

## 11434 The Careless Postman Problem

Once upon a time, there was a postman in china, who walked all through the city to deliver letters. He wanted to cover this path in shortest time, and thus created the famous ‘Chinese Postman Problem.’

Now, after quite a long time, a similar problem arose to a postman. Like the Chinese postman, he also delivers letters walking through the roads. But due to his careless nature, he often delivers them really late, and if you are too unlucky, he might lose the letters as well. So, people are really angry at him. Since, our postman knows about that, he has no intention of facing them. So, he started delivering them, in disguise. But that also has problems too. People may be deceived by his disguise for 1 or 2 times, but they will recognize him, if they meet him over and over. For each road  $e_i$ , he may traverse the road at most  $p_i$  times. On the other hand, he doesn’t like to stay on the same road for long time. So, each time he traverses, he only delivers one letter. So, if he need to deliver  $q_i$  letters along a path, he has to traverse it at least  $q_i$  times.

Now, given the road network, number of letters to deliver along each road and maximum number of time, a road can be traversed, find the shortest time the postman needs to deliver all the letters. All roads are unidirectional.

### Input

First line of input contains an integer  $T$ , the number of test cases. Each test case starts with two integers,  $n$  and  $m$ , the number of vertices and number of edges. The following  $m$  lines each contain 5 integers,  $u_i, v_i, t_i, q_i$  and  $p_i$ , which denotes an edge from  $u_i$  to  $v_i$ , which required  $t_i$  time for the postman to travel.  $q_i$  is the number of letters to deliver along the path, and  $p_i$  is the maximum number of times the road can be traversed. The postman can start from any vertex, but has to return to that vertex, after delivering all the letters. You can assume that (a) The graph is connected and (b) Every vertex has at least one road leading out of it with a required delivery.

### Constraints:

$$T \leq 100$$

$$1 \leq N \leq 100, M \leq N * (N - 1)/2$$

$$1 \leq u_i, v_i \leq N, \text{ no edge is given twice}$$

$$0 \leq t_i, p_i, q_i \leq 100$$

### Output

For each test case, print the case number followed by the minimum time the postman requires to deliver all the letters. If it is not possible to deliver all the letters, print ‘Impossible’ (without quotes).

### Sample Input

```
3
4 4
1 2 1 1 1
2 3 1 1 1
3 4 1 1 1
4 1 1 1 1
4 5
1 2 1 0 1
2 3 1 0 1
```

```
3 4 1 0 1
4 1 1 0 1
2 4 2 1 1
2 2
1 2 1 1 1
2 1 1 1 1
```

### Sample Output

```
Case #1: 4
Case #2: 4
Case #3: 2
```