7722 Tale of a Happy Man

Windarik is a happy man who seeks only happiness in his life. Even when he's working, he consciously chooses tasks which make him happy.

There are N agencies, and each agency offers zero or more tasks. A task is given in the form of an interval $[A, B)$ which means this task should be done from exactly time unit A (inclusive) until right before time unit B (exclusive). Two tasks $[A_1, B_1)$ and $[A_2, B_2)$ where $A_1 \leq A_2$ are conflicting if and only if $B_1 > A_2$. It is guaranteed that there are no two conflicting tasks are from the same agency; subsequently, there are no guarantees for tasks between different agencies.

Windarik has evaluated all available tasks from all agencies and assigned a happiness score H for each task, in which he would get if he decided to do that task. As a happy-oriented man, he needs to determine what is the maximum total happiness can be obtained by doing a set of carefully chosen tasks. Note that, among all the chosen tasks, there should be no two tasks which are conflicting to each other.

For example, let there be 3 agencies:

- Agency #1 offers 2 tasks: [10, 20) with happiness of 1, and [20, 60) with happiness of 1,
- Agency #2 offers 2 tasks: [30, 50) with happiness of 2, and [60, 100) with happiness of 1,
- Agency #3 offers 1 task: [20, 40) with happiness of 3.

In this case, the maximum total happiness which can be obtained by Windarik is 5. He can obtained this by doing the first task from agency #1: [10, 20) with happiness of 1, the task only from agency #3: [20, 40) with happiness of 3, and the second task from agency #2: [60, 100) with happiness of 1. Thus, the total is $1 + 3 + 1 = 5$. Notice that none of the chosen tasks are conflicting to each other.

Windarik happiness is your responsibility; help him with this problem. As an incentive, Windarik will give you a balloon if you managed to solve this problem in four hours.

Input

The first line of input contains an integer T ($T \leq 100$) denoting the number of cases. Each case begins with two integers N and M ($1 \leq N \leq 2,000$; $1 \leq M \leq 20,000$) in a line denoting the number of agencies and the total number of tasks in all agencies. The next M lines, each contains four integers: X A B H ($1 \leq X \leq N$; $0 \leq A < B \leq 10^6$; $1 \leq H \leq 10^6$) which represent a task from agency X which starts at time unit A and finished right before time unit B with happiness of H. It is guaranteed that no two tasks from the same agency are conflicting to each other.

Output

For each case, output '`Case #`X`:` Y' (without quotes) in a line where X is the case number (starts from 1), and Y is the answer for this particular case.

Explanation for the sample:

First case: This is the example given in the problem statement.

Second case: All tasks are from the same agency (agency #1) and none are conflicting to each other. Thus, we can do all the tasks and obtained a maximum possible total happiness: $1+2+3+4+5 = 15$.

Third case: The maximum total happiness can be obtained by doing

- The first task from agency #3: $[0, 10)$ with happiness of 3,
- The second task from agency #1: $[10, 20)$ with happiness of 6.

The total happiness is $3 + 6 = 9$.

Fourth case: The maximum total happiness can be obtained by doing:

- The only task from agency #1: [10000, 30000) with happiness of 100,
- The only task from agency #3: [30000, 50000) with happiness of 200,
- The only task from agency #4: [50000, 70000) with happiness of 300,
- The only task from agency #5: [80000, 90000) with happiness of 400.

The total happiness is 100 + 200 + 300 + 400 = 1000.

Sample Input

```
4
3 5
1 10 20 1
1 20 60 1
2 30 50 2
2 60 100 1
3 20 40 3
1 5
1 0 10 1
1 10 20 2
1 20 30 3
1 30 40 4
1 40 50 5
3 6
1 0 10 1
1 10 20 6
2 0 10 2
2 10 20 5
3 0 10 3
3 10 20 4
5 5
1 10000 30000 100
2 20000 40000 250
3 30000 50000 200
4 50000 70000 300
5 80000 90000 400
```

Sample Output

```
Case #1: 5
Case #2: 15
Case #3: 9
Case #4: 1000
```