CSCI 3104 Fall 2021
Instructors: Profs. Grochow and Waggoner

Quiz- Standard 21

Due Date .... TODO
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Contents

1 Instructions

- The solutions **should be typed**, using proper mathematical notation. We cannot accept hand-written solutions. Here's a short intro to LaTeX.
- You should submit your work through the **class Canvas page** only. Please submit one PDF file, compiled using this LaTeX template.
- You may not need a full page for your solutions; pagebreaks are there to help Gradescope automatically find where each problem is. Even if you do not attempt every problem, please submit this document with no fewer pages than the blank template (or Gradescope has issues with it).
- You **may not collaborate with other students**. **Copying from any source is an Honor Code violation. Furthermore, all submissions must be in your own words and reflect your understanding of the material.** If there is any confusion about this policy, it is your responsibility to clarify before the due date.
- Posting to **any** service including, but not limited to Chegg, Discord, Reddit, StackExchange, etc., for help on an assignment is a violation of the Honor Code.
- You **must** virtually sign the Honor Code (see Section 2). Failure to do so will result in your assignment not being graded.

2 Honor Code (Make Sure to Virtually Sign)

Problem 1.

- My submission is in my own words and reflects my understanding of the material.
- I have not collaborated with any other person.
- I have not posted to external services including, but not limited to Chegg, Discord, Reddit, StackExchange, etc.
- I have neither copied nor provided others solutions they can copy.

Agreed (john blackburn. □

3 Standard 21- Dynamic Programming: Identify Precise Subproblems

Problem 2. Given an undirected graph $G(V, E)$ with positive weight $c_e > 0$ for each edge $e \in E$, you are asked to find the shortest path from a source $s \in V$ to a destination $t \in V$. For each node $v \in V$, denote by d_v the cost of shortest path from v to the destination t. Clearly identify the precise sub-problems to consider. That is, what is the recursive structure to leverage when designing a dynamic programming algorithm? [**Note:** Dijkstra's algorithm combines both the greedy and dynamic programming techniques.]

Answer. at node d_v, we must consider the shortest path to t from each of d_v's children nodes. and we must consider the children of those children and so on until the current path we are on reaches t. we reach the base case as soon as we reach t and can start building back up from there. But at the precise node d_v the subproblems we must consider is the shortest path of all the nodes connected to d_v.

□