CSS-114- FUNDAMENTALS OF PROGRAMMING

ASSIGNMENT 1

Course Instructor: Dr. Jawad Khan

Lab Instructor: Muhammad Affan

Student Name: ABDULLAH BIN KHORRAM

CMS ID: 466612, SECTION A

DATE: NOVEMBER 19, 2023.

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

SOLUTION:

```
cout<<"Assignment Question 1"<<endl; // Program to display factors of a number using for loops

int n,p;

cout<<"Please Enter the number whose factors you wish to find:"<<endl;

cin>>n;

cout<<"The Factors for "<<n<<" are:"<<endl;

for(p=1;p<=n;p++){

if(n%p==0){ //if any number from 1 to n has 0 remainder when dividing n, that number is a factor of n

cout<<p<<endl;

}

}

cout<<endl;
```

OUTPUT:

```
Assignment Question 1
Please Enter the number whose factors you wish to find:
46
The Factors for 46 are:
1
2
23
46
```

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:

```
cout<<"Assignment Question 2"<<endl; //program to display a statement with a condition
int x = 5;
int y = 10;
if (x == 5){
if (y == 10){
cout << "x is 5 and y is 10" << endl;}
else{cout << "x is not 5" <<endl;}
 }
cout<<endl;
```

OUTPUT:

```
Assignment Question 2
x is 5 and y is 10
```

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

CODE:

```
cout<<"Assignment Question 3"<<endl; //program to check if a number is greater than 10 or less than or equal to 20
int k;
cout<<"Please Enter Your Number to check if it falls within the range (10,20]:"<<endl;
cin>>k;
if(k>10){
if(k<=20){cout<<"1"<<endl;} //nested if is used to check this condition
        }
        else{ cout<<"0"<<endl; }
```

OUTPUT:

```
Assignment Question 3
Please Enter Your Number to check if it falls within the range (10,20]:
15
1
```

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.

CODE:

```
cout<<"Assignment Question 4"<<endl; //program to find largest integer closest to a known integer

int N,d,z=2;

cout<<"Please enter the integer against whom the largest prime number is to be found:"<<endl;

cin>>N;

while(z<=(N/2)){

z++;

if(N%z!=0){ cout<<"The Largest Prime Number is: "<<N<<endl; break;}  //if remainder of N / z is not 0, then N itself is a prime number

else{ for(d=3;d<N;d++){

if(d%z!=0){ cout<<" "<<d;        } } //if any number from 1 to N when divided by z does not have a remainder of 0, that number is prime.

cout<<endl;                                                                    //the largest of those would be the result

cout<<endl;

cout<<endl;

cout<<"The Largest Prime Number is the Last Number of the above sequence."<<endl; break; }

}

cout<<endl;
```

OUTPUT:

```
Assignment Question 4
Please enter the integer against whom the largest prime number is to be found:
21
 4 5 7 8 10 11 13 14 16 17 19 20
```

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.

CODE:

```
#include<iostream>

#include<string>

using namespace std;

int main(){

        cout<<"Assignment Question 5"<<endl;

        cout<<endl;

        string S,Q;

        cout<<"Enter your first string:"<<endl;

        cin>>S;

        cout<<"Enter your second string:"<<endl;

        cin>>Q;                         //input two strings by the user

        if(S!=Q){                       //check if both strings are equal are not

                cout<<"Both strings are unequal."<<endl;

        }

        else {cout<<"Both strings are equal,hence the reverse of the second string is:"<<endl;     //if equal, reverse the second string using a for loop

        for(int i=0;i<=Q.length();i++){   //loop will run for an integer i, which will run 0 times to the number of times the length of the string

        cout<<Q[Q.length()-i]; } }     //cout will be the second string, but the last character will be printed since the rest of the characters are

        return 0;                   //elminiated, as i increases, second last character is printed and the rest get eliminated, and so on

}
```

OUTPUT:

```
Assignment Question 5

Enter your first string:
Banana
Enter your second string:
Banana
Both strings are equal,hence the reverse of the second string is:
 ananaB
--------------------------------
Process exited after 14.63 seconds with return value 0
Press any key to continue . . .
```

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.

CODE:

```
cout<<"Assignment Question 6"<<endl; //program to do division without using the / operator

int divid,divis,quot,remain;

cout<<"Enter the dividend:"<<endl;

cin>>divid;

cout<<"Enter the divisor:"<<endl;

cin>>divis;

if(divid<divis || divis==0){ cout<<"ERROR, run the program and try again."<<endl;} //divident must be greater than the divisor which must never

else{


//be zero

quot=0;

remain=divid;     //if the divis is subtracted from the divid n number of times without the divisor exceeding the value of the divid,

while(remain>=divis){                  // n is then the quotient and the last remaining value is the remainder

remain=remain-divis;
```

```
quot=quot+1; } }


cout<<"Quotient of the division is: "<<quot<<endl;
cout<<"Remainder of the division is: "<<remain<<endl;
cout<<endl;
```

OUTPUT:

```
Assignment Question 6
Enter the dividend:
45
Enter the divisor:
16
Quotient of the division is: 2
Remainder of the division is: 13
```

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.

CODE:

```
#include<iostream>
#include<string.h>
using namespace std;
int main(){


cout<<"Assignment Question 7"<<endl; //program to eliminate all duplicate characters from a string
string S,newS;
int i,j;
cout<<"Enter a string:"<<endl; //input a string from the user
cin>>S;
cout<<endl;
```

```
 for(i=0;i<S.length();i++){

        for( j=0;j<S.length();j++){  //using two loops, for every character in the string, it is compared with each character starting from the first

        if(S[i]==S[j]){

         break; }         //if it matches a character, it is printed and the loop breaks, then the cycle is repeated. If a duplicate character matches with

        } if(i==j){    //a character, then the character is not re-printed, but instead the loop breaks and the outer loop continues for the next character

         newS+=S[i]; }

 } cout<<"New String without any duplicate characters: "<<newS; //cout the new string

 return 0;

}
```

OUTPUT:

```
Assignment Question 7
Enter a string:
bloopydibloop

New String without any duplicate characters: blopydi
--------------------------------
Process exited after 12.07 seconds with return value 0
Press any key to continue . . .
```

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

CODE:

```
  cout<<"Assignment Question 8"<<endl; //print an array after having added elements to it

        int v=8;

        cout<<"Elements of the array after alteration :"<<endl;

  int a[v]={1,2,3,4,5,6,7,8};
```

```
for(int j=0;j<v;j++){
cout<<a[j]<<" ";
        }
        cout<<endl;
        cout<<endl;
```

OUTPUT:

```
Assignment Question 8
Elements of the array after alteration :
1 2 3 4 5 6 7 8
```

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**.

CODE:

```
cout<<"Assignment Question 9"<<endl; //check if the sum of a triplet in an array is equal to a known integer
   int asum,wasp,m,s,t,X;
 cout<<"NOTE:If condition is true, '1' will be printed 3 times. If condition is false, it will be printed twice."<<endl;
   cout<<"Enter the integer X:"<<endl;
   cin>>X;
   cout<<"Enter the number of elements in the array:"<<endl;    //input an integer and an array from the user
   cin>>m;
        int arr[m];
        cout<<"Input elements of the array:"<<endl;
        for(int l=0;l<m;l++){
          cin>>arr[l];
        }
```

```
for(int l=0;l<m-1;l++){
        for(int p=l+1;p<m;p++){
            if(arr[p]<arr[l]){
            wasp = arr[p];          //first sort the array in ascending order
            arr[p]=arr[l];
            arr[l]=wasp;
            }
        }
} for(int l=0; l<m-2;l++){
 s= l+1;
 t= m-1;
 while(s<t){ asum= arr[l] + arr[s] + arr[t];   //add the first element, the next element that incrementally increased by (s), and the last element
 if (asum>X){t--; }                              //which incrementally decreased by 1 (t)and continue the loop until s<t
 if (asum<X){ s++; }
 if (asum=X){ cout<<"1"; break;  } //111 will be printed if statement is true, 11 if not
 } }
```

OUTPUT:

```
Assignment Question 9
NOTE:If condition is true, '1' will be printed 3 times. If condition is false, it will be printed twice.
Enter the integer X:
12
Enter the number of elements in the array:
5
Input elements of the array:
3
4
2
1
5
111
```

10. Implement Bubble Sort on an array of 6 integers.

CODE:

```
#include<iostream>

using namespace std;

int main(){


 cout<<"Assignment Question 10"<<endl; //Use Bubble sequence to sort an array

   int swap,h=6;

          int arr[h];

          cout<<"Input elements of the 6 integer array:"<<endl; //input a six element array from the user

          for(int i=0;i<h;i++){

            cin>>arr[i];

          }

          for(int i=0;i<h-1;i++){ //using two loops and an integer intermediate, the value of each element is compared with its corresponding element

                    for(int j=i+1;j<h;j++){                    //and its position is swapped in ascending order

                              if(arr[j]<arr[i]){

                              swap = arr[j];

                              arr[j]=arr[i];

                              arr[i]=swap;

                              }

                    }

          } cout<<"The Sorted Array is:"<<endl;

          for(int i=0;i<h;i++){

            cout<<arr[i]<<" ";} return 0; }
```

OUTPUT:

```
Assignment Question 10
Input elements of the 6 integer array:
5
4
7
2
9
8
The Sorted Array is:
2 4 5 7 8 9
--------------------------------
Process exited after 11.6 seconds with return value 0
Press any key to continue . . .
```