Exercise 1

Consider a graph $G = (V, E)$ with $\Delta(G) = k$. Assume $U \cap M = \emptyset$, where $U = \{v \in V : v \text{ lies on an odd cycle}\}$ and $M = \{v \in V : \deg(v) = k\}$. What are the possible values for $\chi'(G)$ on such a graph $G$?

($\Delta(G)$ is defined as the maximum degree of any node in $G$. $\chi'(G)$ is the minimum number of colors needed to achieve a feasible edge-coloring of $G$.)

Exercise 2

Give an efficient algorithm that determines the size of a biggest clique in a given arc graph $G$.

Exercise 3

A Halin Graph is defined as a tree together with some extra edges: For $v_1, \ldots, v_k$ being the leaves of the tree, put in the extra edges

$$\{v_k, v_1\}, \{v_i, v_{i+1}\} \mid i \in \{1, \ldots, k-1\}$$

How would a good Separator in a Halin Graph look? What would be its size and how can it be found?

Exercise 4

Prove the following statement: A circle graph is a permutation graph if and only if it allows an equator, i.e. an additional chord intersecting with all existing ones.

Exercise 5

Consider the following algorithm for finding a maximum independent set in interval graphs: We put the interval with the leftmost ending (not the leftmost start!) into the set, then delete this and all intervals intersecting with it and start again. Prove that the independent set computed by this algorithm is optimal.