Sorting and Searching

Assignment Questions

PW SKILLS

Problem 1 :

Intersection of Two Sorted Arrays
Write a Python program to find the intersection of two sorted arrays.

Input:
A = [1, 3, 5, 7, 9]
B = [2, 4, 5, 8]
Output:
Intersection: [5]

Problem 2 :

Find the Kth Smallest Element
Write a Python function to find the kth smallest element in an unsorted list.

Input:
[12, 3, 1, 7, 8, 20], k = 3
Output:
The 3rd smallest element is 7

Problem 3 :

Binary Search in a Rotated Sorted Array
Implement a Python program to perform a binary search on a rotated sorted array.

Input:
[4, 5, 6, 7, 8, 9, 1, 2, 3], 6
Output:
Element 6 found at index 2

Problem 4 :

Searching in a Matrix
Write a Python program that searches for a given element in a 2D matrix and returns its position.

Input:
```
Matrix = [
   [1, 3, 5],
   [7, 9, 11],
   [13, 15, 17]
]
Element = 11
```

Output:
Element 11 found at position (1, 2)

Problem 5 :

Sorting Strings by Length
Write a Python program that takes a list of strings and sorts them based on their length.

Input:
['apple', 'banana', 'kiwi', 'orange', 'grape']

Output:
['kiwi', 'grape', 'apple', 'banana', 'orange']

Problem 6 :
Implementing the merge sort (Will be discussed in the class)

Problem 7 :
Implementing the quick sort (will be discussed in the class)

Problem 8 :
Implementing the count sort (will be discussed in the class)

Problem 9 :

Implement a Python function to find a peak element in an array. A peak element is an element that is greater than or equal to its neighbors.

Input:
[1, 3, 20, 4, 1, 0]

Output:
Peak element is 20

Problem 10 :

Search in a Nearly Sorted Array

Implement a Python program to perform a binary search in a nearly sorted array. In a nearly sorted array, each element is at most k positions away from its sorted position.

Input:
[2, 1, 3, 4, 6, 5, 7], k = 1

Output:
Element 5 found at index 4