CSCI 3104 Spring 2022
Instructors: Profs. Chen and Layer

Quiz 7 – Safe and useless edges

Due Date ..... February 18
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Contents

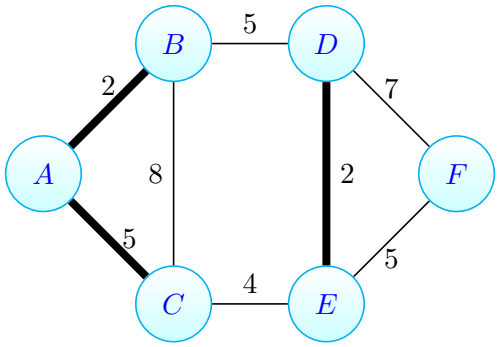
1 Instructions

- 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.

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. The individual trees in this forest are {A,B,C}, {D,E} and {F}.

{B, C} is a useless edge because it connects two vertices that are part of the same tree {A,B,C}.

{C, E} is incident to one vertex from {A,B,C} and one from {D,E}. It's a safe edge because it's the minimum weight edge to {A,B,C} and {D,E}.

{B, D} is incident to one vertex from {A,B,C} and one from {D,E}. It's an undecided edge because it's not the minimum weight edge to either {A,B,C} or {D,E}.

{E, F} is incident to one vertex from {D,E} and one from {F}. It's a safe edge because it's the minimum weight edge to {F}.

{D, F} is incident to one vertex from {D,E} and one from {F}. It's an undecided edge because it's not the minimum weight edge to either {D, E} or {F}. □