Problem 10: “more broke than a. . . ”
9 Points

Problem ID: `debt`
Rank: `3`

Introduction

After a McAlico’s j*b application is sent in your friend’s group chat, along with a joke about being “more broke than the McAlico’s ice cream machine”, it’s probably a sign that something needs to change. Help your friends pay off all their debts while spending the least amount of money!

Problem Statement

Given a debt log with $\mathbf{N}$ people and $\mathbf{M}$ debt entries between them, find the minimum amount of extra money needed to be given to people to eliminate all debts. A debt entry is defined as a triple $\mathbf{X}, \mathbf{Y}, \mathbf{Z}$ which indicates that person $\mathbf{Y}$ lent $\mathbf{Z}$ money to person $\mathbf{X}$ and now $\mathbf{X}$ owes $\mathbf{Y}$ the same quantity.

Initially, everyone has no money, and whenever someone that has pending debt gets any amount of money, they will try to repay their debt to the people to which they owe money. If they owe money to more than one person, the person they give the money to is uniformly random between all the people they owe the money.

People are numbered from 1 to $\mathbf{N}$, and debts are numbered from 1 to $\mathbf{M}$. Each debt $\mathbf{i}$ means that person $\mathbf{X_i}$ owes $\mathbf{Z_i}$ dollars to person $\mathbf{Y_i}$.

Note that two people can owe each other money (this also happens in real life) and debts don’t cancel each other out. This means that, even if two people owe each other the same amount of money, they still have to do the corresponding transactions to cancel their debts, rather than magically cancelling each other out.

Note that a person cannot be in debt to themselves. More formally, $\mathbf{X}_i \neq \mathbf{Y}_i$ for all i.

Input Format

The first line of the input contains a single integer $\mathbf{T}$ denoting the number of test cases that follow.

For each test case:

- The first line contains two space-separated integers $\mathbf{N}$ $\mathbf{M}$.
  - $\mathbf{N}$ denotes the number of people.
  - $\mathbf{M}$ denotes the number of debt entries.
- The next $\mathbf{M}$ lines each contain three space-separated integers $\mathbf{X}_i$ $\mathbf{Y}_i$ $\mathbf{Z}_i$ representing debt i.
  - $\mathbf{X}_i$ denotes the the person in debt.
  - $\mathbf{Y}_i$ denotes the person who is owed money.
  - $\mathbf{Z}_i$ denotes the amount of money that is owed.

Output Format

For each test case, output an integer representing the minimum amount of extra money needed to pay off all debts.

Constraints

$1 \leq \mathbf{T} \leq 10$
$2 \leq \mathbf{N} \leq 2 \cdot 10^5$
$1 \leq \mathbf{M} \leq 2 \cdot 10^5$
$1 \leq \mathbf{X}_i \leq \mathbf{N}$ for all i
$1 \leq \mathbf{Y}_i \leq \mathbf{N}$ for all i
$1 \leq \mathbf{Z}_i \leq 10^9$ for all i
The sum of $\mathbf{N}$ across all test cases in an input file does not exceed $2 \cdot 10^5$.
The sum of $\mathbf{M}$ across all test cases in an input file does not exceed $2 \cdot 10^5$.
There might be repeated debt entries between the same two people (the total debt will be the sum of all these entries).
A person cannot be in debt to themselves.

Sample Test Cases

Sample Input Download

```
3
5 4
1 2 4
2 3 3
3 4 2
4 5 1
8 7
1 2 3
2 1 3
3 4 5
4 3 7
6 5 2
5 7 4
7 6 3
6 8
1 2 2
1 4 4
2 3 3
3 6 7
4 3 6
4 5 8
5 6 9
6 1 5
```

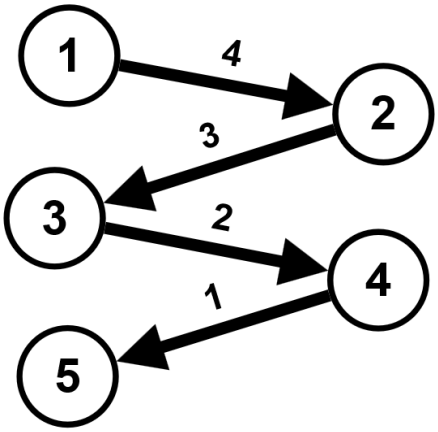
Sample Output Download

```
4
5
13
```

Sample Explanations

Test Case #1:

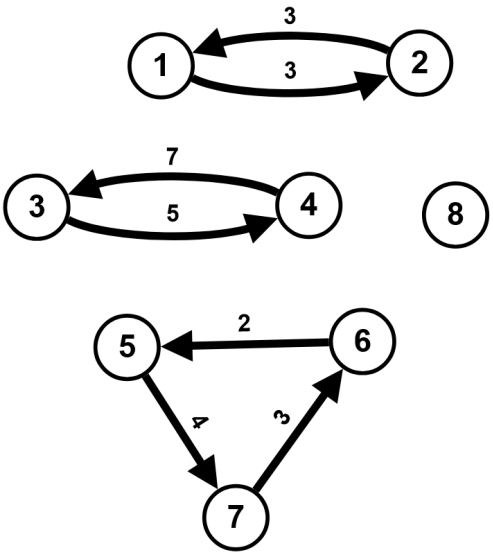
The debt relations can be modeled by the diagram to the right:



For test case #1, we can give person 1 four dollars to pay off their debt to person 2. Then person 2 can use three of those to pay person 3. The process repeats for person 4 and 5. Therefore, we output: `4`.

Test Case #2:

The debt relations can be modeled by the diagram to the right:



For test case #2, we can give person 2 one dollar, person 3 two dollars, and person 5 two dollars. Therefore, we output `5`. Note that, after giving person 2 one dollar, they will give that dollar to 1, which will give it back to 2, and so on until they cancel each other's debts out. Giving person 1 the dollar would also be valid. Note that there might be people who don't owe or are owed any money. Good for them!