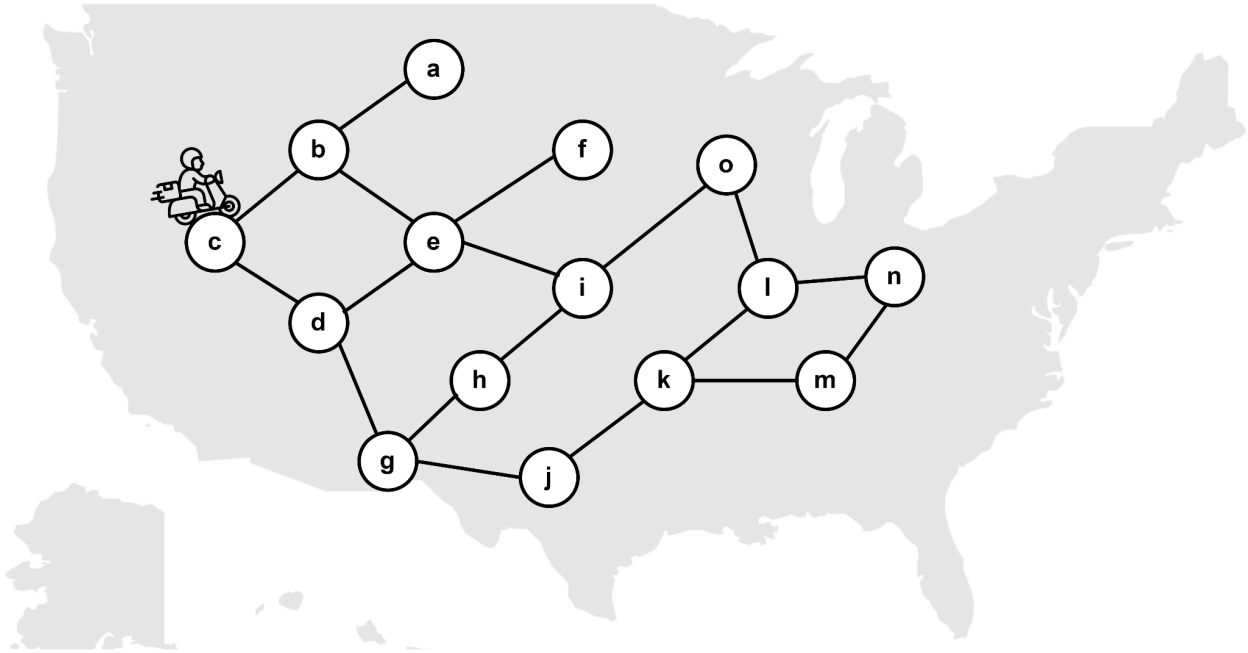
Fall 2023
CSE 221 Lab Final

Total Marks: 20
Time: 1 hour

A delivery man named Ramsay plans his delivery regularly to organize his work. He has a map of the cities he needs to deliver the parcels. Recently he got a big order of delivery which will take him to travel to many cities, and he can not do that in one day. He decided to deliver some of them today and others tomorrow. He chose to deliver to those cities that are on even distance today and odd distant tomorrow. He will calculate the distance level-wise.



Here in the map above, suppose Ramsay lives in city ‘c’; he found in the map that ‘b’ and ‘d’ cities are in the distance 1 as they are on level 1, then he discovered that ‘a’, ‘e’, ‘g’ cities are at a distance 2 as they are on the level 2 and so on. Your task is to help Ramsay make the list of the cities he will deliver today and the cities he will deliver tomorrow.

Q1 (Marks 2): Read the graph inputs from a text (.txt) file following the given format.
Q2 (Marks 4): Show inputs (which you have taken from the text file) in the adjacency matrix or adjacency list [*you may use a dictionary*] to represent the graph. Generate an **output file** of the adjacency matrix or list you created.
Q3 (Marks 9): Apply a suitable algorithm by which you can find the distance(levels) of the cities and, based on that, find which cities are on today’s delivery list and which are on tomorrow’s delivery list.

Input:

The first line contains two integers N and M separated by a space, denoting the number of nodes and edges in the graph, respectively.
The following M lines each contain two characters(the nodes) and indicate their connection.
The last line will contain the city(Node) where Ramsay lives and start the journey.

Output:

*Output should be in an **output file**
1st line: Name of the cities which will get delivery today. [Even distance]
2nd line: Name of the cities which will get delivery tomorrow. [Odd distance]

Sample Input	Sample Output
15 18 a^b b^c b^e c^d d^e e^f d^g e^i g^h h^i g^j j^k k^l i^o o^l k^m m^n l^n c	Todays delivery: g,e,a,k,o,n Tomorrows delivery: d,b,j,i,h,f,l,m

**The output order does not matter; the city's names should be in their respective list as shown in the output.*

Q4 (Marks 5): Ramsay recently heard the news that some protests are going on in some cities, so the government announced a total shutdown in those cities. As a result, he can not deliver in those cities, and he can not cross those cities to reach other cities that are only accessible by those cities. Now, your task is to help him recalculate his new delivery list by avoiding those cities.

Hint: You will consider those inaccessible cities as they don't exist on the map.

Input:

You will use the input from the Q3 for the graph reference. In addition, take another input from the below sample input. Here the first line contains a single integer N, denoting the number of cities that are inaccessible. The next N line will contain the inaccessible city name.

Output:

*Output should be in an **output file**

1st line: Updated Names of the cities that will get delivery today. [Even distance]

2nd line: Updated Names of the cities that will get delivery tomorrow. [Odd distance]

Sample Input	Sample Output
3 d g k	Todays delivery: e,a,h,o,n Tomorrows delivery: b,f,i,l,m

**The output order does not matter; the city's names should be in their respective list as shown in the output.*