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

b) Prove that $f(n) = 3n - 5$ for $(n - 2) \equiv 0 \pmod{3}$ 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, 11:00 AM.