

### Third homework assignment

1. Find two graphs  $G$  and  $H$ , such that  $G$  contains  $H$  as a minor, but not as a subdivision.
2. Determine the genus of the graphs  $K_6$ ,  $K_7$  and  $K_8$  (2 points for each graph).
3. Find a 2-degenerate graph which is not a partial 1000-tree.
4. Prove that a graph is planar if and only if it does not contain  $K_5$  and  $K_{3,3}$  as minors.
5. Recall that a graph is called *outerplanar* if it can be drawn in the plane in such a way that all its vertices belong to the boundary of the outer face. Prove that a graph is outerplanar if and only if it does not contain  $K_4$  and  $K_{2,3}$  as minors.