

1 Conceptual Shortest Paths

Answer the following questions regarding shortest path algorithms for a **weighted, undirected graph**. If the statement is true, provide an explanation. If the statement is false, provide a counterexample.

- (a) (T/F) If all edge weights are equal and positive, the breadth-first search starting from node A will return the shortest path from a node A to a target node B.

- (b) (T/F) If all edges have distinct weights, the shortest path between any two vertices is unique.

- (c) (T/F) **Adding** a constant positive integer k to all edge weights will not affect any shortest path between two vertices.

- (d) (T/F) **Multiplying** a constant positive integer k to all edge weights will not affect any shortest path between two vertices.