COSC2436 hw1: Dynamic Arrays and Recursion

1. Introduction

You will implement a C++ program to add integers into a dynamic array class that you will create. You must use a dynamic array class (no vectors or other containers). You will also need to create 4 **recursive** functions inside that dynamic array class based on the commands given in the command file. This homework will focus on dynamic array implementation and recursive techniques. When submitting this assignment, please name the folder on the server as “hw1”.

2. Input Files

- The input file will have the size of the array on the first line and a list of integers separated by a comma on the second line.

Example input:

5

1, 2, 3, 4, 5

- While reading the input, \n and \r should be removed before processing the string of integers.

3. Command Files

- There will be 4 types of commands you will have to implement as functions in your dynamic array class. **These must be recursive**. They are: AddNums, FindNum, Replace, IsSorted, Print.

- AddNums(index)
    - The AddNums command will be followed by an integer inside the parenthesis (representing the number of first elements you should add). For example:
      Array = [1, 2, 3, 4, 5, 6]
      AddNums(3) should output “6” to the output file as 1 + 2 + 3 = 6.
    - If the Index = 0, 0 should be outputted as we are adding the first 0 elements.
    - If the index >= size of the array, “Invalid index” should be outputted.
- FindNum(target)
    - The FindNum function should output “true” or “false” depending on if the target element is inside the array.

- Replace(value, newvalue)
  - The Replace function replaces “value” in the array with “newvalue”. If “value” is not found in the array, output “(value) is not in the array” (view example section below).
    For example:
    Array = [32, 4, 20, 40, 10]
    Replace(20, 22)
    Array = [32, 4, 22, 40, 10]
- IsSorted
  - The IsSorted function outputs “true” or “false” depending on if the array was input sorted or not.
- Print
  - The Print function prints the array to the output file. This will need to be the same as when inputted in the input.txt file. (see example below)

Example:

input1.txt:	command1.txt:	ans1.txt:

5
1, 2, 3, 4, 5
	Replace(2, 4)
	Print
	FindNum(3)
	AddNums(3)
	IsSorted
	Replace(0, 5)
		1, 4, 3, 4, 5
		true
		8
		false
		(0) is not in the array

- The command file can be empty
- While reading the command file, \n and \r should be removed before processing the string.

4. Output Files

- The output file must match exactly with the answer file for credit to be awarded. Be sure to check for small things like leading spaces and newline characters.

5. Rules/Requirements

- Homework is individual. Your homework will be automatically screened for code plagiarism against code from other students and code from external sources. Code that is copied from another students (for instance, renaming variables, changing for and while loops, changing indentation, etc. will be considered as a copy) will be detected and result in “0” in this homework. The limit is 50% similarity.

- For the 5 functions, **<u>you MUST use recursion only.</u>** You must also use a dynamic array. Failure to do so will result in no credit being awarded. We will go through all submissions and check the functions to make sure you adhere to this rule.

6. Turn in your homework

Homework 1 will need to be turned in to our Linux server. Instructions on how to submit the homework can be found here:
https://uh.edu/nouhadrizk/about/courses/programming-and-data-structures/homework/

Make sure to create a folder under your root directory, name it “hw1” (case sensitive), copy all your .cpp and .h files to this folder, “ArgumentManager.h” needs to be included as well.