

Graph Theory 2, MATH 5450, Spring 2021

Homework 2, 4.2. Spanning Trees

Due Friday, February 5, at 1:40

Write in complete sentences!!! *Explain* what you are doing and convince me that you understand what you are doing and why. Justify all steps by quoting relevant results from the textbook, class notes, or hypotheses. Do not copy the work of others; **do your own work!!!**

4.2.1. Let G be a connected graph and e a link (i.e., an edge with distinct ends) of G .

(a) Describe a one-to-one correspondence between the set of spanning trees of G that contain e and the set of spanning trees of G/e .

(b) Deduce Proposition 4.9: “Let G be a graph and e a link of G . Then $t(G) = t(G \setminus e) + t(G/e)$.” HINT: Consider the case where e is a cut edge of G and the case where e is not a cut edge of G .

4.2.7. (a) Let G be a simple graph on n vertices and let H be the graph obtained from G by replacing each edge of G by k multiple edges. Prove $t(H) = k^{n-1}t(G)$.