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Algorithms for Planar Graphs
Summer 2017

Assignment 2

Post Date: 08 May 2017 **Due Date:** 15 May 2017 **Tutorial:** 24 May 2017

Problem 1: Subdivisions of K_5 and $K_{3,3}$ — 5 Points

Let $e = (x, y)$ be an edge in a graph G and G/e be the graph G in which e has been contracted to a vertex z.

Show that if G/e contains a subdivision of K_5 or $K_{3,3}$, then G also contains a subdivision of K_5 or $K_{3,3}$.

Hint: Reverse the contraction and show that, no matter how the edges connecting to z in G/e are distributed among x and y in G, you will always end up with a subdivision of K_5 or $K_{3,3}$.

Problem 2: Skewness — 5 Points

The *skewness* of a graph is the minimum number of edges that have to be deleted such that the graph becomes planar.

(a) Can the skewness of a graph with m edges and n vertices be smaller than $m - 3n + 6$?

(b) Compute the skewness of the graphs K_3, K_5, $K_{3,3}$, and K_6.

(c) What is the skewness of the complete graph $K_n, n \geq 3$?