Quick Sort

Assignment Solutions

PW SKILLS

1. Which of the following sorting algorithms is used along quicksort to sort the sub arrays?
a) Merge Sort
b) Selection Sort
c) Insertion Sort
d) Bubble Sort

Ans: c) Insertion Sort

Explanation: In practice, quicksort can be optimized by switching to insertion sort for small subarrays because insertion sort is more efficient for small input sizes. Typically, when the size of the subarray falls below a certain threshold (e.g., 10 elements), quicksort will use insertion sort to finalize the sorting process.

2. How many subarrays does the partitioning step of the quick sort algorithm divide the entire array into?
a) one
b) two
c) depends on the elements of the array
d) depends on the size of the array

Ans: b) two

Explanation: The partitioning step in quicksort always divides the array into two sub arrays: one with elements smaller than the pivot and one with elements larger than the pivot.

3. Given an array where all its elements are sorted in increasing order except two swapped elements, sort it in linear time. Assume there are no duplicates in the array.
Input: A[] = [3, 8, 6, 7, 5, 9, 10]
Output: A[] = [3, 5, 6, 7, 8, 9, 10]

Ans:

```
def fix_swapped_elements(arr):
    n = len(arr)
    first = second = -1

    # Identify the two swapped elements
    for i in range(n - 1):
        if arr[i] > arr[i + 1]:
            if first == -1:
                first = i
            second = i + 1

    # Swap the two identified elements
    arr[first], arr[second] = arr[second], arr[first]

# Test the function
arr = [3, 8, 6, 7, 5, 9, 10]
print("Original array:", arr)
fix_swapped_elements(arr)
print("Sorted array:", arr)
```