Applied Programming

Fall 2017-18

Quiz # 1

Roll Number:

Q. 1. Suppose assignment statement takes 1 time unit to run, whereas reading from memory takes 3 time units, comparing two numbers takes 2 time units and addition takes 4 time units. If n is the size of the array A, then find the exact number of time units required to complete the following pseudocode. Then, find the best Big-Oh bound on the worst case running time.

sum = 0;

for i = 1 to n

do

if A[i] > 0 then

sum = sum + A[i]

end if

end for

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Q. 1. Suppose we have a singly linked list with a head pointer that points to the first element in the list and a tail pointer that points to the last element in the list. If n is the number of nodes in the linked list, what is the time complexity, in Big-Oh notation, of deleting the last node in the linked list. Note: The obvious answer may not be the right answer.

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Q. 1. We wish to show that n lg n is O(n2) by using the definition of Big-Oh. Suppose we pick n0 = 2. Pick an appropriate positive value for c to show that n lg n is O(n2) for all n ≥ n0.

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Q. 1. An algorithm has the exact running time of 4 n lg n + 9000. Is it O(n2)? Prove or disprove using the definition of Big-Oh.

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Q. 1. What is the worst case, best case and average case time complexity of inserting an item into an array, in Big-Oh notation? Provide reasoning.

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Q. 1. Give an algorithm to find the maximum from an array of integers A of size n. What is the worst case, best case and average case number of primitive operations performed by this algorithm?