

CENG223, Final Exam, Fall 2020-2021, Key

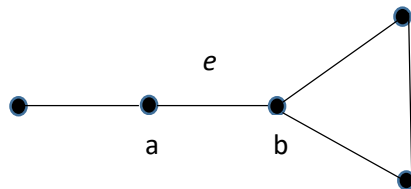
Q-4) {10 points} A connected simple graph $G = (V, E)$ has an edge e , with endpoints a and b , which occurs in every spanning tree of G . Draw an example for G such that the following conditions are also satisfied:

- $\deg(a) = 2$, $\deg(b) = 3$
- G contains a simple circuit

Explain your reasoning briefly.

Answer:

An example graph could be as follows (a minimal one).



Remove the edge e and the graph becomes disconnected, with two connected components. In other words, e serves as a “bridge”. You might also note that the edge e must not be on a simple circuit as this would provide an alternative path to reach b from a .

Grading:

(All) Edge e occurs in every spanning tree (5 points)

(Exp) Explanation of your *reasoning* (2 points)

Describing your graph in words is useless, and restating the required properties is waste of time. An “explanation of your reasoning” should address the “why” aspect of your solution. Somehow you need to reflect on your own thought process. Correct use of terminology is essential.

(Deg) Degree condition is satisfied (1 point)

(Cct) There is a simple circuit (1 point)

(Oth) Your graph is structured properly (1 point)