Electronic Toll Collection

In a land far, far away, where administrative reforms to abolish district-level subdivisions have not been implemented, lies the vibrant city of *Nogias*, divided into four districts, each with its own unique beauty. District 1 serves as the "heart" of *Nogias*, where administrative buildings are built. District 2 is home to a myriad of gorgeous, affluent neighborhoods. District 3 hosts the majority of corporate buildings in the city. And district 4 has earned the reputation of a food paradise by both *Nogias'* residents and foreign tourists. The districts are further divided into n wards numbered from 1 to n, such that each district has at least one ward.

The city's road network consists of m bidirectional roads, each connecting two wards. There may exist multiple roads that connect the same pair of wards, and there may even exist roads that connect a ward to itself – after all, more roads is good, maintenance cost be damned. It is guaranteed that for every pair of wards (u, v), there exists at least one path connecting them.

If there is one thing to be critical of *Nogias*, that would be its countless traffic jams. Every day, hundreds of thousands of motorbikes flood the roads, creating a truly nightmarish experience. As one of the best performing teams in the International City Planning Competition (ICPC), you have been hired by the city council to address the issue. After analyzing, you have found that most of the traffic comes from people who reside at one district and work in another. In particular, the following pairs of districts are very problematic in terms of traffic load:

- District 1 and district 2
- District 2 and district 3
- District 3 and district 4
- District 4 and district 1

Since relocating the people is out of the question and your suggestion of building public transport infrastructure got promptly ignored by the city, you decided on the only option left: Electronic Toll Collections (ETC)! The plan is to install ETC along the roads, such that for every pair of problematic districts (x, y), **every** path that starts in a ward belonging to district x and ends in a ward belonging to district y (or vice versa) must go through **at least** one ETC road.

To the surprise of no one, your genius plan was immediately approved by the city, with a small caveat: people really *don't* like paying money. Therefore, your plan should also minimize the number of roads with ETC installed.

Input

Each test contains multiple test cases. The first line contains the number of test cases τ ($1 \le \tau \le 10^5$). The description of the test cases follows.

- The first line contains two integers n and m ($4 \le n \le 10^5$; $n - 1 \le m \le 10^5$) — the number of wards and the number of roads.
- The second line contains n integers $a_1, a_2, \ldots, a_n$ ($1 \le a_i \le 4$), where a_i is the district that ward i belongs to.
- In the next m lines, each contains two integers u and v ($1 \le u, v \le n$), representing a road between two wards u and v.

It is guaranteed that:

- Each of the four districts has at least one ward and for every pair of wards (u, v), there exists at least one path connecting them.
- The sum of n over all test cases does not exceed 10^5.
- The sum of m over all test cases does not exceed 10^5.

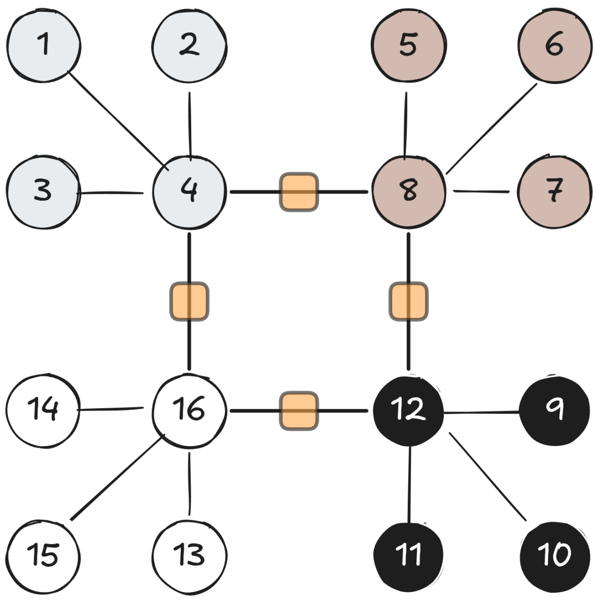
Output

For each test case, print the minimum number of roads with ETC installed.

Sample Input 1	Sample Output 1
1 16 16 1 1 1 1 2 2 2 2 3 3 3 3 4 4 4 4 1 4 2 4 3 4 4 8 5 8 6 8 7 8 8 12 9 12 10 12 11 12 12 16 13 16 14 16 15 16 16 4	4

Sample Explanation

Below is one optimal plan for the first test case.



Here, wards with the same colors belong to the same district. The edges with small squares on it represent roads with ETC installed.

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