

Homework 3: Dijkstra's algorithm

Problem Description

1. Dijkstra's Correctness:

Please proof this THEOREM:

After running Dijkstra's algorithm, the estimate $d[v]$ is the actual distance $d(s,v)$ for all v .

Hints:

PROOF OUTLINE: Prove these two claims. Together, they imply the theorem.

Claim 1: For all v , $d[v] \geq d(s, v)$.

Claim 2: When a vertex v gets marked as "sure", $d[v] = d(s, v)$

2. If you run Dijkstra both from source and destination on a graph, the first vertex to appear in both the forward and backward runs must be on the shortest path between the source and the destination. True or False? If it is true, please proof it! Or, please provide a counter-example.

Solution: Your answers and proofs go here. **Note that the end of the proof should be marked with ■ or □.**

Please submit the PDF version to assistant.