Discrete Mathematics

Homework#3

Due date : April 23, 2018

Section 3.1)

28. Specify the steps of an algorithm that locates an element in a list of increasing integers by successively splitting the list into four sublists of equal (or as close to equal as possible) size, and restricting the search to the appropriate piece.

44. Describe an algorithm based on the binary search for determining the correct position in which to insert a new element in an already sorted list.

56. Show that if there were a coin worth 12 cents, the greedy algorithm using quarters, 12-cent coins, dimes, nickels, and pennies would not always produce change using the fewest coins possible.

Section 3.2)

26. Give a big-O estimate for each of these functions. For the function g in your estimate f (x) is O(g(x)), use a simple function g of smallest order.

a) $\mathrm{nlog}(n^2 + 1) + n^2 logn$

b) $(\mathrm{nlogn} + 1)^2 + (logn + 1)(n^2 + 1)$

c) $n^{2^n} + n^{n^2}$

32. Show that if f (x) and g(x) are functions from the set of real numbers to the set of real numbers, then f (x) is O(g(x)) if and only if g(x) is Ω (f (x)).

46. Show that if f1(x) and f2(x) are functions from the set of positive integers to the set of real numbers and f1(x) is Θ (g1(x)) and f2(x) is Θ (g2(x)), then (f1/f2)(x) is Θ ((g1g2)(x)).