Math 462 ***HOMEWORK #5*** ***due Friday, February 8***

Written Assignment: There are 2 mandatory problems in this assignment and a "brownie points" question (which is optional).

Problem 1. (Problem 14 from Chapter 12) Take K_6, the complete graph on 6 vertices, and delete two of its edges. Prove that the resulting graph cannot be planar. What if you delete three edges? (Hint: a graph is planar if and only if it does not contain either $K_{3,3}$ or K_5 as a subgraph. Clarification: a subgraph is any subset of the graph, not necessarily an *induced* one.)

Problem 2. (Problem 15 from Chapter 12) Let P be a convex polyhedron whose faces are all either a-gons or b-gons, and whose vertices are each adjacent to exactly 3 edges. Let p_a, p_b, and n denote the number of a-gonal faces, b-gonal faces, and vertices of P.

(a) Express the number of edges of P in two different ways.

(b) Prove that $p_a(6-a) + p_b(6-b) = 12$. (Hint: think "Euler formula".)

Problem 3 (Brownie points). Is it possible to partition a square into a finite number of concave quadrilaterals?