CSE222 / BİL505
Data Structures and Algorithms
Homework #6 – Report

MUHAMMED BİLAL TÜRK

1) Selection Sort

Time Analysis	Time complexity in best case, worst case and average case is O(n^2). Because iterates all element for comparison. Usage of this sorting algorithm might be efficient for small arrays because it is efficient in terms of space complexity.
Space Analysis	Space complexity is O(1), because it uses only current array.

2) Bubble Sort

Time Analysis	Time complexity in best case is O(n) and in worst case is O(n^2). Usage of this sorting algorithm might be efficient for small arrays because it is efficient in terms of space complexity. And also might be used for nearly sorted array, because it has boolean variable to check if swapping is done. If swapping is not done which means array is sorted. Therefore, no need more comparison.
Space Analysis	Space complexity is O(1), because it uses only current array.

3) Quick Sort

Time Analysis	Time complexity in best case and average case is O(n logn) due to the efficient divisin of array into smaller parts. If pivot selection is poor which means one of the sub array is empty, time complexity might be O(n^2) which is worst case.
Space Analysis	Space complexity is O(logn) because stack space used for recursive function calls. Function callsdepons on the depth of the recursion tree. Therefore, space complexity is O(logn).

4) Merge Sort

Time Analysis	Time complexity of merge sort in best case, average case and worst case is O(n logn) because it divides the array into halves and merges them after sorting.
Space Analysis	Space comlexity of merge sort is O(n) because t requires additional space proportional to the size of the array fort he temporary arrays use during the merging process.

General Comparison of the Algorithms

Quick sort is often more efficient for very large datasets because its average and best-case time complexity is O(n logn) and space complexity is O(logn).

Merge sort is also very efficient with a consistent time complexity which is O(n logn) in all cases.

Selection sort and Bubble sort have time complexity of O(n^2) which makes these algorithm less efficient for large datasets. However, they might be useful for small arrays or when memory space is limited because their space complexity is O(1).