Problem J - Escape from New Bagel

Time limit: 1 second

With all his investment money, Jack built the world's biggest bagel factory, at 400 floors above ground, and a large basement. Since Jack likes creative names, he has given the kth floor the name k, so the basement is floor 0, the ground floor is floor 1, the second floor is floor 2, and so on. The top floor is of course called floor 400.

Since Jack is also a fan of artistic design, the entire building only has one door, on the ground floor. The building also has exactly one window on every floor above the ground floor, all in a perfect vertical line above the door.

Somewhat inspired by Lucca's donut shop, every floor of the factory is a maze of m hallways and n rooms. Keeping to his artistic design, the maze on each floor is exactly the same. Additionally, each hallway has a unique staircase design inside it, going up and down the entire building.

As one last special feature, on each floor there is a bagel room, containing the tastiest bagel of them all: the golden bagel. Once again, keeping to his design, this room is in the exact same spot on each floor.

Unfortunately, most of the engineers Jack hired to construct his factory were actually bakers, so the building is shaking, and Jack needs to escape as fast as possible. However, Jack is also very hungry, and will refuse to leave his factory without at least one golden bagel. Jack was on floor k when this started, admiring the view through floor's only window.

Some of the hallways contain staircases. Since Jack is in a panic, whenever he sees a staircase going downwards he will take it until he realises he might be going too far. How soon he realises depends on the design of the staircase, so for each hallway with a staircase there is a number of floors $h_i \geq 0$ that Jack will descend before continuing on through the hallway.

If Jack ever ends up in the basement, he will be unable to escape, since in his panic he cannot climb staircases. If he ever ends up with a golden bagel while in front of a window instead of the door on the first floor, he can instantly escape using a parachute that he happened to bring for this exact situation.

Thus, Jack needs to find a path through the building starting from his current position next to the window on floor k, bring him to a bagel, and then bring him back to either the window or the door, without ever ending up in the basement floor.

Help Jack escape from the building as quickly as possible with a golden bagel.

Input

The first line contains an integer T, denoting the number of test cases.

Each test case begins with a line containing three space-separated integers $1 \leq k \leq 400$ denoting the floor Jack starts on, $2 \leq n \leq 2000$ denoting the number of rooms per floor, and $1 \leq m \leq 10000$ denoting the number of hallways between rooms on each floor.

Each of the next m lines contains four integers $1 \leq a_i, b_i \leq n$, $1 \leq t_i \leq 10^5$, and $0 \leq h_i \leq 200$ representing information about the ith hallway. The ith hallway connects rooms a_i and b_i (both ways), and has a staircase design that will cause Jack to descend h_i floors. In total, the time it will take Jack to enter the hallway, descend the stairs, and exit the new hallway is t_i minutes.

The last line of the input contains $1 \leq s, g \leq n$, where s is Jack's starting room and the room number with the door/windows, and g is the room with the golden bagel. It is guaranteed that $s \neq g$

Output

For each test case, output a line containing the integer representing the minimal amount of time it will take Jack to escape with the golden bagel, or -1 if it is impossible.

Sample Input

```
2
20 4 7
1 2 4 4
1 3 7 2
3 1 8 1
3 2 2 2
4 2 1 6
3 4 1 1
1 4 6 12
1 4
5 3 3
1 2 5 1
3 2 8 2
1 3 1 3
1 3
```

Sample Output

```
12
-1
```