Assignment On Searching and Sorting

Easy:

1. **Linear Search - Find the First Occurrence of a Value:**
   - **Question:** You are given an unsorted array of 1000 integers. Write a program to search for the first occurrence of a target value using linear search. If the value is found, return its index. If it is not found, return -1.

   Sample Input:
   arr = [22, 13, 45, 67, 13, 89, 76]
   target = 13

   Sample Output:
   Index: 1
   Sample Input (target not in array):
   arr = [5, 8, 12, 3, 7]
   target = 10
   Sample Output:
   -1

2. **Binary Search - Find a Value in a Sorted Array:**
   - **Question:** You are given a sorted array of 1000 integers. Write a program to perform binary search to find the index of a target value. If the value is found, return its index. If it is not found, return -1.

   Sample Input:
   arr = [3, 6, 9, 12, 15, 18]
   target = 12
   Sample Output:
   Index: 3

   Sample Input (target not in array):
   arr = [10, 20, 30, 40, 50]
   target = 25
   Sample Output:
   -1

3. **Bubble Sort - Sort an Array in Ascending Order:**
    - **Question:** You are given an array of integers. Write a program to sort the array in ascending order using bubble sort.

    Sample Input:
    arr = [29, 10, 14, 37, 14]
    Sample Output:
    Sorted Array: [10, 14, 14, 29, 37]

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4. **Selection Sort - Sort an Array of Integers:**
    - **Question:** Write a program to sort an array of integers in ascending order using selection sort.

    Sample Input:
    arr = [64, 25, 12, 22, 11]
    Sample Output:
    Sorted Array: [11, 12, 22, 25, 64]

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5. **Insertion Sort - Sort a Partially Sorted Array:**
    - **Question:** You are given a partially sorted array of integers. Write a program to fully sort the array using insertion sort.

    Sample Input:
    arr = [3, 8, 12, 15, 6, 20]
    Sample Output:
    Sorted Array: [3, 6, 8, 12, 15, 20]

Medium:

1. Search in a Rotated Sorted Array:

- **Question:** You are given a sorted array of integers that has been rotated at an unknown pivot. Write a program to find the index of a target value in this array.

Sample Input: arr = [15, 18, 2, 3, 6, 12] target = 3

Sample Output: Index: 3

Sample Input (target not in array): arr = [7, 8, 9, 1, 2, 3, 4] target = 5

Sample Output: -1

2. **Find the Top 5 Maximum Values:**

- **Question:** You are given an unsorted array of 3000 integers representing scores in a game. Write a program to sort the array and extract the top 5 highest scores.

Sample Input: scores = [65, 85, 90, 100, 70, 80]

Sample Output: Top 5 Scores: [100, 90, 85, 80, 70]