1. (20pts) Describe how to use the idea of DFS algorithm to determine if a given undirected graph is 2-colorable. You do not need to write a pseudo-code. Elaboration in English is sufficient.
2. (20pts) Give an example and show that Dijkstra’s algorithm may not work correctly if there is one or more negative-weight edges in the graph.
3. (20pts) Prove or disprove:

If the weights of all edges are distinct, the shortest path between any two vertices in a weighted graph is unique.
4. (15pts) In unweighted graphs, the distance between two vertices \( u, v \) is defined as the length of the shortest path between \( u, v \), and the diameter is defined as the maximum distance between two distinct vertices in the graph. Find the diameters of \( K_5 \), \( K_{3,4} \) and a circle of 6 nodes.
5. (10pts) Find the optimum (with the minimum total weight) travelling salesman tour in the following graph.