

DS - Assignment

Q1. Insertion Sort

Shubham Kumar

11912069

Algorithm

```
insert(int arr[], size)
{
    for i  $\rightarrow$  size
        j = arr[i];
        k = i - 1;
        while k > 0 && arr[k] > j
            arr[k+1] = arr[k];
            k--;
        End while
        arr[k+1] = j
    End for
}
```

Insertion does not require any extra space. It only modifies the original array by moving the smallest element to front.

Hence space complexity $O(1)$.

Insertion sort sorts the array by comparing & then swapping.

In best case, ~~time~~ time complexity
 $= O(n)$

2. Quick Sort

Time complexity :-

Worst Case : $O(n^2)$

Avg Case : $O(n \log n)$

Best Case : $O(n \log n)$

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3. Bubble Sort :

For n elements $(n+1)$ comparisons are made

\therefore Time complexity $= O(n^2)$

Note: Quick Sort & Bubble Sort are 'in-place' algorithms.

Bubble sort is efficient for arrays with small size.