Assignment 9

Post Date: 15 June 2015   Due Date: 22 June 2015   Tutorial: 24 June 2015 (!)

Problem 1: Separators of Trees  4 Points

Let $T$ be a tree with non-negative weights on the vertices that sum to one. A *weighted vertex separator* of $T$ is a partition of the vertex set into two sets $A$ and $B$ of weight at most $2/3$ and a vertex $v$ such that there is no edge between $A$ and $B$.

(a) Show how to compute a weighted vertex separator of a tree in linear time.

(b) Can the vertex set of any tree with non-negative weights on the vertices summing to one be partitioned into two sets $A$ and $B$ of weight at most $1/2$ and a vertex $v$ such that there is no edge between $A$ and $B$?

Problem 2: Separators  6 Points

Apply the algorithm from the lecture (see the last slide for a summary) to find a $\frac{3}{4}$-balanced cycle separator of size $\leq 4\sqrt{|V|} + 1$ in the following graph (all faces have the same weight and all nodes and edges have weight 0).