Design and Analysis of Algorithms

Problem #1

Suppose you are given a sequence of n elements to sort. All the numbers in the sequence are in the range $[n, n^{10}-1]$. How fast can you sort the sequence? What if the elements in the sequence are in the range $[n^2, n^{\log n}-1]$?

Problem #2

Describe an algorithm that, given a set $\{x_1, x_2, \ldots, x_n\}$ of n points on the real line, determines the smallest set of unit-length closed intervals that contains all the given points. Analyze the running time of your algorithm.

Problem #3

Give an $O(V)$-time algorithm that determines whether a given undirected graph $G = (V, E)$ contains a cycle.