Midterm 1 Standard 6 - Safe and Usless Edges

Due Date .... March 10
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Quiz Code (enter in Canvas to get access to the LaTeX template) .... **QERFA**

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, Useless, and Undecided Edges

2.1   Problem 1

Problem 1. Consider the following Spanning Forest $\mathcal{F}$ for the weighted graph $G(V, E, w)$ pictured below. Justify the inclusion or exclusion of each edge in $\mathcal{F}$ by deciding if the edges are safe, useless or undecided.
Note: There are 8 edges that needs to be considered
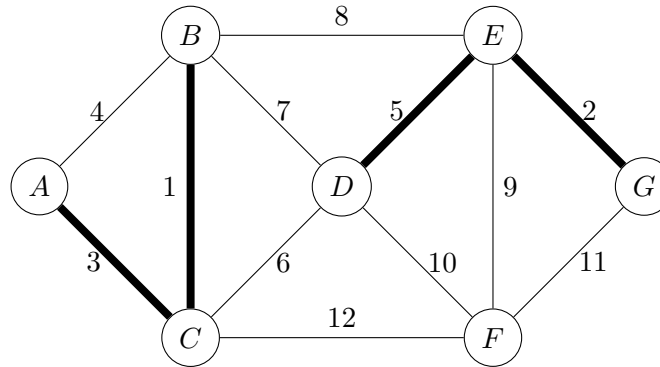
Answer. The following edges are safe/useless/undecided:

1.) The edge $\{A, B\}$ is useless because it has both end points in $\{A, B, C\}$.

2.) The edge $\{B, E\}$ is undecided because it connects $\{A, B, C\}$ and $\{D, E, G\}$ but is not a minimum weight edge.

3.) The edge $\{B, D\}$ is undecided because it connects $\{A, B, C\}$ and $\{D, E, G\}$ but is not a minimum weight edge.

4.) The edge $\{C, D\}$ is safe because it connects $\{A, B, C\}$ and $\{D, E, G\}$ and is a minimum weight edge.

5.) The edge $\{C, F\}$ is safe because it connects $\{A, B, C\}$ and $\{F\}$ and is a minimum weight edge.

6.) The edge $\{F, E\}$ is safe because it connects $\{F\}$ and $\{D, E, G\}$ and is a minimum weight edge.

7.) The edge $\{F, D\}$ is undecided because it connects $\{F\}$ and $\{D, E, G\}$ but is not a minimum weight edge.

8.) The edge $\{F, G\}$ is undecided because it connects $\{F\}$ and $\{D, E, G\}$ but is not a minimum weight edge.

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