11. Homework Total points: 40 (bonus)

Advanced Graph Algorithms SS 2012

Ran Duan, Jens M. Schmidt, Magnus Wahlström Tutor: Bernhard Schommer

Exercise 1: Dominating set in interval graphs *(15 points)*

Recall Dominating Set: Find a minimum set of vertices X, such that every vertex in G is either a member of X or has a neighbour in X. Give a polynomial-time algorithm for Dominating Set in interval graphs.

Exercise 2: Maximum matching *(15 points)*

Let M be a maximum weight matching among those with exactly $k = |M|$ edges. Let P be a maximum-gain augmenting path w.r.t. M (i.e., it begins and ends with free vertices). Prove that $M \oplus P$ is a maximum weight matching among those with $k + 1$ edges.

Exercise 3: 2-Connectivity *(10 points)*

Let $C = \{C_1, C_2, \ldots\}$ be a chain decomposition of a simple connected graph G. Show that G is 2-connected if and only if its minimum degree is 2 and C_1 is the only cycle in C.