

Graph Theory 2, MATH 5450, Spring 2021

Homework 10, 10.2. Duality, 10.3. Euler's Formula

Due Wednesday April 28, 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!!!**

10.2.7. Let B be a bond of a (connected) plane graph G . Prove that B^* is a cycle of the plane dual.

10.3.1. Prove that the crossing number of a simple graph G satisfies the inequality $\text{cr}(G) \geq m - 3n + 6$.

10.3.2. (a) Let G be a connected planar graph G with girth k , where $k \geq 3$. Prove that $m \leq k(n - 2)/(k - 2)$.

(b) Prove that the Petersen graph is nonplanar using part (a).