CS-114 - Fundamental of Programing
Assignment # 1

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Q1. Write a C++ program to display factors of a number using for loops.

1st task.cpp

```cpp
1    #include<iostream>
2    using namespace std;
3
4    int main() {
5        int i,num,remainder;
6        cout<<"Enter a number: ";
7        cin>>num;
8        cout<<"The factors of this number are:";
9        for(i=1;i<=num;i++)
10       {
11           remainder=num%i;
12           if(remainder==0)
13           {
14               cout<<" "<<i;
15           }
16       }
17       return 0;
18   }
```

```
Enter a number: 40
The factors of this number are: 1 2 4 5 8 10 20 40
-------------------------------
Process exited after 10.87 seconds with return value 0
Press any key to continue . . .
```

Q2. Write output to the following code.

```cpp
#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;
}
```

Ans: Output will be: -

x is 5 and y is 10

Q3. 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.

3rd task.cpp

```cpp
1   #include<iostream>
2   using namespace std;
3
4   int main() {
5       int num;
6       cout<<"Enter an integer: ";
7       cin>>num;
8       if(num>10&&num<=20)
9       {
10          cout<<"\n"<<true;
11      }
12      else
13      {
14          cout<<"\n"<<false;
15      }
16      return 0;
17  }
```

```
Enter an integer: 15

1
-------------------------------
Process exited after 1.074 seconds with return value 0
Press any key to continue . . .
```

Q4. 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.

4th task.cpp

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

int main() {
    int N,i,r;
    cout<<"Enter a number: ";
    cin>>N;
    r=N-1;
    while(r>=2)
    {
        i=2;
        while(i<r)
        {
            if(r%i==0)
            {
                break;
            }
            i++;
        }
        if(i==r)
        {
            cout<<"The greatest prime number less than or equal to "<<N<<" is "<<r<<endl;
            return 0;
        }
        r--;
    }
    cout<<"There is no prime number less than or equal to "<<N;
    return 0;
}
```

```
Enter a number: 40
The greatest prime number less than or equal to 40 is 37

--------------------------------
Process exited after 1.012 seconds with return value 0
Press any key to continue . . . _
```

Q5. 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.

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

int main() {
    string string1,string2;
    cout<<"Enter first string: ";
    cin>>string1;
    cout<<"Enter second string: ";
    cin>>string2;
    for(int i=0;i<string1.length();i++)
    {
        if(string1[i]!=string2[i])
        {
            cout<<string1[i]<<" "<<string2[i]<<endl;
            cout<<"Strings not equal";
            break;
        }
        else
        {
            string2[i]=string1[string1.length()-1-i];
        }
        cout<<string2[i];
    }
    return 0;
}
```

```
Enter first string: Hello
Enter second string: Hello
olleH
------------------------------
Process exited after 4.603 seconds with return value 0
Press any key to continue . . .
```

Q6. Perform division in C++ **without / using for** loops. You can use / only to display the final results. Your dividend must be greater than divisor.
6th task.cpp

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

int main() {
    int dividend,divisor,remainder,quotient,result;
    cout<<"Enter dividend: ";
    cin>>dividend;
    cout<<"Enter divisor: ";
    cin>>divisor;
    quotient=0;
    remainder=0;
    for(int i=dividend;i>0;i-=divisor)
    {
        if(divisor==0)
        {
            cout<<"Math Error";
            break;
        }
        else
        {
            if(dividend>divisor)
            {
                dividend-=divisor;
                quotient++;
            }
            else
            {
                break;
            }
        }
    }
    cout<<"Division result= "<<quotient<<endl;
    remainder=dividend%divisor;
    cout<<"Remainder= "<<remainder<<endl;
    cout<<"Division verified using the division formula:- \nDividend = (Quotient * Divisor) + Remainder"<<endl;
    result=(quotient*divisor)+remainder;
    cout<<"Dividend = ("<<quotient<<" * "<<divisor<<") + "<<remainder<<endl;
    cout<<"Dividend = "<<result;
    return 0;
}
```

```
Enter dividend: 22
Enter divisor: 4
Division result= 5
Remainder= 2
Division verified using the division formula:-
Dividend = (Quotient * Divisor) + Remainder
Dividend = (5 * 4) + 2
Dividend = 22
-------------------------------
Process exited after 6.077 seconds with return value 0
Press any key to continue . . .
```

Q7. 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.

```cpp
1    #include<iostream>
2    #include<string>
3    using namespace std;
4
5    int main() {
6        string string,result;
7        cout<<"Enter your string: ";
8        cin>>string;
9        int i,j;
10       for(i=0;i<string.length();i++)
11       {
12           for(j=0;j<string.length();j++)
13           {
14               if(string[i]==string[j])
15               {
16                   break;
17               }
18           }
19           if(i==j)
20           {
21               result+=string[i];
22           }
23       }
24       cout<<"String after removal of duplicate characters: "<<result;
25       return 0;
26   }
```

```
Enter your string: differentiate
String after removal of duplicate characters: difernta
------------------------------
Process exited after 63.17 seconds with return value 0
Press any key to continue . . .
```

Q8. Suppose an integer array a[5] = {1,2,3,4,5}. Add more elements to it and display them in C++.

8th task.cpp

```cpp
1    #include<iostream>
2    using namespace std;
3
4    int main() {
5        int n;
6        cout<<"Enter number of elements to be added: ";
7        cin>>n;
8        int a[5+n]={1,2,3,4,5};
9        for(int i=0;i<n;i++)
10       {
11           cout<<"Enter number for ["<<5+i<<"] place of array: ";
12           cin>>a[5+i];
13       }
14       cout<<"\nNew array: ";
15       for(int i=0;i<5+n;i++)
16       {
17           cout<<a[i]<<" ";
18       }
19       return 0;
20   }
```

```
Enter number of elements to be added: 5
Enter number for [5] place of array: 10
Enter number for [6] place of array: 11
Enter number for [7] place of array: 12
Enter number for [8] place of array: 13
Enter number for [9] place of array: 14

New array: 1 2 3 4 5 10 11 12 13 14
------------------------------
Process exited after 7.847 seconds with return value 0
Press any key to continue . . .
```

Q9. 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**.

9th task.cpp

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

int main() {
    int X,elements;
    cout<<"Enter number of elements in array: ";
    cin>>elements;
    int num[elements-1];
    for(int i=0;i<elements;i++)
    {
        cout<<"Enter number for ["<<i<<"] place of array: ";
        cin>>num[i];
    }
    cout<<"Enter the value of the sum of 3 elements: ";
    cin>>X;
    for(int i=0;i<elements;i++)
    {
        for(int j=0;j<elements;j++)
        {
            for(int k=0;k<elements;k++)
            {
                if(num[i]+num[j]+num[k]==X)
                {
                    if(num[i]<num[j])
                    {
                        if(num[j]<num[k])
                        {
                            cout<<"Triplet that adds up to "<<X<<" (without any repeating values) is: "<<num[i]<<" "<<num[j]<<" "<<num[k]<<endl;
                        }
                        else
                        {
                            continue;
                        }
                    }
                    else
                    {
                        continue;
                    }
                }
            }
        }
    }
    return 0;
}
```

```
Enter number of elements in array: 6
Enter number for [0] place of array: 1
Enter number for [1] place of array: 2
Enter number for [2] place of array: 3
Enter number for [3] place of array: 4
Enter number for [4] place of array: 5
Enter number for [5] place of array: 6
Enter the value of the sum of 3 elements: 8
Triplet that adds up to 8 (without any repeating values) is: 1 2 5
Triplet that adds up to 8 (without any repeating values) is: 1 3 4

---------------------------------
Process exited after 8.737 seconds with return value 0
Press any key to continue . . .
```

Q10. Implement Bubble Sort on an array of 6 integers.

10th task.cpp

```cpp
1    #include<iostream>
2    using namespace std;
3
4    int main() {
5        int temp;
6        int num[6];
7        for(int i=0;i<6;i++)
8        {
9            cout<<"Enter number for ["<<i<<"] place of array: ";
10           cin>>num[i];
11       }
12       for(int i=0;i<6;i++)
13       {
14           for(int j=0;j<6;j++)
15           {
16               if(num[i]<num[j])
17               {
18                   temp=num[i];
19                   num[i]=num[j];
20                   num[j]=temp;
21               }
22               else
23               {
24                   continue;
25               }
26           }
27       }
28       cout<<"Array after bubble sort: ";
29       for(int i=0;i<6;i++)
30       {
31           cout<<num[i]<<" ";
32       }
33       return 0;
34   }
```

```
Enter number for [0] place of array: 8
Enter number for [1] place of array: 2
Enter number for [2] place of array: 6
Enter number for [3] place of array: 4
Enter number for [4] place of array: 9
Enter number for [5] place of array: 1
Array after bubble sort: 1 2 4 6 8 9
------------------------------
Process exited after 12.57 seconds with return value 0
Press any key to continue . . .
```