Lab 12

1- Write a C++ program to sort a given unsorted array of integers, in wave form.
Note: An array is in wave form when array[0] >= array[1] <= array[2] >= array[3] <= array[4] >= . . . . **(without using temporary array)**
Original array: 4 5 9 12 9 22 45 7
Wave form of the said array: 5 4 9 7 12 9 45 22

2- Write a C++ program to rearrange the elements of a given array size = 10 (take values as input) of integers in a zig-zag pattern. **(without using temporary array)**
Note: The format zig-zag array in form a < b > c < d > e < f.
Original array: 0 1 3 4 5 6 7 8 10
New array elements: 0 3 1 5 4 7 6 10 8

3- Write a C++ program to find the maximum sum of a subarray of size 3 in a given array of integers. The program should output the maximum sum along with the start and last indices of the subarray. If there are multiple subarrays with the same maximum sum, output the one with the smallest start index.**(without using temporary array)**
Input: {1, -2, 3, -4, 5, -6, 7}
Output: Maximum sum subarray: [5, -6, 7], Sum: 6, Start Index: 4, Last Index: 6
Input: {2, -1, 2, 3, -9, 5, 1, -7}
Output: Maximum sum subarray: [2, 3, -9], Sum: -4, Start Index: 2, Last Index: 4

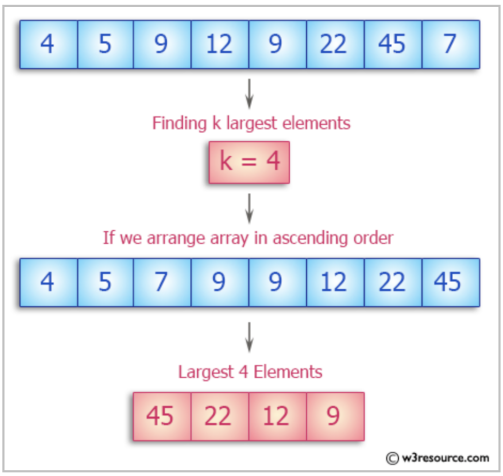
4- Write a C++ program to find the number of pairs of integers in a given array of integers whose sum is equal to a specified number (take input).

Original array: 1 5 7 5 8 9 11 12
Array pairs whose sum equal to 12:
1,11
5,7
7,5
Number of pairs whose sum equal to 12: 3

5- Implement a C++ program to rotate an array to the right by a given number of steps. The program should take an array of integers and the number of steps as input, and it should modify the array in-place **(without using temporary array)**
int arr[5] = {1, 2, 3, 4, 5};
int steps = 2;
Output: Rotated array: {4, 5, 1, 2, 3}

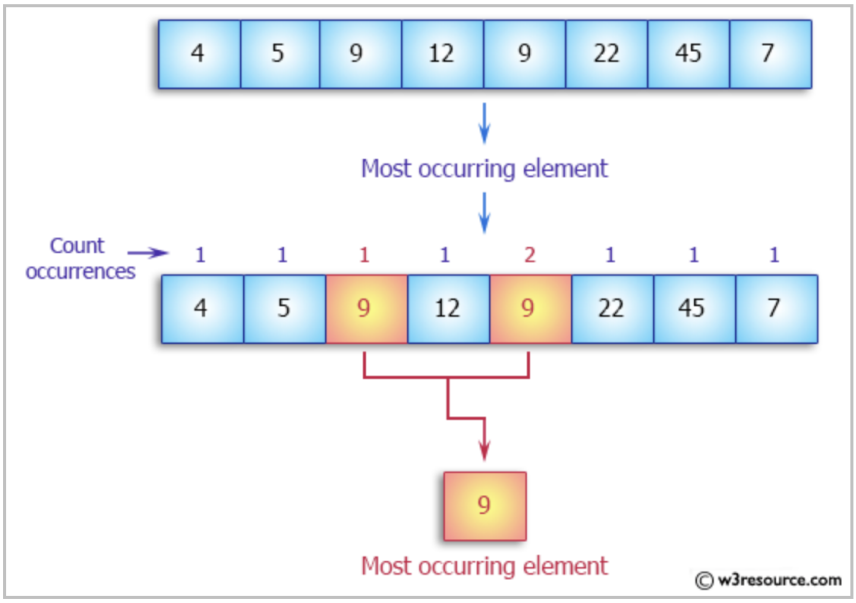
5- Write a C++ program to find the k largest elements in a given array of integers.**(without using temporary array)**

Pictorial Presentation:



6- Write a C++ program to find the most frequent element in an array of integers.**(without using temporary array)**

Pictorial Presentation:



7- Write a C++ program to find the union & intersection of two integer arrays.

8- Design a password validation C++ program for a user registration system. The password must adhere to the following criteria. Take password as string input.

- At least 8 characters long.
- Contains a mix of uppercase and lowercase letters.
- Includes at least one numeric digit.
- Contains at least one special character (e.g., @, #, $, %).

9- Write a C++ program that takes a string as input and returns the reversed version of the string. Do not use any built-in reverse functions. **(without using temporary array)**
Input: "Hello, World!"
Output: "!dlroW ,olleH"

10- Write a C++ program that takes a sentence as input and displays the number of words in it. Assume that words are separated by spaces, and there are no leading or trailing spaces. The program should handle multiple spaces between words and ignore them while counting. Test your program with different sentences.

11- Implement a C++ program that checks if a given string is a palindrome. A palindrome is a word, phrase, number, or other sequence of characters that reads the same forward and backward.