Recursion
Due Date : Monday April 12 th @
3:45 pm for Section 252 & 2:15 pm for section 253

Write a C++ program that does the following :

1. Accepts array size (n) from the keyboard. The size must be positive integer that is >= 5

2. Use the size from step 1 in order to create an integer array of size n. Populate the created array with random integer values between 100 and 5896 inclusive .

3. Display the generated array.

4. Write a function that uses recursion in order to display the array in reverse order

5. Write a function that uses recursion in order to display squares of integers in ascending order, starting from 1 to n (array size that was entered from the keyboard) .

6. Write a recursive function that takes the first integer in the array and returns the sum of the digits of that integer

7. Write a function that uses recursion in order to determine whether or not the last number in the array is a prime number .

NOTES:

- Just one .cpp file with 4 individual recursive functions plus main for testing.
- Do not use global variable , dynamic arrays , global arrays or vector arrays, linked lists and pointers.
- Not allowed to use build in libraries such as power … etc
- Validation must be conducted on the arrays size. Size must be integer that is >= 5.
- Your program's format and messages must match the output provided
- Replace My name (Husain Gholoom) with your first and last name.

Sample Output

```
***  Welcome to My Recursion APP ***

Enter The array size. ( Must be >= 5 ) - - >   -5


Invalid arrays size. Size must >= 5.

Husain Gholoom  - Tweak Programming Director
April 2021
```

Sample Output

```
***  Welcome to My Recursion APP ***

Enter The array size. ( Must be >= 5 ) - - >      a


Invalid arrays size. Size must >= 5.

Husain Gholoom  - Tweak Programming Director
April 2021
```

Sample Output

```
***  Welcome to My Recursion APP ***

Enter The array size. ( Must be >= 5 )  - - >   5

The generated array is  :  127  224  443  559  1113

Reversed Array is  :  1113   559   443   224   127

Table of square values  from  1  to   5   is  :

N        N Squared
1        1
2        4
3        9
4        16
5        25


Sum of 1113  digits  is  :  6


Is  127  Prime  Number  :   127  is   a prime number


Husain Gholoom  - Tweak Programming Director
April  2021
```

Style Guidelines:

At the beginning of your program (and **before** the #include statement), include the following :

Header comments (file documentation block) should be at the top of each file and should contain: Author / s, Due Date, Assignment Number, Course number and section, Instructor, and a brief description of the purpose of the code in the file. For example :

```
//
//      Author  : (Your name  here!!)
//
//      Due Date  :
//
//      Programming Assignment Number  5
//
//      Spring   2021   -   CS 3358    -    Your Section  Number
//
//      Instructor:    Husain Gholoom.
//
//       <Brief description of the  purpose of the program>
```

Variable names :

- Must be meaningful.
- The initial letter should be lowercase, following words should be capitalized, no other caps or punctuation (i.e. weightInPounds).
- Each variable must be declared on a separate line with a descriptive comment.

Named constants :

- Use for most numeric literals.
- All capitals with underscores (i.e. TX_STATE_SALES_TAX)
- Should occur at top of function, or global (only if necessary)

Line length of source code should be no longer than 80 characters (no wrapping of lines).

Indentation :

- Use 2-4 spaces (but be consistent throughout your program).
- Indent blocks, within blocks, etc.
- Use blank lines to separate sections.

Comments for variables :

All variable definitions should be commented as follows:

```
int  gender;    // integer value for the gender,
                        // 1 = Male , 2 = Female ,
```

Rules : In order to get a full mark :

1. Your program **must compile** and run using **latest version of Code::Blocks under windows (20:03) . You are not allowed to use C++11, C++14 … etc.**
2. Your program must be **documented according to the style above . See the website for the sample programming style program.**
3. Must **use functions (prototypes and definitions) with recursive calls .**
4. You must use the appropriate libraries in writing this program.
5. Must properly format the output as it is shown on the sample run above. Replace my name with your name
6. You must name your program as :

    - **PG5_SP21_3358_253_LastName_FirstName.cpp**

    Where LastName is your Last Name and FirstName is your First Name. For example , the file name should look something like :

    PG5_SP21_3358_252_Gholoom_Husain.cpp (not .cbp)

7. Everyone must upload the electronic version of the program no later than 3:45 pm for CS3358-252 and 2:15 pm for CS 3358-253 on the due date. **No late assignments will be accepted. DO NOT** send your assignment solution via email.

    Use Canvas to upload your program

The following points will be deducted if :

- Incorrect file format such as uploading .cbp instead of .cpp , missing electronic copy , using .h and .cpp files , compilation errors , using global variables / global arrays / global vector arrays / dynamic arrays , using linked lists and pointers , not using recursion … etc **(- 10 points)**

- Other **(at least 1.25 point each)** :

  - Logical Errors
  - Incorrect program file name.
  - Not using at least 4 functions.
  - Incorrect Style **such as but not limited to** missing comments or program documentations , missing or incorrect section number, missing function prototypes , missing signature line , incorrect format … etc