CSE221: Algorithms

Lab Final

Fall 2023

Submission Guidelines:

1. You can code all of them either in Python, Java or CPP. But you should choose a specific language for all tasks.

2. For each task write separate python files like task1.py, task3.py and so on.

3. Add a hand written explanation of 3-4 lines for each of your solutions and submit that as a single document.

4. For each problem, take input from files called "inputX.txt", and output at "outputX.txt", where X is the task number. So, for problem 2, in your code, the input file is basically this, "input2.txt". Same for the output file.

5. Finally zip all the files and rename this zip file as per this format: LabSectionNo_ID_CSE221LabFinal_Fall2023.zip. [Example: LabSection01_21101XXX_CSE221LabAssignment01_Fall2023.zip]

6. You MUST follow all the guidelines, and naming/file/zipping convention stated above. Failure to do so will result in a straight 50% mark deduction.

7. Don't copy from your friends. For plagiarism, you will get a 0.

Given an undirected graph with V vertices and E edges, represented as an adjacency list, find the shortest path from a given starting vertex S to every other vertex in the graph. If a vertex is unreachable from S, return -1. Output the shortest path for each vertex.

The input file (`input.txt`) is expected to contain:

1. The first line: Three integers V (number of vertices), E (number of edges), and S (the starting vertex).
2. The next E lines: Pairs of integers X and Y, indicating that there is an undirected edge between vertex X and vertex Y.

The output file (`output.txt`) should contain:

- One line for each vertex, listing the vertices in the shortest path from S to that vertex (or -1 if the vertex is unreachable).