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Exercise Sheet BGL Week II

Algorithms Lab

Exercise 2 – *Satellites*

The Euclidean Satellite Academy (ESA) has satellites in orbit and radio stations on the ground. Each satellite is connected to a few ground stations by wireless links. ESA plans to monitor the performance of the wireless links. It does this with software that can be installed on a satellite or a ground station and monitors all links connected to the entity. Where should they install the monitoring software if they want to install it in as few places as possible?

Given a set of satellites, ground stations, and the links between them, decide which nodes in the system (by nodes we mean satellites and ground stations) must install the monitoring software if all links need to be monitored by at least one of their end-points but the number of nodes with the software should be minimized. If there are multiple solutions, output any single one of them.

Input First line of input contains $1 \leq t \leq 100$, the number of test cases. Each test case starts with three numbers: $0 \leq g \leq 100$, $0 \leq s \leq 100$, and $0 \leq l \leq 10000$, denoting the number of ground stations, satellites, and links respectively. Ground stations are given labels from 0 to $g - 1$ and satellites from 0 to $s - 1$. The following l pairs of numbers denote the (ground station, satellite) pairs defining each link.

Output For each testcase output two lines. The first one should contain two integers, g' and s' denoting respectively the number of ground stations and satellites that will have the monitoring system installed, followed by g' numbers with ground station IDs and s' numbers with satellite IDs on the second line.

Sample Input

```
2
3 3 5
0 1
1 0
1 2
2 1
2 2
5 4 8
0 0
1 0
2 0
3 0
4 0
3 1
3 2
3 3
```

Sample Output

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