National University of Computer and Emerging Sciences, Lahore Campus

Course: Programming Fundamentals Course Code: CS1002
Program: BS(Computer Science) Semester: Fall 2023
Duration: N/A Total Marks: 140
Due Date: 29-OCT-2023 CLO: 3
Section: 1K Page(s): 2
Exam: Assignment 5 Roll No.

Instructions:
- *Late submissions will lead to negative marking and submissions after 20 hours past the due time will not be accepted.*
- *This is an individual assignment and the solution submitted must be your own.*
- *Any sort of plagiarism will be dealt with seriously and may lead to severe consequences including negative marking.*
- *Submit .cpp files named as XXL-XXXX_Q#X.cpp i.e [your roll number]_[question number].cpp*

For all the following questions, take size and elements of the integer array as input from the user. Allow maximum size of 100.

QUESTION#1: (10) Write a C++ program which sorts the given data with respect to their frequency.

Sample Output:

```
• Input: [1, 2, 1, 3, 4, 2, 3, 3, 8, 7, 4, 2, 2]
  Output: [2, 2, 2, 2, 3, 3, 3, 1, 1, 4, 4, 7, 8]
```

QUESTION#2: (10) Rearrange a given array of positive integers such that first element should be maximum value, second minimum value, third second maximum value, fourth second minimum value, fifth third maximum and so on.

Sample Output:

```
• Input: [1, 8, 7, 4, 2, 3]
  Output: [8, 1, 7, 2, 4, 3]
```

QUESTION#3: (10) Rotate the elements of an array to the left by a specified number of positions.

Sample Output:

```
• Array = [1, 8, 7, 4, 2, 3]
  Rotation Index = 3
  Updated Array = [4, 2, 3, 1, 8, 7]
• Array = [1, 4, 3]
  Rotation Index = 5
  Updated Array = [3, 1, 4]
```


QUESTION#4: (10) Given an integer array nums, return an array answer such that answer[i] is equal to the

product of all theelements of nums except nums[i]. (Do not use nested loop)

Sample Output:

- `Input: nums = [1, 2, 3, 4]`
  `Output: [24, 12, 8, 6]`
- `Input: nums = [-1, 1, 0, -3, 3]`
  `Output: [0, 0, 9, 0, 0]`

QUESTION#5: (5*6)Take two sets A and B as input from the user and implement a program which should mimic thefollowingSet operations:

- **Union (AUB):** It will output resulting set.
- **Intersection (A∩B):** It will output resulting set.
- **Subtraction:** It will output resulting set. It will have further two options: 1. A - B
  2. B – A
- **Disjoint:** It will output True/False. Two sets are disjoint if there is no common element inbetween them.
- **Proper Subset:** It will output True/False. It will have further two options: 1. A as main set and B as subset
  2. B as main set and A as subset
- **Equal set:** It will output True/False.

Make proper user menu that asks what function we need to perform. Set proper terminatingconditions.Program should not terminate after performing one operation.

QUESTION#6: (8+5+12+5) Take two large integers represented as an integer array digits as input from the user, whereeachdigits[i] is the ith digit of the integer. The digits are ordered from most significant to least significant inleft to-right order. The large integer does not contain any leading 0's.

- **Addition (A+B):** It will output resulting integer.
- **Subtraction:** It will output resulting set. It will have further two options: 1. A - B
  2. B – A
- **Multiplication (A*B):** It will output resulting integer.
- **Is Equal (A==B):** It will output True/False.

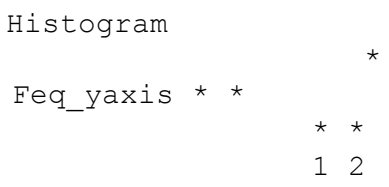
Make proper user menu that asks what function we need to perform. Set proper terminatingconditions.Program should not terminate after performing one operation.

QUESTION# 7: (10) Write a program to find the count of elements repeating in an array, store the count of thoseelementsin another array respective of the element index number. Assume that elements in thefirst arrayhave values >=1 and <=10 and it has 200 elements in total. Also print the histogramof theelements showing the frequency of each number.

Example with an array of five elements:

Sample Output:

```
Arr[5]:
[1,1, 2, 2, 2]
Output:
Sum[5]:
           3, 0, 0, 0]
[2,
Example:
Arr[5]:
           3, 1, 2, 5]
[3,
Output:
Sum[5]:
[1,1, 2, 0, 1]
```



QUESTION#8 (10)

Write a program to update every element in an array with the multiplication of the secondnext andsecond previous values of a given array of integers. If you come across an index wherethesecond next value doesn't exist, then start from the beginning of the array. Similarly, if youcomeacross an index where the second previous value doesn't exit, then take the valuefromthelastindex of array.

Example:

```
Arr1[6]: [1,2,3,4,5,6]
Output:
Arr2[6]: [3x5, 4x6, 5x1, 2x6, 1x3, 2x4]
```

QUESTION#9 (10) Given two arrays of N elements each. Check if the two arrays are reverse of each other or not.

```
Input:
    Array1 = {1, 3, 5, 4, 9, 8, 2, 6, 7, 10} Array2 = {10, 7,
6, 2, 8, 9, 4, 5, 3, 1} Output:
    Array1 is reverse of Array2
```

QUESTION#10 (10) An array has N integers that it reads from a user. It then encrypts the read numbers by replacingthenumber with the sum of the remaining numbers in the array if number is greater thanzero. Theseencrypted numbers are store in another array.

First line of the file contains the number of integers that this file contains. This number will alwaysbe less than 100. Then the actual integers start. Output file will also have this number andthenthe encrypted numbers.

Example:

Input	Encrypted
12 3 4 8 10 7	32 41 40 36 34 37

```
Array read from the file: Arr[100] =
{12,3,4,8,10,7,0,0,…..,0} Encrypted array is obtained as
Arr1[100] = ( 3+4+8+10+7, 12+4+8+10+7, 12+3+8+10+7,
12+3+4+8+7,12+3+4+8+10}
Encrypted array: Arr1[100] = {32 41 40 36 34 37,0,0,0,…,0}
```