The purpose of this lab is to manipulate an array of integers. The assignment is to write a program that:

1. Declares an array of integers of size equal to const int SIZE = 10.
2. Implements the following functions:

✓ A function that displays a menu. The menu should be displayed after each completed menu selection.

✓ A function that prompts the user to initialize the array. The entire array does not need to be initialized. The user may enter only as many (or as few) values as they would like in the array. The user will enter a negative value to indicate no more to be added. ***Hint:*** *This implies that the number of elements in the array does not necessarily have to be the same as the maximum size of the array.*

✓ A function that displays the contents of the array. Only elements currently contained in the array should be horizontally displayed.

   Important: Each of the remaining functions described below should <u>have no cin and cout statements</u>. In other words, any and all information required by the function should be passed in through parameters. Likewise, information from the function that the caller needs should be returned back either through the return statement or through reference parameters. If the user needs to specify an index in the array, they should enter from the range 0 to max size - 1.

✓ A function that calculates the *minimum*, *maximum*, *sum* and *average* of all the elements currently contained in the array. Note that this information should all be calculated in one function.

✓ A function that accepts a number and determines how many times (if any) that number appears as an element in the array.

✓ A function that allows you to insert a *specified number* at a *specified index* within the <u>currently filled portion</u> of the array.

   Hint: *In order to accomplish this, the function must first check to see if there is room in the array to accept a new number. If the array is currently full (e.g. number of elements equals the maximum size of the array) then the user has to first delete an element from the array. Think carefully about what an insert into the array implies. The physical size of the array cannot change, therefore what must happen if a value is to be inserted somewhere in the middle of the array without losing any of the existing elements.*

✓ A function that removes an element at a *specified index* in the array.

Hint: As with the insert function, the physical size of the array cannot change, therefore how could we simulate an element of the array being deleted?

Sample run: Menu only displayed once here. Your program should display the menu after each completed menu selection.

1. Initialize Array
2. Display Array
3. Show min, max, sum and average
4. Search
5. Remove an element at specific index
6. Add an element at a specific index
7. Exit

1. Initialize Array
Enter integer values to fill the array -ve value to stop:
1 2 3 4 5 6 8 -9

2. Display Array
1 2 3 4 5 6 8

3. Show min, max, sum and average
Min=1
Max=8
Sum=29
Average=4.14

4. Search
Enter number to search for: 2
2 occurs 1 time.

5. Remove an element at specific index
Enter index between 0 and 6
7
Invalid index
Enter index between 0 and 6
1

2. Display Array
1 3 4 5 6 8

6. Add an element at a specific index
Enter index between 0 and 5
6
Invalid index

Enter index between 0 and 5
3
Enter number to insert 9

2. Display Array
1 3 4 9 5 6 8

1. Initialize Array
Enter integer values to fill the array -ve value to stop:
1 2 3 4 5 6 7 8 9 10 -9
Array is full. One or more numbers could not be inserted

2. Display Array
1 2 3 4 5 6 7 8 9

7. Exit
Goodby

For full credit, please follow consistent programming conventions including: *consistent logical structure (i.e. proper use of functions), consistent use of braces, proper indentation, and appropriate comments throughout the program.*

existing array

add(1,10) , insert at index 1 so need to shift all elements one index right

inserted at index 1

existing array

delete(1), removes element at index 1 and hence shift all elemnts right to it one index left