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 $K_n$, $n \geq 3$?