

- (1) The Erdős–Szekeres lemma can be stated as follows: If $n = ab + 1$ and x_1, \dots, x_n is a sequence of n numbers, then the sequence contains a strictly increasing subsequence of $a + 1$ terms or a weakly decreasing subsequence of $b + 1$ terms.
Prove the lemma and think about generalizations.
- (2) Describe an algorithm to find a maximum weight free set in a weighted binary tree, here a set of nodes is called free if no two of them are on a joint path to the root.
- (3) A geometric graph is a graph given with a straight line drawing. A convex geometric graph has its vertices in convex position, e.g. as points on a circle. Show that a convex geometric graph with n vertices and no three pairwise crossing edges has at most $4n - 10$ edges.
- (4) Let G be a geometric graph with n vertices such that each edge is crossed by at most one other edge. How many edges can G possess?
- (5) Find a constant factor approximation algorithm for intersection graphs of discs.
- (6) Find a constant factor approximation algorithm for intersection graphs of translates of a fixed convex shape.