Quiz 7

Due Date ....TODO
Name ....**John Blackburn**
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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 the Honor Pledge)

Problem 1. On my honor, my submission reflects the following:

- 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.

In the specified region below, clearly indicate that you have upheld and agree to the Honor Code. Then type your name.

Honor Pledge. I have upheld and agree to the Honor Code. John Blackburn □

3 Standard 7- Kruskal's Algorithm

3.1 Problem 2

Problem 2. Consider the following graph $G(V, E, w)$. Clearly indicate the order in which Kruskal's algorithm adds the edges to the minimum-weight spanning tree. You may simply list the order of the edges; it is not necessary to exhibit the state of the algorithm (i.e., the disjoint-set data structure) at each iteration.
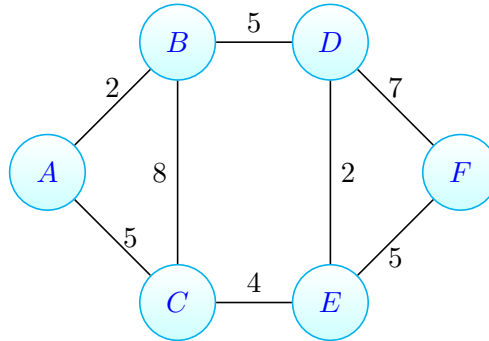
Answer. Kruskal's first sorts all the edges in G by least weight and places them all in a priority queue. Then the algorithm adds the lightest edge in all of G. Then adds the next lightest edge available until a MWST has been reached. It only skips edges if they are useless. Otherwise they next lightest edge available is always added no matter if it is a part of the MWST. For this graph the path Kruskal's takes is: First Kruskal's would add the lowest weight edge in the graph $\{A, B\}$, Then edge $\{D, E\}$. These two edges have the same weight so the algorithm could add either edge first, it depends on the way the queue sorts them in the beginning. The next edge added is $\{C, E\}$. Then $\{A, C\}$, then finally edge $\{E, F\}$. These last two edges are of the same weight so they could be added in reversed order depending on the queue. This completes the execution of Kruskals because we have reached the MWST.

□