Quiz 7 – Safe and useless edges

Due Date . . . . February 18
Name . . . . **Your Name**
Student ID . . . . **Your Student ID**
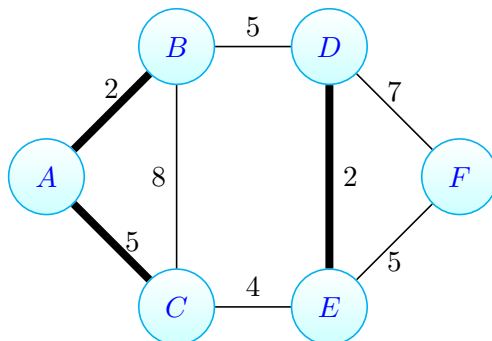
Contents

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.

2 Standard 6- Safe and Useless Edges

2.1 Problem 1

Problem 1. Consider the following graph $G(V, E, w)$. Suppose we have the intermediate spanning forest $\mathcal{F}$ (indicated using thick edges) consisting of the edges $\{A, B\}$, $\{A, C\}$, and $\{D, E\}$. Clearly identify the safe, useless, and undecided edges. Justify your reasoning.

Answer.
- $\{B,D\}$: This edge is undecided because it connects two parts of G so it's not useless but it creates a cycle in A,B,D,E,C so it also is not safe.

- $\{D,F\}$: This edge is undecided because it connects a vertex in G with a vertex not in G so it's not useless but it also is not safe because it creates a cycle in D,F,E.

- $\{F,E\}$: This edge is safe because it connects a vertex in G with a vertex out of G and has the minimum weight.

- $\{E,C\}$: This edge is safe because it connects two unconnected vertices in G with the minimum weight.

- $\{B,C\}$: This edge is useless because it creates a cycle in A,B,C

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