Assignment 5: Graph

~ 11/27 11:59 PM

Notification

The task should be done by yourself, and you can't use codes from Internet or anyone else. If you don't follow this rule, we will give you 0 score and there can be other disadvantages.

Exam Guide

1. **This test will be conducted in Groom and scoring results will not be released until 11/20.**
2. **A perfect score is 100 points**
3. **Each question will be scored with multiple test cases and scored based on the number of passed test cases.**
4. **Please keep the submission deadline. Late submissions are not accepted.**
5. **If you have any questions, please ask them on the following site. https://docs.google.com/spreadsheets/d/1G7QYGyBwR2pDejsJgR60HtIhy0fkP2kIWzVPftkuF7U/edit#gid=713612294**

Problem Lists

Problem 1. 40 pts

Problem 2. 60 pts

Problem 1

The four color theorem

Score: 40pts

The four-color theorem is the theorem that no more than 4 colors are needed when different adjacent countries on the map are painted in different colors. Your task is to count how many countries are on the map.

➢ **Input**

- The first line contains integer ***n***, ***m*** number of the region and number of edges
  - $0 < n \leq 10000$
- Next line gives ***n*** integers x_i, color of region ***i***
  - $0 \leq x_i < 2^{32} - 1$
- Next ***m*** line gives integers ***a*** and ***b***. which means person ***a*** and ***b*** directly connected
  - $0 \leq a, b < n$, $a \neq b$
  - **Same pair can be given multiple times.**

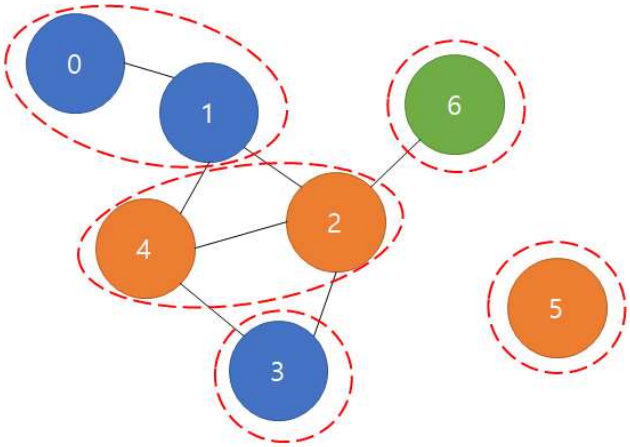
➢ **Output**

- Print total number of close contacts.

Sample Input 1 Sample Output 1

Sample Input 1	Sample Output 1
7 8 0 0 1 0 1 1 2 0 1 1 4 1 2 4 3 2 3 4 2 2 6 6 2	5

➢ **Hint**



Problem 2

Self-Isolation

Score: 60pts

Still, the COVID-19 epidemic is not over. The government wants close contacts to self-isolate. Contact information between people can be represented as a form of a graph, and people whose shortest distance to the confirmed patient is less or equal to ***M*** are defined as close contacts. Find the number of close contacts.

➢ **Input**

- The first line contains integers ***n***, ***M***, ***x***, ***y***, total number of people, maximum distance from confirmed patient, number of confirmed patients, number of connections information.
  - $0 < n, M, x < 10000, 0 < y \leq n * n$
- Next line gives ***x*** integers x_i, ID of confirmed patients.
  - $0 \leq x_i < n$, $x_i != x_j$ if i!=j
- Next y line gives integers ***a*** and ***b***. which means person ***a*** and ***b*** directly connected
  - $0 \leq a, b < n$, $a != b$
  - **Same pair can be given multiple times.**

➢ **Output**

- Print total number of close contacts.

Sample Input 1

```
12 2 3 13
0 11 7
0 1
6 0
0 6
2 6
2 8
8 9
2 9
2 3
3 5
3 7
4 7
7 4
3 7
```

Sample Output 1

```
6
```

➢ **Hint**