be several points specializing in the same pair of currencies. Each point has its own exchange rates, exchange rate of A to B is the quantity of B you get for 1A. Also each exchange point has some commission, the sum you have to pay for your exchange operation. Commission is always collected in source currency.
For example, if you want to exchange 100 US Dollars into Russian Rubles at the exchange point, where the exchange rate is 29.75, and the commission is 0.39 you will get (100 - 0.39) * 29.75 = 2963.3975RUR.
You surely know that there are N different currencies you can deal with in our city. Let us assign unique integer number from 1 to N to each currency. Then each exchange point can be described with 6 numbers: integer A and B - numbers of currencies it exchanges, and real R_{AB}, C_{AB}, R_{BA} and C_{BA} - exchange rates and commissions when exchanging A to B and B to A respectively.
Nick has some money in currency S and wonders if he can somehow, after some exchange operations, increase his capital. Of course, he wants to have his money in currency S in the end. Help him to answer this difficult question. Nick must always have non-negative sum of money while making his operations.

Input

The first line of the input contains four numbers: N - the number of currencies, M - the number of exchange points, S - the number of currency Nick has and V - the quantity of currency units he has. The following M lines contain 6 numbers each - the description of the corresponding exchange point - in specified above order. Numbers are separated by one or more spaces. $1<=S<=N<=100$, $1<=M<=100$, V is real number, $0<=V<=10^3$.
For each point exchange rates and commissions are real, given with at most two digits after the decimal point, $10^{-2}<=rate<=10^2$, $0<=commission<=10^2$.

Let us call some sequence of the exchange operations simple if no exchange point is used more than once in this sequence. You may assume that ratio of the numeric values of the sums at the end and at the beginning of any simple sequence of the exchange operations will be less than 10^4.

Output

If Nick can increase his wealth, output YES, in other case output NO to the output file.

Sample Input

```
3 2 1 20.0
1 2 1.00 1.00 1.00 1.00
2 3 1.10 1.00 1.10 1.00
```

Sample Output

```
YES
```

题目大意：给定 N 种货币，某些货币之间可以相互兑换，现在给定一些兑换规则，问能否从某一种货币开始兑换，经过一些中间货币之后，最后兑换回这种货币，并且得到的钱比之前的多。

提示：可以用单源点或每对结点之间的最短路径求。多试几种方法。

第 22 题：POJ2387 Til the Cows Come Home

Til the Cows Come Home

Description

Bessie is out in the field and wants to get back to the barn to get as much sleep as possible before Farmer John wakes her for the morning milking. Bessie needs her beauty sleep, so she wants to get back as quickly as possible.

Farmer John's field has N (2 <= N <= 1000) landmarks in it, uniquely numbered 1..N. Landmark 1 is the barn; the apple tree grove in which Bessie stands all day is landmark N. Cows travel in the field using T (1 <= T <= 2000) bidirectional cow-trails of various lengths between the landmarks. Bessie is not confident of her navigation ability, so she always stays on a trail from its start to its end once she starts it.

Given the trails between the landmarks, determine the minimum distance Bessie must walk to get back to the barn. It is guaranteed that some such route exists.

Input

* Line 1: Two integers: T and N

* Lines 2..T+1: Each line describes a trail as three space-separated integers. The first two integers are the landmarks between which the trail travels. The third integer is the length of the trail, range 1..100.

Output

* Line 1: A single integer, the minimum distance that Bessie must travel to get from landmark N to landmark 1.

Sample Input

```
5 5
1 2 20
2 3 30
3 4 20
4 5 20
```

```
1 5 100
```

Sample Output

```
90
```

Hint

INPUT DETAILS:

There are five landmarks.

OUTPUT DETAILS:

Bessie can get home by following trails 4, 3, 2, and 1.

题目大意：牛的问题一向是大事。有 N 个点，给出从 a 点到 b 点的距离，当然 a 和 b 是互相可以抵达的，问从 1 到 n 的最短距离

提示：注意数据范围、重边。可以考虑多种实现。了解一下 SPFA 算法

第 23 题：POJ 1062 昂贵的聘礼

昂贵的聘礼

Description

年轻的探险家来到了一个印第安部落里。在那里他和酋长的女儿相爱了，于是便向酋长去求亲。酋长要他用 10000 个金币作为聘礼才答应把女儿嫁给他。探险家拿不出这么多金币，便请求酋长降低要求。酋长说："嗯，如果你能够替我弄到大祭司的皮袄，我可以只要 8000 金币。如果你能够弄来他的水晶球，那么只要 5000 金币就行了。"探险家就跑到大祭司那里，向他要求皮袄或水晶球，大祭司要他用金币来换，或者替他弄来其他的东西，他可以降低价格。探险家于是又跑到其他地方，其他人也提出了类似的要求，或者直接用金币换，或者找到其他东西就可以降低价格。不过探险家没必要用多样东西去换一样东西，因为不会得到更低的价格。探险家现在很需要你的帮忙，让他用最少的金币娶到自己的心上人。另外他要告诉你的是，在这个部落里，等级观念十分森严。地位差距超过一定限制的两个人之间不会进行任何形式的直接接触，包括交易。他是一个外来人，所以可以不受这些限制。但是如果他和某个地位较低的人进行了交易，地位较高的的人不会再和他交易，他们认为这样等于是间接接触，反过来也一样。因此你需要在考虑所有的情况以后给他提供一个最好的方案。
为了方便起见，我们把所有的物品从 1 开始进行编号，酋长的允诺也看作一个物品，并且编号总是 1。每个物品都有对应的价格 P，主人的地位等级 L，以及一系列的替代品 Ti 和该替代品所对应的"优惠"Vi。如果两人地位等级差距超过了 M，就不能"间接交易"。你必须根据这些数据来计算出探险家最少需要多少金币才能娶到酋长的女儿。

Input

输入第一行是两个整数 M，N（1 <= N <= 100），依次表示地位等级差距限制和物品的总数。接下来按照编号从小到大依次给出了 N 个物品的描述。每个物品的描述开头是三个非负整数 P、L、X（X < N），依次表示该物品的价格、主人的地位等级和替代品总数。接下来 X 行每行包括两个整数 T 和 V，分别表示替代品的编号和"优惠价格"。

Output

输出最少需要的金币数。

Sample Input

```
1 4
10000 3 2
2 8000
3 5000
1000 2 1
4 200
3000 2 1
4 200
50 2 0
```

Sample Output

```
5250
```

提示：dijkstra+枚举

第 24 题：POJ 3660 Cow Contest

Cow Contest

Description

N ($1 \le N \le 100$) cows, conveniently numbered 1..N, are participating in a programming contest. As we all know, some cows code better than others. Each cow has a certain constant skill rating that is unique among the competitors.
The contest is conducted in several head-to-head rounds, each between two cows. If cow A has a greater skill level than cow B ($1 \le A \le N$; $1 \le B \le N$; $A \ne B$), then cow A will always beat cow B.
Farmer John is trying to rank the cows by skill level. Given a list the results of M ($1 \le M \le 4{,}500$) two-cow rounds, determine the number of cows whose ranks can be precisely determined from the results. It is guaranteed that the results of the rounds will not be contradictory.

Input

* Line 1: Two space-separated integers: N and M
* Lines 2..M+1: Each line contains two space-separated integers that describe the competitors and results (the first integer, A, is the winner) of a single round of competition: A and B

Output

* Line 1: A single integer representing the number of cows whose ranks can be determined

Sample Input

```
5 5
4 3
4 2
3 2
1 2
2 5
```

Sample Output

```
2
```

题目大意：有 N 头奶牛在比赛，给出一系列条件，形如 A 战胜了 B。若 A 战胜 B，B 战胜 C，则我们认为 A 也能战胜 C。问，根据这一系列条件，有多少牛的排名是可以确定的？

提示：注意一个概念“传递闭包”，其它都很简单。

第 25 题：POJ 1201 Intervals

Intervals

Description

You are given n closed, integer intervals [ai, bi] and n integers c1, ..., cn.
Write a program that:
reads the number of intervals, their end points and integers c1, ..., cn from the standard input,
computes the minimal size of a set Z of integers which has at least ci common elements with interval [ai, bi], for each i=1,2,...,n,
writes the answer to the standard output.

Input

The first line of the input contains an integer n (1 <= n <= 50000) -- the number of intervals. The following n lines describe the intervals. The (i+1)-th line of the input contains three integers ai, bi and ci separated by single spaces and such that 0 <= ai <= bi <= 50000 and 1 <= ci <= bi - ai+1.

Output

The output contains exactly one integer equal to the minimal size of set Z sharing at least ci elements with interval [ai, bi], for each i=1,2,...,n.

Sample Input

```
5
3 7 3
8 10 3
6 8 1
1 3 1
10 11 1
```

Sample Output

```
6
```

题目大意：给出 n 段区间，a_i, b_i, c_i 表示在［a_i, b_i］区间内至少要选择 c_i 个点。在满足这 n 个条件的情况下，最少要选多少个点？

选做：**POJ 3169 Layout**

Layout

Description

Like everyone else, cows like to stand close to their friends when queuing for feed. FJ has N (2 <= N <= 1,000) cows numbered 1..N standing along a straight line waiting for feed. The cows are standing in the same order as they are numbered, and since they can be rather pushy, it is possible that two or more cows can line up at exactly the same location (that is, if we think of each cow as being located at some coordinate on a number line, then it is possible for two or more cows to share the same coordinate).

Some cows like each other and want to be within a certain distance of each other in line. Some really dislike each other and want to be separated by at least a certain distance. A list of ML (1 <= ML <= 10,000) constraints describes which cows like each other and the maximum distance by which they may be separated; a subsequent list of MD constraints (1 <= MD <= 10,000) tells which cows dislike each other and the minimum distance by which they must be separated.

Your job is to compute, if possible, the maximum possible distance between cow 1 and cow N that satisfies the distance constraints.

Input

Line 1: Three space-separated integers: N, ML, and MD.

Lines 2..ML+1: Each line contains three space-separated positive integers: A, B, and D, with 1 <= A < B <= N. Cows A and B must be at most D (1 <= D <= 1,000,000) apart.

Lines ML+2..ML+MD+1: Each line contains three space-separated positive integers: A, B, and D, with 1 <= A < B <= N. Cows A and B must be at least D (1 <= D <= 1,000,000) apart.

Output

Line 1: A single integer. If no line-up is possible, output -1. If cows 1 and N can be arbitrarily far apart, output -2. Otherwise output the greatest possible distance between cows 1 and N.

Sample Input

```
4 2 1
1 3 10
2 4 20
2 3 3
```

Sample Output

```
27
```

Hint

Explanation of the sample:

There are 4 cows. Cows #1 and #3 must be no more than 10 units apart, cows #2 and #4 must be no more than 20 units apart, and cows #2 and #3 dislike each other and must be no fewer than 3 units apart.

The best layout, in terms of coordinates on a number line, is to put cow #1 at 0, cow #2 at 7, cow #3 at 10, and cow #4 at 27.

题目大意：

一共有 n 头牛，有 ml 个关系好的牛的信息，有 md 个关系不好的牛的信息，对应输入的第一行的三个元素，接下来 ml 行，每行三个元素 A,B,D，表示 A 牛和 B 牛相距不希望超过 D，接下来 md 行，每行三个元素 A,B,D 表示 A 牛和 B 牛的相距至少要有 D 才行。求 1 号牛和 n 号牛的最大距离，如果距离无限大输出-2，如果无解输出-1。