National University of Science and technology

(NUST)

CS-114 - Fundamental of Programing

Course Instructor: Dr Jawad Khan

Lab Instructor: Muhammad Affan

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Date: 28/11/2023

“Assingment#1”

Question#1

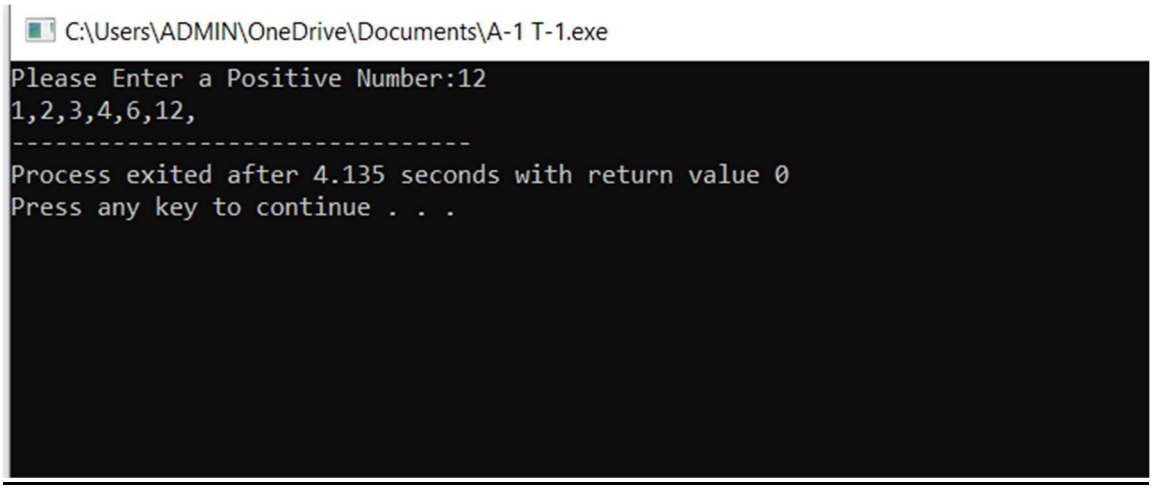
Write a C++ program to display factors of a number using for loops.

Solution

```
/*-----------------------------------------------------------------
-----Name:Asim Imran-----Regno.:476434------Section:A----------------
The program A1 T-1 is for "displaying factors of a given number"--*/
#include <iostream>
using namespace std;
int main(){
        int num;        //Declaring variable
        cout<<"Please Enter a Positive Number:";
        cin>>num;       //Taking input from user
        if(num>0){
                for(int i=1;i<=num;i++){  //using for loop for generating divisors
                        if(num % i ==0){     //using if statement to extract divisors
                        cout<<i<<",";         //Displaying the  output
                        }

                }
        }
        else{
```

```
            cout<<"Enter a Positive Number."<<endl;
        }
        return 0;
}
```

Output:



Question#2

2. Write output to the following code.

```
#include <iostream>

int main() {
   int x = 5;
   int y = 10;

   if (x == 5)
      if (y == 10)
         std::cout << "x is 5 and y is 10" << std::endl;
   else
      std::cout << "x is not 5" << std::endl;

   return 0;
}
```

Solution

X is 5 and y is 10.

Question#3

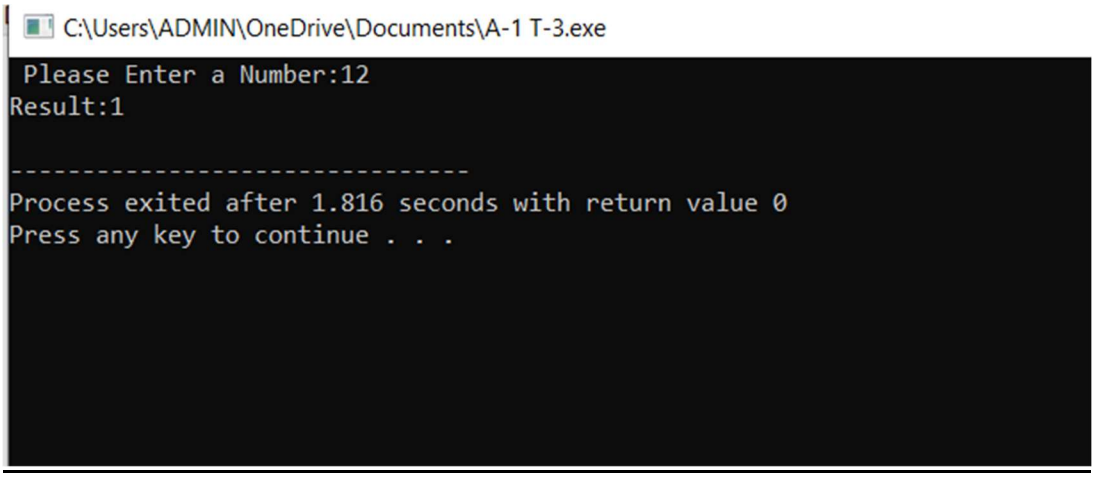
Write a C++ program, take an integer value from user and check if it's greater than 10 and less than equal to 20. Print 1 if yes and print 0 if no. Use appropriate datatype for output.

Solution

```
/*-----------------------------------------------------------------
-----Name:Asim Imran-----Regno.:476434------Section:A----------------
The program A1 T-3 is for "Displaying result for integers"----------*/
#include <iostream>
using namespace std;
int main(){
	int num;	//Declaring Variables
	cout<<" Please Enter a Number:";
	cin>>num;
	if(num>10 && num<20){	//using if-else for checking the condition
		cout<<"Result:"<<1<<endl;
	}
	else{
		cout<<"Result:"<<0<<endl;
	}
		//displaying the  result for both if and else statements
	return 0;
```

}

Output:



Question#4

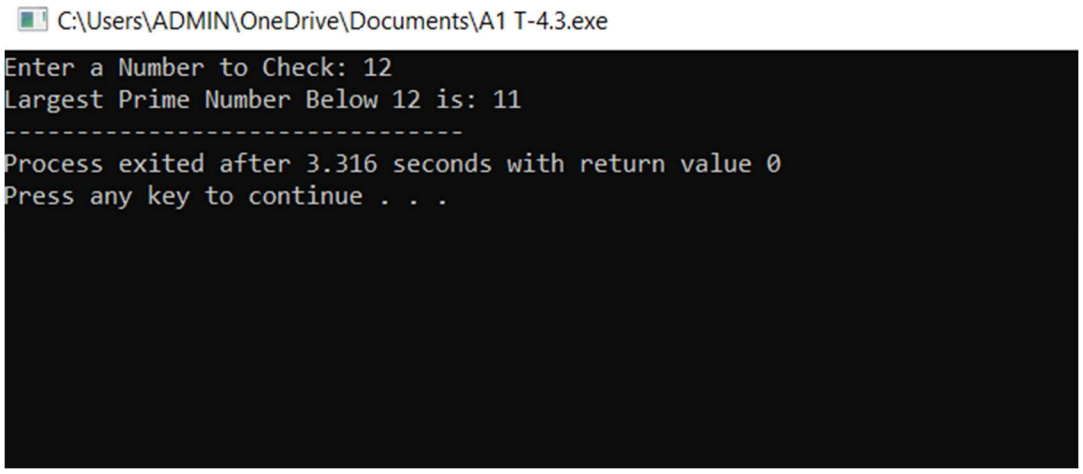
Write a C++ program that uses a while loop to find the largest prime number less than a given positive integer N. Your program should take the value of N as input from the user and then find the largest prime number less than or equal to N. You are not allowed to use any library or pre-existing functions to check for prime numbers.

Solution

```
/*-------------------------------------------------------------------------------

-----Name:Asim Imran-----Regno.:476434------Section:A---------------------------------

The program A1 T-4.3 is for finding the nearest prime number from input from a user"--*/

#include <iostream>

using namespace std;

int main(){

int num,i,j;                    //determing the variables

 bool res=false;
```

```
cout<<"Enter a Number to Check: ";
cin>>num;                    //Taking input from user
i=num;
 while(i>1){                 //using a reverse loop
   j=i-1;
 res=false;
     while(j>1){             //using a nested loop for divisors and using if-else to check the remainders
   if(i%j==0){
   res=false;
     break;
 }
 else if(i%j==1){
    res=true;                //if the remainder is one then then update res to true from false
 }
   j--;
 }
 if(res==true){
 cout<<"Largest Prime Number Below "<<num<<" is: "<<i;     //cout the result
 break;
 }
 i--;
 }
 return 0;
}
```

Output:



Question#5

Write a C++ program, take two string as input from user and check if both strings are equal or not. If they are equal make them unequal by rotating string. e.g., Hello is turned into olleH etc.

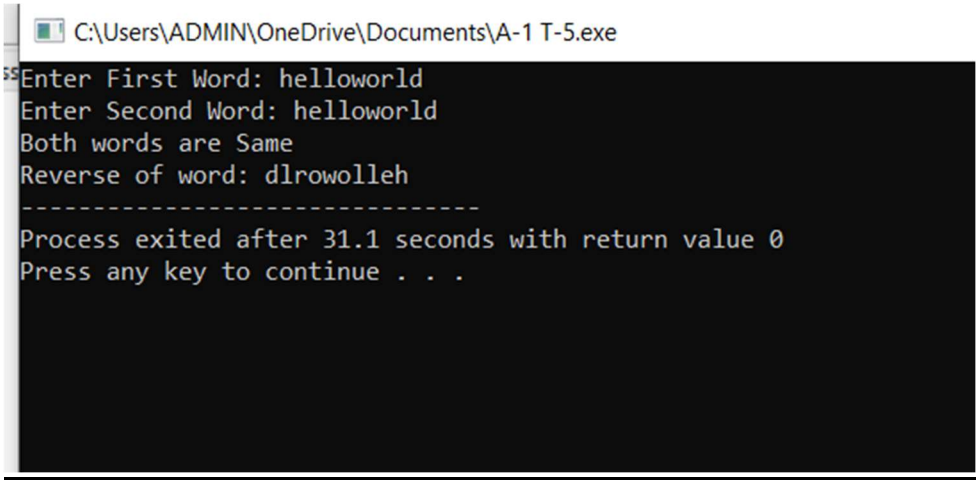
Solution

```
/*-------------------------------------------------------------------------------

-----Name:Asim Imran-----Regno.:476434------Section:A---------------------------------

The program A1 T-5 is for "checkig two strings and if they are equal,reverse them"--*/

#include <iostream>

#include <string>

using namespace std;

int main(){

 int i, length1, j, length2; //Declaring variables

 string word, word2;

char temp;

bool res=false;

 cout<<"Enter First Word: ";

cin>>word;
```

```
cout<<"Enter Second Word: ";
cin>>word2;              //Taking input from  user
length1=word.length();
length2=word2.length();

if(length2==length1){
                    //using if statement to check if both strings are equal
for(i=0; i<word.length(); i++){
if(word[i]==word2[i]){
res=true;                   //If both string are equal than update res to true
continue;
}
else{
res=false;
cout<<"Both Words are Not the Same!"<<endl;
break;
}
}
if(res==true){
cout<<"Both words are Same"<<endl;
length1=length1-1;
for(i=0; i<=length1/2; i++){       //Using for loop for reversing the string
temp=word[i];
word[i]=word[length1-i];
word[length1-i]=temp;
}

cout<<"Reverse of word: "<<word;  //Outputting the result
 }
```

```
}
else{
 cout<<"Both Words
  are not Equal!";
}
return 0;
 }
```

Output:



Question#6

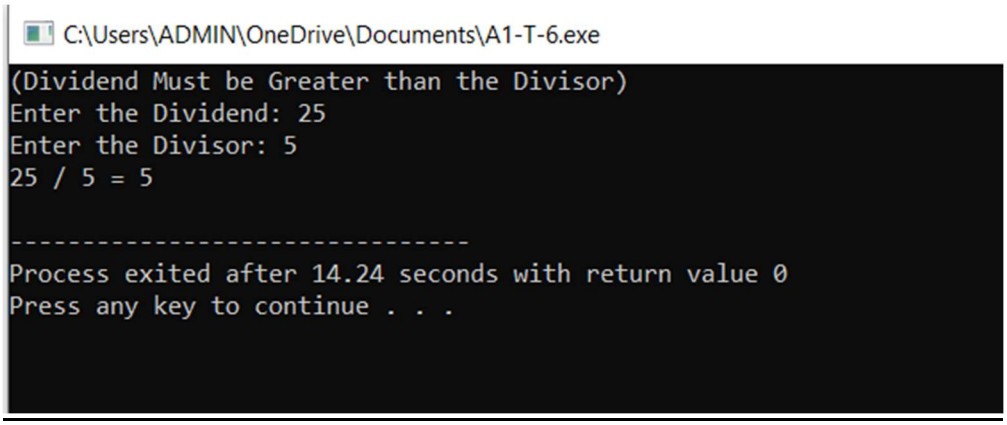
Perform division in C++ without / using for loops. You can use / only to display the final results. Your dividend must be greater than divisor.

Solution

```
/*-------------------------------------------------------------------

-----Name:Asim Imran-----Regno.:476434------Section:A--------------------

The program A1 T-6 is for "PERFORMING division without "/" operator--*/

#include <iostream>

using namespace std;
```

```
int main(){
 int dividend=0, divisor=1, remainder, qoutient, result, count; //Declaring variables
 while(divisor>dividend){
 cout<<"(Dividend Must be Greater than the Divisor)"<<endl;
 cout<<"Enter the Dividend: ";
 cin>>dividend;
 cout<<"Enter the Divisor: ";
 cin>>divisor;                    //Taking input from user
 }
 for(count=1; count<=dividend; count++){
 remainder=dividend%divisor;          //using for loop for the division
 result=(divisor*count)+remainder;
 if(result==dividend){
 qoutient=count;
 break;
 }
 }
cout<<dividend<<" / "<<divisor<<" = "<<qoutient<<endl;
 if(remainder>0)                  //using if statement to check if remainder is greater than 1
 {
 cout<<"The Remainder is: "<<remainder;  //outputting the result
 }
 return 0;
}
```

Output:



Question#7

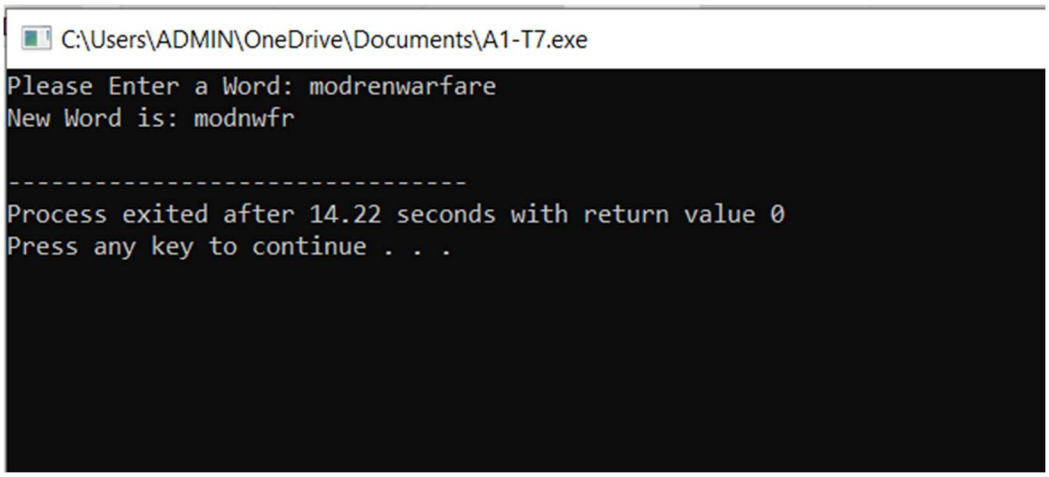
Write a C++program for a string which may contain lowercase and uppercase characters. The task is to remove all duplicate characters from the string and find the resultant string.

Solution

```
/*--------------------------------------------------------------------------------

-----Name:Asim Imran-----Regno.:476434------Section:A---------------------------------

The program A1 T-7 is for "Removing all double characters and printing result"------*/

#include <iostream>

#include <string>

using namespace std;

int main(){

string letter, uletter;

 int len, count, count2;         //Declaring Variables

 cout<<"Please Enter a Word: ";

cin>>letter;                    //Taking input from user

uletter=letter;

 for(count=0; count<letter.length(); count++){

 tolower(letter[count]);
```

```
 for(count2=count+1; count2<=letter.length(); count2++ ){    //using the nested for loop for removing double alphabets
 if(letter[count]==letter[count2]){
 letter[count]=' ';
 letter[count2]=' ';


 }
 }
 }
uletter="";
 for(count=0; count<letter.length(); count++){
 if(isspace(letter[count])){
 continue;                    //using if statement for checking if all doubles are removed
 }
 else{
 uletter += letter[count];
 }
 }
cout<<"New Word is: "<<uletter<<endl; //Printing te result
return 0;
 }
```

Output:



Question#8

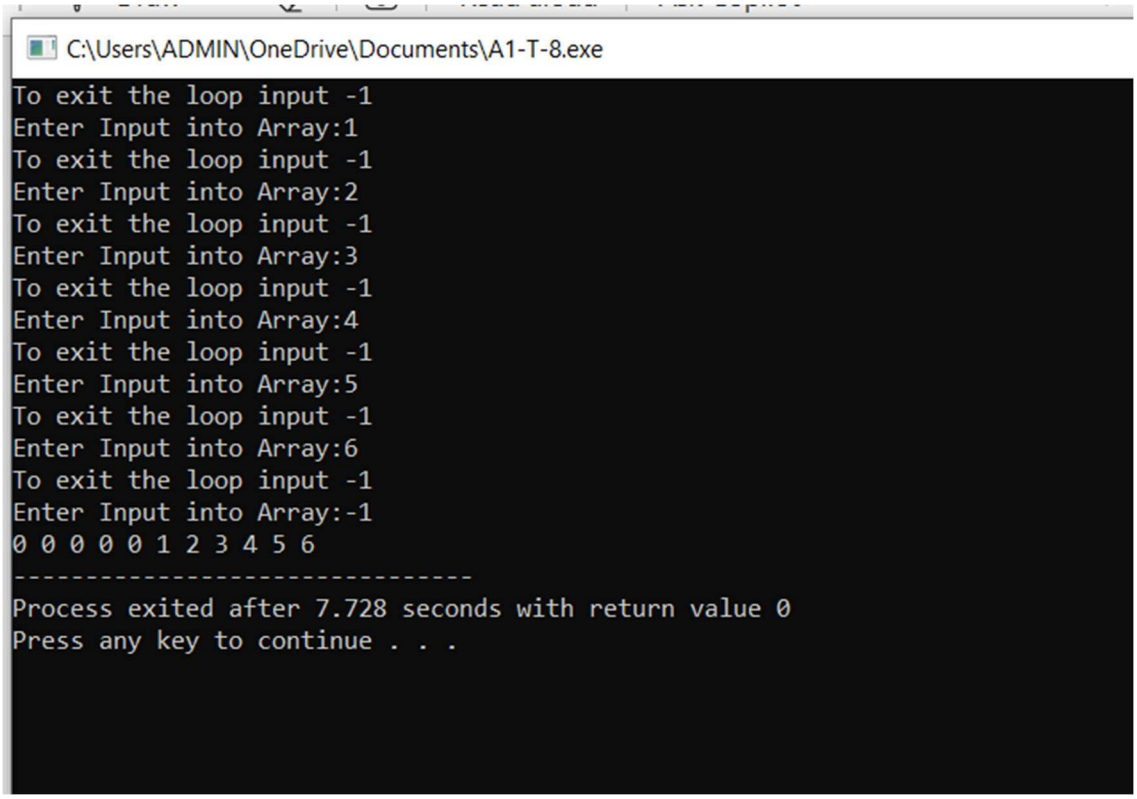
Suppose an integer array a[5] = {1,2,3,4,5}. Add more elements to it and display them in C++.

Solution

```
/*-----------------------------------------------------------------

-----Name:Asim Imran-----Regno.:476434------Section:A----------------

The program A1 T-8 is for "adding more elements to given array"--*/

#include <iostream>

using namespace std;

int main(){

 int a[5]={1, 2, 3, 4, 5};

 int b[5];

 int i, num=2, j=5;   //Declaring variables variables and arrays

 for(i=0; i<5; i++){


 b[i]=a[j];           //using for loop to equal the both arrays
```

```
}

while(num!= -1){
cout<<"To exit the loop input -1"<<endl;
cout<<"Enter Input into Array:";
cin>>num;              //using a while loop to input elements of array
if(num==-1){
break;
}                    //using if statement to break the loop
else{
b[j]=num;
j++;
}
}

for(i=0; i<=j-1; i++){

cout<<b[i]<<" ";        //using a for loop for the output of elements of arrays
}
return 0;
}
```

Output:



Question#9

Given an integer array and an integer X. Find if there's a triplet in the array which sums up to the given integer X.

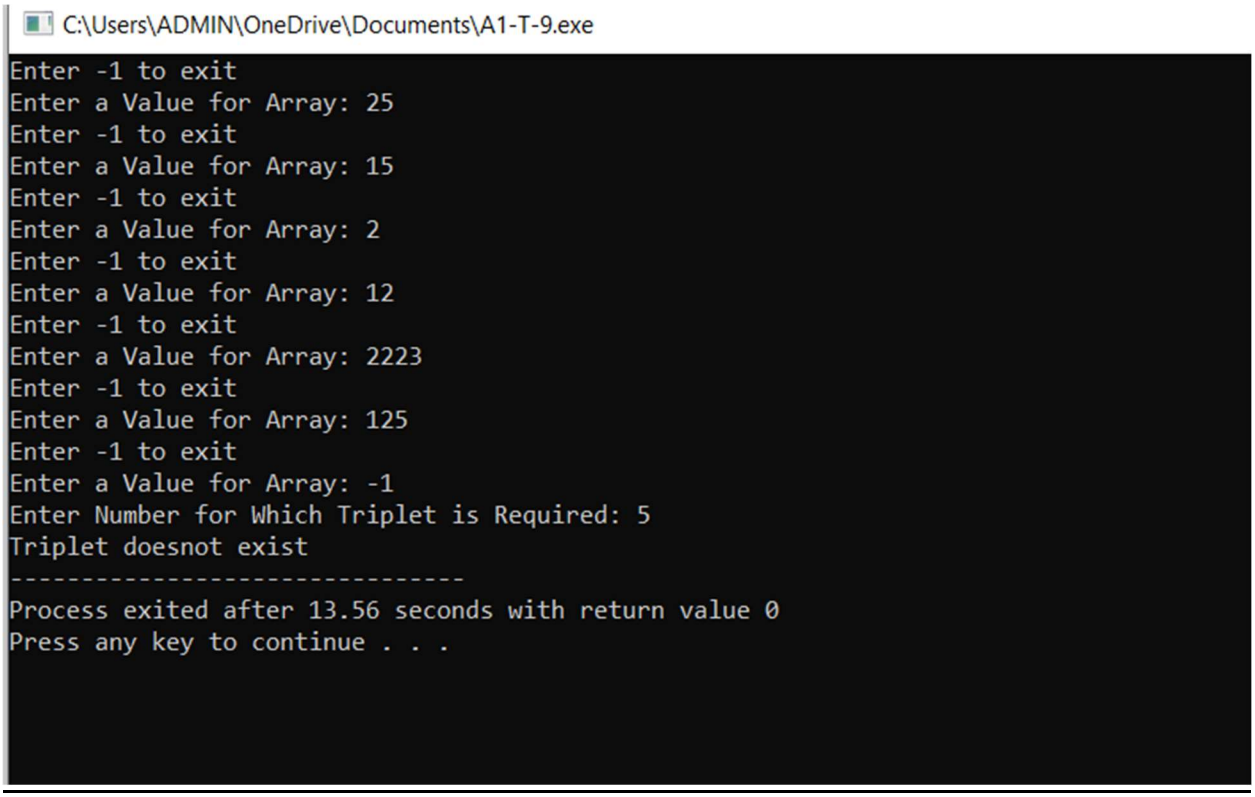
Solution

```
/*-----------------------------------------------------------------

-----Name:Asim Imran-----Regno.:476434------Section:A----------------

The program A1 T-9 is for "Finding an triplet in inputted array"--*/

#include <iostream>

using namespace std;

int main(){

 int a[10];

 int X, input=0, size,i=0;

bool res=false;          //Declaring variables, arrays and a bool variable
```

```
while(input != -1){
cout<<"Enter -1 to exit"<<endl;
cout<<"Enter a Value for Array: ";
cin>>input;              //using a while loop for input of elements of arrays
if(input==-1){

break;                //using if statement to break the loop if input is -1
}
else{
a[i]=input;
i++;
}
}
cout<<"Enter Number for Which Triplet is Required: ";
cin>>X;
size=sizeof(a)/sizeof(a[0]);

for ( i = 0; i < size - 2; ++i) {
for (int j = i + 1; j < size - 1; ++j) {
for (int k = j + 1; k < size; ++k) {              //using three nested for loops to assign the numbers to arrays
if (a[i] + a[j] + a[k] == X) {  //using if statement to check if the sum of three elements of arrays is equal to desired number
cout << "Triplet: " << a[i] << " " << a[j] << " " << a[k] << endl; //outputting the result
res=true;          //updating the value of res to true
}
}
}
}
if(res==false){
```

```
 cout<<"Triplet doesnot exist";
 }
 return 0;
}
```

Output:



Question#10

Implement Bubble Sort on an array of 6 integers.

Solution

```
/*-------------------------------------------------------------------------------

-----Name:Asim Imran-----Regno.:476434------Section:A---------------------------------

The program A1 T-10 is for "implementing bubble sort on array"--*/

#include<iostream>
```

```
using namespace std;
int main(){
 int arr[6];
bool sort=false;
int i,temp;                 //Declaring the varaibles,array and the bool variable
 for(i=0; i<6; i++){
 cout<<"Enter Value for Array: ";
 cin>>arr[i];
 }                      //using the for loop to take the input for array from user
 while(sort==false){
 for(i=0; i<6; i++){
 if(arr[i]>arr[i+1]){
 temp=arr[i];
 arr[i]=arr[i+1];
 arr[i+1]=temp;
              }
       }                      //using a while as outer while two for loops as its nested loops
 for(i=0; i<6; i++){
 if(arr[i]>arr[i+1]){
 sort=false;
 break;
 }
 else{
 sort=true;
  }
     }
          }
cout<<"Sorted Array: { ";
 for(i=0; i<5; i++){
```

```
 cout<<arr[i]<<", ";
 }
 cout<<arr[5]<<"}";
        //outputting the result
    return 0;
}
```

Output: