CS205
Algorithm Lab
End Semester
Time: 2 Hours, Full Marks:15

a. In a party a number of guests are invited. If u knows v, then v knows u. You are required to arrange the seating such that any guest at a table knows every other guest sitting at the same table either directly or through some other guests sitting at the same table. For example, if w knows x, x knows y, and y knows z, then w, x, y, z can sit at the same table. Develop an efficient algorithm that returns the minimum number of tables needed to achieve this requirement. [7.5]

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b. Now suppose that there are only two tables, and you are given a different relationship - a list of guests who are on bad terms with each other. If v is on bad terms with u, then u is on bad terms with v. Your goal is to arrange the seating such that no pair of guests sitting at the same table who are on bad terms with each other. Figure 1 below shows two graphs in which we present each guest as a vertex and an edge between two vertices means these two guests are on bad terms with each other. Figure 1(a) is an example where we can achieve the goal by having A, C sitting at one table and B, E, D sitting at another table. Figure 1(b) is an example where we cannot achieve the goal. Describe an efficient algorithm that returns TRUE if you can achieve the goal or FALSE otherwise. [7.5]

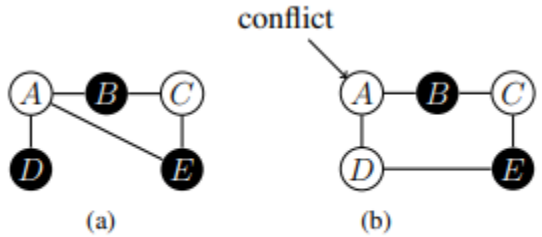

Figure 1: Examples of guest relationships represented as graphs.

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Input format:

Part A begins

Enter the number of guests (V):

Next |V| lines take details (nodes are name in string) about nodes

Enter the number of edges (knows each other) (E):

Next E line takes details about edges

Output: Number of table

list of guests at each table (if list is $x_1, x_2,....,x_n$ then x_i must know directly x_{i-1} and x_{i+1})

Part B begins

Enter the number of guests (V):

Next |V| lines take details (nodes are name in string) about nodes

Enter the number of edges (bad-terms) (E):

Next E line takes details about edges

Output: True/False

list of guests at each table if response is True