Problem 1 (40pt)
Modify the QUICKSORT algorithm so that at each recursive call the pivot value is the median of the values in the current array. Provide the pseudo-code of the proposed algorithm.
Note 1: The median is the value X such that 50% of the elements in the array are ≤ X and 50 % ≥ X.
Note 2: It can be assumed that the initial array contains distinct values.
Problem 2 (45pt)
Analyze the complexity of the proposed algorithm and derive the recurrence equation (10pt). Solve the recurrence equation with the Master’s Theorem (10pt) and with the Recursion Tree method (25pt).
**Problem 3 (15pt)**
Discuss if there is a best and a worst case for the modified algorithm. If yes, discuss what these cases are, if not, discuss why.