Assignment 10

Post Date: 22 June 2015  Due Date: 29 June 2015  Tutorial: 8 July 2015

Problem 1: Girth 6 Points

The girth of a graph is the number of edges on a shortest cycle.

(a) For a given vertex $v$, show how to compute a shortest cycle that contains $v$.

(b) Use (a) to compute the girth of a graph. What is the run time of your algorithm?

(c) Use the planar separator theorem to improve the run time of your algorithm if the input is restricted to planar graphs.

Problem 2: Balanced Planar Separator 4 Points

(a) Prove or disprove that for every planar graph with $n \leq 9$, there exists a $2/3$-balanced separator of size $\leq \sqrt{n}$.

(b) Can you find a planar graph with $n > 9$ vertices that does not have a $2/3$-balanced separator of size $\leq \sqrt{n}$? Explain why your example is correct or argue why such an example does not exist.