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Graphs & Algorithms II — Exercise Set 2 — HS07

URL: http://www.ti.inf.ethz.ch/ew/courses/GA07/

Exercise 4

Show that a graph is outerplanar if and only if it does not contain a subdivision of K_4 or $K_{2,3}$.

Exercise 5

In the *Minimum Dominating Set Problem* one is given a graph $G = (V, E)$ and has to find a minimum cardinality subset $D \subset V$ of the vertices such that $D \cup N(D) \supseteq V$.

Describe a subexponential time algorithm for Minimum Dominating Set on planar graphs.

Exercise 6

Let $f(n)$ be the maximum number of edges in a simple graph on n vertices that does not contain a $K_{3,3}$ subdivision.

a) For $(n-2) \bmod 3 \equiv 0$, construct a graph with $3n-5$ edges that does not contain a $K_{3,3}$ subdivision.

b) Prove that $f(n) = 3n-5$ for $(n-2) \bmod 3 \equiv 0$ and $f(n) = 3n-6$, for any other $n \geq 2$.
Hint: Use induction and Homework 2.

Homework 2

Prove that every 3-connected graph on at least six vertices that contains a subdivision of K_5 also contains a subdivision of $K_{3,3}$.

Homework due: 10.10.2007, 11:00AM.