Homework #9

For all questions, choose the **best** answer.

1.

What is the greedy choice being made in Dijkstra's algorithm?

(a) Adding the edge incident to the available vertex of least total distance from the source vertex

(b) Adding the edge incident to the available vertex of least distance from the current Dijkstra tree

(c) Removing the edge of highest weight from further consideration in the algorithm.

(d) Adding the edge of lowest weight to the forest.

(e) None of the above

2.

If a graph $G = (V, E)$ is connected, Dijkstra's algorithm can alternatively be thought of as creating a (spanning) tree T for G. The source vertex $s \in V$ is T's root, and the paths in T represent shortest-paths from s to every other vertex in G. When a vertex v is marked "finished" in the algorithm, the edge corresponding to the shortest path to v is added to T.

In what order are edges added to the Dijkstra spanning tree for the following undirected graph, where a is the source vertex?
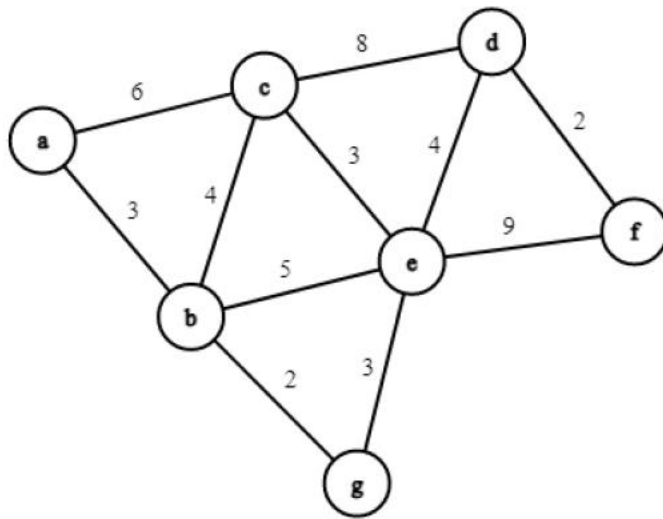
(a) {(a, b), (b, g), (b, c), (g, e), (e, d), (d, f)}

(b) {(a, b), (b, g), (g, e), (b, c), (e, d), (d, f)}

(c) {(a, b), (b, g), (b, c), (g, e), (d, f), (e, d)}

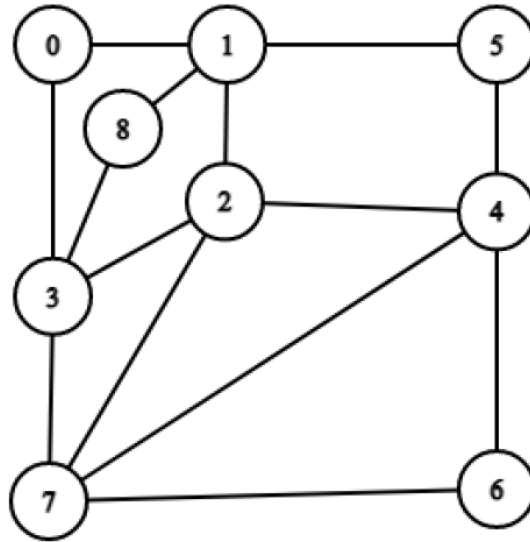(d) {(b, g), (d, f), (c, e), (a ,b), (b, c), (e, d)}

(e) None of the above

3.

In the previous problem, what is $d(a, f)$?

(a) 10

(b) 12

(c) 14

(d) 16

(e) None of the above

4.

Which of the following statements is true about the undirected graph shown?
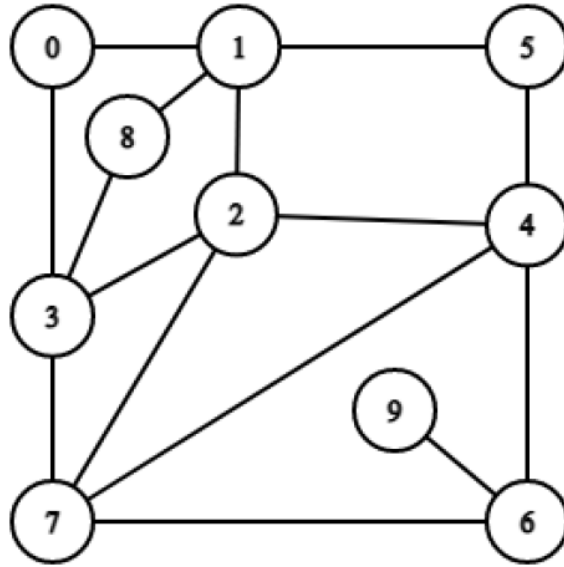
1. There exists an Eulerian path in the graph.

2. There exists an Eulerian cycle in the graph.

3. It is possible to add a single edge to the graph such that the resulting graph contains an Eulerian cycle.

(a) 1

(b) 1 and 3

(c) 2 and 3

(d) All of the above

(e) None of the above

5.

Which of the following statements is true about the undirected graph shown?

1. There exists an Eulerian path in the graph.

2. There exists an Eulerian cycle in the graph.

3. It is possible to remove a single edge from the graph such that the result-
   ing graph contains an Eulerian path.

(a) 1

(b) 1 and 3

(c) 2 and 3

(d) All of the above

(e) None of the above