ADS
Assignment5

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Problem 5.1

(c)

As seen in the programs output the average time taken by all the algorithms are:
Average of time taken by Lomoto is:0.000785576
Average of time taken by Hoare is:0.000709963
Average of time taken by med is:0.000132017

Here, we can see that the time taken by Lomoto partition is the greatest. It is due to the fact that because Hoare does three times fewer swaps on average, and it creates efficient partitions even when all values are equal.

Also, median of three partation takes less time than all of the algorithm because we are choosing the pivot so that we will not have problem if the spilt is not even, that means we are less likely to jump into the worst case and prone to move to th best case providing the time complexity less than Hoare and Lomoto.

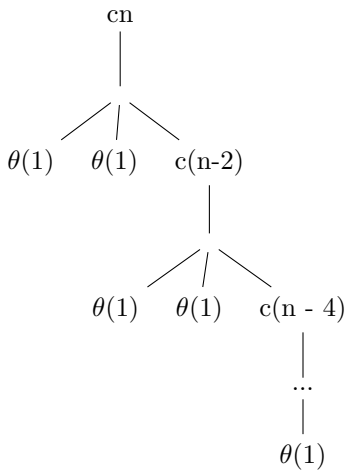
Problem 5.2

(b)

Time -complexity of quick sort is :

$$T(n) = 3T(n/3) + f(n)$$

Best case running time
Using master methode, we get: $a = 3, b = 3$
So $n^{log_3 3} = n$ $f(n) = cn$ and $n^{log_a b} = n$
so , best case time complexity is θ(nlg(n))
Worst case running time
Worst case is produced when the array is sorted.



In recursion tree we can see that the n-2... till 2. Thus the time taken in the worst acase is:

θ(n) = sum of multiple of 2 to n-2

θ**(n)** $= n(n+1)$

θ**(n)** $= n^2$