Cosmotrips

In the year **3025**, *Intergalactic Miller Agency* maintains two gigantic networks of corridors:

- **Network A** – the ancient “**Gates of Silk**” discovered by humanity’s first pioneers.
- **Network B** – the brand-new “**Nebula Express**” built by the Cosmic Union.

Each network consists of exactly $N-1$ corridors and links all N planets, which are numbered from 1 to N. From every planet there is **exactly one** route to every other planet inside one network. Meaning that networks have structure of tree.

Both structures connect exactly the same N planets, but their corridors are *weighted*: the weight of a corridor is its **safety rating** – the lower the safer.

For two planets u, v let

- $g(u, v)$ be the risk of fly from u to v. The risk of fly from u to v is defined as the **maximum weight** of all corridors on the unique route from u to v inside **Network A**
- $f(u, v)$ be the same quantity inside **Network B**

Thus g (respectively f) is the worst corridor you must traverse inside Network A (respectively Network B). Remember that $g(x, x) = f(x, x) = 0$ for any x.

During a cargo mission commander **Nazarbek** needs to reach planet y from planet x. To finish his mission, he does the following:

1. He picks **any** planet z;
2. Flies from x to z inside **Network A** (having $g(x, z)$ risk);
3. Makes "*Hyper-jump*" to the **Network B** (instant, risk-free);
4. Continues trip from z to y inside **Network B** (having $f(z, y)$ risk).

Total risk of trip using stopover z is $\mathrm{risk}(x, y, z) = \max\big(g(x, z),\ f(z, y)\big)$

Nazarbek, being cautious, chooses the best stopover z:

$\mathrm{minrisk}(x, y) = \min_{1 \le z \le N}\ \mathrm{risk}(x, y, z)$

Given Q such missions, output every $\mathrm{minrisk}(x_i, y_i)$

Input

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

Each test case starts with a line containing two integers N and Q — the number of planets and the number of queries.

The next $N-1$ lines describe **Network A**. The i-th of these lines contains three integers u_i, v_i, w_i — the indices of two planets connected by a corridor and its safety rating.

The following $N-1$ lines describe **Network B** in the same format: a_i, b_i, c_i.

Finally, Q lines follow. The j-th line contains two integers x_j, y_j — the endpoint planets of the j-th mission query.

Constraints

- $2 \le N, Q \le 2 \cdot 10^5$
- $0 \le w_i, c_i \le N$
- $1 \le x_i, y_i \le N$
- It is guaranteed that the two sets of $N-1$ edges each form trees on N vertices

Subtasks

1. **(6 points)** $N, Q \le 500$ and each network forms a **path** (every planet has degree ≤ 2)
2. **(9 points)** $N, Q \le 5,000$ and each network forms a **path**
3. **(21 points)** Each network forms a **path**
4. **(8 points)** $N, Q \le 500$
5. **(11 points)** $N, Q \le 5,000$
6. **(45 points)** No additional constraints

Output

For each query print a single integer from a new line – $\text{minrisk}(x_i, y_i)$.

Examples

Example 1

Input

```
2
6 3
4 5 3
4 3 6
4 2 2
3 1 5
3 6 4
5 2 6
5 6 5
6 1 4
6 4 3
4 3 2
4 5
1 5
6 5
5 4
1 2 2
2 3 3
3 4 5
4 5 4
1 2 2
2 3 3
3 4 4
4 5 5
1 5
4 2
1 2
3 5
```

Output

```
3
5
5
5
4
2
5
```