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COURSE CODE: CSCD 304 (Design and analysis of algorithm)

1a. Situation in which quicksort algorithm is in it best case is when the partition process always picks the middle element of the pivot. The solution for occurrence is O(n)..

1. Situation in which the algorithm is in its worst case is when the partition process always picks the greatest element or smallest element as pivot. The solution for occurrence is O().

2.a Time complexity in terms of worst case scenario

When quick sort always has the most unbalanced partitions available, then the original call takes cn times for some constant c, the recursive call on n-1 element elements take c(n-1) time, the recursive call on n-2 element takes c(n-2) time. Therefore in quick sort algorithm, the worst case running time is O().

b. Time complexity in terms of best case scenario

Quicksort's best case occurs when the partitions are as evenly balanced as possible: their sizes either are equal or are within 1 of each other. The former case occurs if the subarray has an odd number of elements and the pivot is right in the middle after partitioning, and each partition has (n-1)/2(*n*−1)/2left parenthesis, n, minus, 1, right parenthesis, slash, 2 elements. The latter case occurs if the subarray has an even number n of elements and one partition has n/2*n*/2n, slash, 2 elements with the other having n/2-1*n*/2−1n, slash, 2, minus, 1. In either of these cases, each partition has at most n/2*n*/2n, slash, 2 elements. Best case running time is O(n).