

# CSE 106: Assignment on Graph

## Background

In an international tournament, several countries participated. The tournament is divided into multiple groups. During the first round, matches are played only between countries belonging to the same group. Some other information are provided below:

- Each country belongs to exactly one group.
- Countries compete only with other countries in the same group.
- At least one match have been played by each country.
- A match outcome is represented as a pair  $[A, B]$ , meaning country  $A$  defeated country  $B$ .
- There are no draws.
- Within a group, every pair of countries is expected to play exactly one match against each other.
- Each group must contain at least two countries, though group sizes may vary.

Now, you have the list of matches that were played in the first round. However, the group assignments are not known. Also, some matches within a group may not yet have taken place. Based on this information, your task is to reconstruct the tournament structure, i.e., the groups, and for each group, find out the matches not played yet.

## Task

You are given:

- An integer  $n$ , representing the total number of participating countries, labeled from 0 to  $n - 1$
- A list of match results from the first round

**Your tasks are:**

1. Determine the number of tournament groups.
2. Identify the set of countries belonging to each group.
3. For each group, list all matches that are expected to occur but have not yet been played.

## Sample I/O

### Input:

```
9
[0, 1]
[3, 4]
[5, 6]
[4, 8]
[2, 5]
[6, 2]
[1, 7]
```

```
8
[0, 1]
[0, 2]
[3, 0]
[3, 4]
[5, 6]
[6, 7]
```

### Output:

```
3
Group 1: {0, 1, 7} | [0, 7]
Group 2: {3, 4, 8} | [3, 8]
Group 3: {5, 6, 2} | none
```

```
2
Group 1: {0, 1, 2, 3, 4} | [0,4], [1,2], [1,3], [1,4], [2,3], [2,4]
Group 2: {5, 6, 7} | [5,7]
```

**Note:** You have to use your knowledge of graph theory to solve this