CCC '18 S5 - Maximum Strategic Savings

Time limit: 1.4s   **Memory limit:** 1G

Canadian Computing Competition: 2018 Stage 1, Senior #5

A long time ago in a galaxy far, far away, there are N planets numbered from 1 to N. Each planet has M cities numbered from 1 to M. Let city f of planet e be denoted as (e, f).

There are $N \times P$ two-way flights in the galaxy. For every planet e $(1 \leq e \leq N)$, there are P flights numbered from 1 to P. Flight i connects cities (e, a_i) and (e, b_i) and costs c_i energy daily to maintain.

There are $M \times Q$ two-way portals in the galaxy. For all cities with number f $(1 \leq f \leq M)$, there are Q two-way portals numbered from 1 to Q. Portal j connects cities (x_j, f) and (y_j, f) and costs z_j energy daily to maintain.

It is possible to travel between any two cities in the galaxy using only flights and/or portals.

Hard times have fallen on the galaxy. It was decided that some flights and/or portals should be shut down to save as much energy as possible, but it should remain possible to travel between any two cities afterwards.

What is the maximum sum of energy that can be saved daily?

Input Specification

The first line contains four space-separated integers N, M, P, Q $(1 \leq N, M, P, Q \leq 10^5)$.

Then P lines follow; the i-th one contains three space-separated integers a_i, b_i, c_i $(1 \leq a_i, b_i \leq M, 1 \leq c_i \leq 10^8)$.

Then Q lines follow; the j-th one contains three space-separated integers x_j, y_j, z_j $(1 \leq x_j, y_j \leq N, 1 \leq z_j \leq 10^8)$.

It is guaranteed that it will be possible to travel between any two cities using flights and/or portals. There may be multiple flights/portals between the same pair of cities or a flight/portal between a city and itself.

For 2 of the 15 available marks, $P, Q \leq 100$, $c_i = 1$ for all $1 \leq i \leq P$, and $z_j = 1$ for all $1 \leq j \leq Q$.

For an additional 2 of the 15 available marks, $P, Q \leq 200$.

For an additional 5 of the 15 available marks, $N, M \leq 200$.

Output Specification

Output a single integer, the maximum sum of energy that can be saved daily.

Sample Input 1

```
2 2 1 2
1 2 1
2 1 1
2 1 1
```

Sample Output 1

```
3
```

Sample Input 2

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

Sample Output 2

```
41
```

Explanation for Sample Output 2

One possible way is to shut down the flights between cities $(1, 1)$ and $(1, 1)$, $(2, 1)$ and $(2, 1)$, $(1, 1)$ and $(1, 2)$, $(1, 3)$ and $(1, 2)$, $(2, 3)$ and $(2, 2)$, and shut down the portal between cities $(2, 3)$ and $(1, 3)$ for total energy savings of $8 + 8 + 6 + 7 + 7 + 5 = 41$.