Design and Analysis of Algorithms

Problem #1.

Describe the general idea of Quick Sort. Show step-by-step how to sort the following list using Quick Sort and always picking the first element as the pivot: [10, 200, 30, 25, 70, 30, 7, 27]? Is Quick Sort stable? Explain why or why not.

Problem #2.

Draw a single binary tree *T* such that
a) each node of *T* stores a single character,
b) a *preorder* traversal of *T* yields EXAMFUN, and
c) a *inorder* traversal of *T* yields MAFXUEN.

Problem #3.

Describe an *O(n)* time algorithm that, given a set of *n* points on the real line $x_1 \leq \ldots \leq x_n$, in sorted order, determines a position of a closed interval of length *k* that covers the maximum number of the given points. Argue that your algorithm is correct.