

# System of Difference Constraints

Time Limit: 2 seconds

## Problem Description

A system of difference constraints is a system of inequalities such that the left hand side of each inequality is the difference of some two variables and its right hand side is a constant. For example:

$$\begin{aligned}x_1 - x_2 &\leq 0, \\x_2 - x_3 &\geq -2, \\x_3 - x_1 &\leq 5.\end{aligned}$$

The system above has a feasible solution:  $x_1 = 0, x_2 = 0, x_3 = -5$ . However, not every system has a feasible solution. For example, the following system does not have any feasible solution.

$$\begin{aligned}x_1 - x_2 &\leq 1, \\x_2 - x_1 &\leq -2.\end{aligned}$$

Without loss of generality, we may describe a system of difference constraints which has  $n$  variables and  $m$  constraints in the following form:

$$\begin{aligned}x_{A_1} - x_{B_1} &\leq c_1, \\x_{A_2} - x_{B_2} &\leq c_2, \\&\vdots \\x_{A_m} - x_{B_m} &\leq c_m,\end{aligned}$$

Note that  $A_i, B_i \in \{1, \dots, n\}$  for  $i \in \{1, \dots, m\}$ , and the left hand side of every constraint is no more than the right hand side. Please write a program to determine whether a given system of difference constraints has a feasible solution.

## Technical Specifications

1. The number of test cases is no more than 20.
2. Basic:  $n \leq 100, m \leq 500$ .
3. Hard:  $n \leq 1000, m \leq 5000$ .
4.  $-1000 \leq c_i \leq 1000$ , and  $c_i$ 's are integral.

## Input Format

The first line of the input file contains an integer indicating the number of test cases. The first line of each test case contains two integers  $n$  and  $m$ . The  $i$ -th of the following  $m$  lines contains three integers  $A_i, B_i, c_i$ . Note: the integers in the same line are separated by blanks.

## Output Format

For each test case, output **Yes** if there exists a feasible solution. Otherwise, output **No**.

## Sample Input

```
3
2 1
1 2 1
2 2
1 2 1
2 1 -2
4 5
1 2 1
2 3 2
3 4 3
4 1 10
1 3 1
```

## Sample Output

```
Yes
No
Yes
```