Part (b): Write output of the code segment below. If there is any error, clearly mention the error. (There is no syntax error in this code.)

```
#include <iostream>
using namespace std;

int* SomeFunction()
{
        int abc = 50;
        return &abc;
}

void main()
{                          Babc
        int* ptr1 = SomeFunction();
        cout<<"Data = ";
        cout<<*ptr1<<endl;
}
```

Output/Error:

Data = 3751 (Junk Value)

Error: ptr1 is storing the address of abc but as soon as the function is popped from the stack the variable abc is also popped. Hence illegal memory access.

So, cout << *ptr1 will give an error and give junk value.

3

Part (c) Write the output of the code segment given below. (There is no syntax error in this code.)

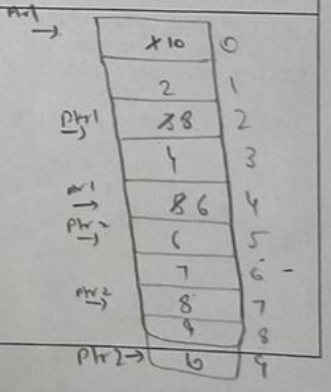
```
#include <iostream>
using namespace std;

void SomeFunction(int* arr, int size) {
    int* ptr1 = arr;
    int* ptr2 = arr + size - 1;
    while(ptr1 < ptr2) {
        *ptr1 = *ptr2;
        ptr1 = ptr1+2;
        ptr2--;
    }
}
```

```
int main() {
    int nums[] = {1, 2, 3, 4, 5, 6, 7, 8, 9, 10};
    int* ptr = nums;
    SomeFunction(ptr, 10);
    for(int i = 0; i < 10; ++i) {
        cout << nums[i] << " ";
    }
    return 0;
}
```

Output:

10 2 8 4 6 6 7 8 9 10



Part (d) For the code segment given below, write output/error. In case of crash, highlight the line where program will crash. (There is no syntax error in this code.)

[THIS QUESTION IS NOT FOR BCS-2C]

```
#include <iostream>
using namespace std;

int* GetData(int xyz)
{
        int* ptr = 0;
        if(xyz%2 == 0)
        {
                ptr = new int[5];
                for(int i=0; i<5; i++)
                        ptr[i] = i+1;
        }
        return ptr;
}
```

```
int main() {
        int* array1[10];
        for(int i=0 ; i<10 ; i++)
        {
                ;
                array1[i] = GetData(i);
        }
        for(int i=0; i<10; i++)
        {
                for(int j=0; j<5 ; j++)
                {
                        array1[i][j] = array1[i][j] *2;
                        cout<<array1[i][j]<<" ";
                }
                cout<<endl;
        }
        //Assume we have Deallocation code here that
//successfully deallocates the memory.
}
```

Output/Error:

Error = null ptr is being returned
Pointer ptr is not set to null when an odd number of i is being sent

Part (d) *[FOR BCS-2C ONLY]*

Consider the following program, **give C++ code for the class Point.** The distance formula is d = sqrt(dx*dx + dy*dy). The function sqrt is available in the C++ standard library.

```
int main() {
  Point p1(10,20);
  Point p2(30,50);
  cout << p1.distance(p2);
  return 0;
}
```

Solution:

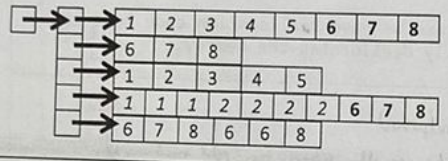
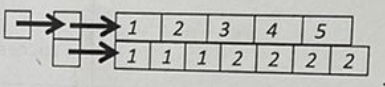
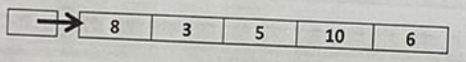
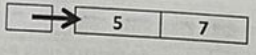
CLO # 3: Model an algorithmic solution for a given problem

Q2: [20 marks]

A program is getting multiple integer arrays (each array of variable size). It needs to keep only those arrays which end with a specific subArray. Your task is to write a function that takes a ListOfIntArrays (int**) and an ArrayToFind (int*) i.e. SubArray. The function should remove all the arrays (from ListOfIntArrays) that do not end with ArrayToFind. Prototype of the function is given below:

void FilterData(int& ListOfIntArrays, int*& LenghtsOfArrays, int*& ArrayToFind, int& SizeOfArrayToFind, int& TotalIntArrays)**

Sample run below shows the values of required variables and arrays' content before and after the function call for **ArrayToFind = {6,7,8}** and **SizeOfArrayToFind = 3**.

Before Function Call	After Function Call	Explanation
ListOfIntArrays:  	**ListOfIntArrays:**  	All the arrays that do not end with ArrayToFind = {6,7,8} have been removed. The array that ends with {6,7,8} but does not have any other data has also been removed.
TotalIntArrays: 5	**TotalIntArrays:** 2	Total no. of int arrays in ListOfIntArrays
LenghtsOfArrays:  	**LenghtsOfArrays:**  	Array Containing Lengths of all 1D int arrays in ListOfIntArrays.

Functionality Explanation:

Row 1, {1,2,3,4,5,**6,7,8**}: *Not Removed*, as ArrayToFind {6,7,8} found at the end.
Row 2, {**6,7,8**}: *Removed*, as ArrayToFind {6,7,8} found at end but there wasn't any other data in this array.
Row 3, {1,2,3,4,5}: *Removed*, as ArrayToFind {6,7,8} NOT Found at the end.
Row 4, {1,1,1,2,2,2,2,**6,7,8**}: *Not Removed*, as ArrayToFind {6,7,8} found at the end.
Row 5, {6,7,8,6,6,8}: *Removed*, as ArrayToFind {6,7,8} NOT Found at the end.
Note that the data of ArrayToFind {6,7,8} has also been removed from original data arrays (ListOfIntArrays).

Make sure that arrays do not consume extra space. Also there should not be any memory leakage or dangling pointer.

```
void FilterData(int**& ListOfIntArrays, int*& LenghtsOfArrays, int*& ArrayToFind, int& SizeOfArrayToFind, int&
TotalIntArrays)
{
//Start your code here...
for (int i=0; i < TotalIntArrays ; i++)
{   int End = LenghtsOfArrays - SizeOfArrayToFind
    int k=0;
    for (int j=0 ; j < LenghtsOfArrays ; j++)
    {
      if ( ListOfIntArrays[i][j]=ArrayToFind[k] && ListOfIntArrays[i][j] =ArrayToFind[k+1]
           && ListOfIntArrays[i][j+2] = ArrayToFind[k+2])
           {
              if (j == End)
              { cout << "Array will not be removed";
              }
              else
              {
                 delete [] ListOfIntArrays[i]; //deleting cols
              }
              delete [] ListOfIntArrays; //deleting row
              TotalIntArrays--;
           }
    }
}
   delete [] ArrayToFind;
}
```

4

0072

National University of Computer and Emerging Sciences 0072

Object Oriented Programming (CS1004)

Date: Feb 27, 2024

Course Instructor(s)

Mr. Aamir Rahim
Ms. Anosha Khan
Ms. Arooj Khalil
Ms. Samin Iftikhar
Mr. Uzair Naqvi
Mr. Waqas Manzoor

18

Sessional-I Exam

Total Time: 1 Hour
Total Marks: 40
Total Questions: 02

Semester: SP-2024
Campus: Lahore
Dept: FAST School of Computing

Zara Hassan — Student Name
23L-0716 — Roll No
2B — Section
Zara Hassan — Student Signature

Vetted by
Vetter Signature

IMPORTANT INSTRUCTIONS: Answer in the space provided. **Answers written on rough sheet will not be marked.** Do not use pencil or red ink to answer the questions. In case of confusion or ambiguity make a reasonable assumption.

14

CLO # 4: Apply good programming practices

Q1: [4x5 = 20 marks] Short Questions

Part (a) Write output of the code segment below. (There is no syntax error in the code.)

```
#include <iostream>
using namespace std;

void Swap(int*& a, int*& b)
{
    int* temp = a;
    a = b;
    b=temp;
}
```

```
void main()
{
    int a=5;
    int b=10;
    int* ptr1 = &a;
    int* ptr2 = &b;
    int** ptr3 = &ptr1;
    cout<<"Data = "<<**ptr3<<endl;
    int* temp1 = ptr1;
    int* temp2 = ptr2;
    Swap(temp1, temp2);
    cout<<"-------------"<<endl;
    cout<<"*ptr1 = "<<*ptr1<<endl;
    cout<<"*ptr2 = "<<*ptr2<<endl;
}
```

Output:
Data = 5
*ptr1 = 5
*ptr2 = 10