CS-114 - Fundamentals of Programing

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ME-15/A

ASSIGNMENT # 1

QUESTIONS

Q-No # 1

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

Code (Screenshot)

```cpp
#include<iostream>
using namespace std;
int main()
{
    int num;
    cout<<"Input the number : ";
    cin>>num;
    cout<<"The factors of "<<num<<" are = ";
    for(int i=1; i<=num; i++)
    {
        if(num % i == 0){ cout<<i<<","; }
    }
return 0;
}
```

Code (Copy)

```cpp
#include<iostream>

using namespace std;

int main()

{

        int num;

        cout<<"Input the number : ";

        cin>>num;

        cout<<"The factors of "<<num<<" are = ";

        for(int i=1; i<=num; i++)

        {

                if(num % i == 0){ cout<<i<<",";    }

        }

return 0;

}
```

Execution

```
Input the number : 77
The factors of 77 are = 1,7,11,77,
---------------------------------
Process exited after 3.521 seconds with return value 0
Press any key to continue . . .
```

```
Input the number : 50
The factors of 50 are = 1,2,5,10,25,50,
---------------------------------
Process exited after 1.627 seconds with return value 0
Press any key to continue . . .
```

Q-No # 2

2. 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;
}
```

Output

The output will be:

"x is 5 and y is 10"

Q-No # 3

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 data type for output.

Code (Screenshot)

```cpp
#include<iostream>
using namespace std;
int main()
{
    bool is_true;
    cout<<"Is this integer greater than 10 and less than equal to 20?"<<endl;
    int num;
    cout<<"Input the integer : ";
    cin>>num;

    if(num>10 && num<=20)
        {is_true=true;
        cout<<is_true<<" (yes the integer is greater than 10 and less than equal to 20)";}

    else
        {is_true=false;
        cout<<is_true<<" (no the integer isn't greater than 10 and less than equal to 20)";}

return 0;
}
```

Code (Copy)

#include<iostream>

using namespace std;

```cpp
int main()
{
    bool is_true;
    cout<<"Is this integer greater than 10 and less than equal to 20?"<<endl;
    int num;
    cout<<"Input the integer : ";
    cin>>num;

    if(num>10 && num<=20)
        {is_true=true;
        cout<<is_true<<" (yes the integer is greater than 10 and less than equal to 20)";}

    else
        {is_true=false;
        cout<<is_true<<" (no the integer isn't greater than 10 and less than equal to 20)";}
        return 0;
}
```

Execution

```
Is this integer greater than 10 and less than equal to 20?
Input the integer : 500
0 (no the integer isn't greater than 10 and less than equal to 20)
-------------------------------
Process exited after 1.568 seconds with return value 0
Press any key to continue . . .
```

```
Is this integer greater than 10 and less than equal to 20?
Input the integer : 11
1 (yes the integer is greater than 10 and less than equal to 20)
-------------------------------
Process exited after 0.6692 seconds with return value 0
Press any key to continue . . .
```

Q-No # 4

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 (Screenshot)

```cpp
#include<iostream>
#include<cmath>
using namespace std;
int main()
{
    int N, prime;
    bool is_prime;
    cout<<"Input a positive integer : ";
    cin>>N;
    if(N>=0)
    {
        int i=1;
        while(i<N)
        {
            is_prime = true;
            for(int j=2; j<=sqrt(i); j++)

            { if ( i % j == 0) {is_prime=false; break;}}
        }
            if(is_prime)
            {
            prime = i;
            }

        i++;
        }

        cout<<"The largest prime number smaller than "<<N<<" is : "<<prime;

    }

else
{cout<<"Invalid Input";}

return 0;

}
```

Code (Copy)

```cpp
#include<iostream>

#include<cmath>

using namespace std;

int main()

{

        int N, prime;

        bool is_prime;

        cout<<"Input a positive integer : ";
```

```cpp
        cin>>N;

        if(N>=0)

        {

                int i=1;

                while(i<N)

                {

                        is_prime = true;

                        for(int j=2; j<=sqrt(i); j++)


                        { if ( i % j == 0) {is_prime=false; break;}}

                }

                        if(is_prime)

                        {

                        prime = i;

                        }


                i++;

                }


                cout<<"The largest prime number smaller than "<<N<<" is : "<<prime;


        }


else

{cout<<"Invalid Input";}


return 0;}
```

Execution

```
Input a positive integer : 77
The largest prime number smaller than 77 is : 73
--------------------------------
Process exited after 1.713 seconds with return value 0
Press any key to continue . . .
```

```
Input a positive integer : 221
The largest prime number smaller than 221 is : 211
--------------------------------
Process exited after 1.114 seconds with return value 0
Press any key to continue . . .
```

Q-No # 5

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 (Screenshot)

```cpp
#include<iostream>
#include<string>
using namespace std;
int main() {
    string s1, s2;

    cout << "Enter the first string: ";
    cin >> s1;
    cout << "Enter the second string: ";
    cin >> s2;
    if(s1==s2)
    {
        int lens2 = s2.length();
        string revs2;
        for(int i=lens2 - 1; i>=0; i--)
        {
            revs2 += s2[i];
        }

        cout<<"The strings are equal so reversing one of the strings(2nd)"<<endl;
        cout<<"the first string is : "<<s1<<endl;
        cout<<"the second string is(now) : "<<revs2;

    }
    else
    {
        cout<<"The strings are not equal";
    }
return 0;
}
```

Code (Copy)

```cpp
#include<iostream>

#include<string>

using namespace std;

int main() {

    string s1, s2;


    cout << "Enter the first string: ";

    cin >> s1;

    cout << "Enter the second string: ";

    cin >> s2;
```

```cpp
    if(s1==s2)
    {
            int lens2 = s2.length();

            string revs2;

            for(int i=lens2 - 1; i>=0; i--)

            {

                    revs2 += s2[i];

            }


                    cout<<"The strings are equal so reversing one of the strings(2nd)"<<endl;

                    cout<<"the first string is : "<<s1<<endl;

                    cout<<"the second string is(now) : "<<revs2;


    }
        else

        {

                cout<<"The strings are not equal";

        }
return 0;}
```

Execution

```
Enter the first string: heyy
Enter the second string: hello
The strings are not equal
--------------------------------
Process exited after 4.7 seconds with return value 0
Press any key to continue . . . |
```

```
Enter the first string: heyy
Enter the second string: heyy
The strings are equal so reversing one of the strings(2nd)
the first string is : heyy
the second string is(now) : yyeh
-------------------------------
Process exited after 4.107 seconds with return value 0
Press any key to continue . . .
```

Q-No # 6

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 (Screenshot)

```cpp
#include<iostream>
using namespace std;
int main()
{
    int dividend, divisor, remainder=0, quotient=0;
    cout<<"Input the dividend : ";
    cin>>dividend;
    cout<<"Input the divisor : ";
    cin>>divisor;

    if(dividend >= divisor && divisor!=0)
    {
        for(remainder=dividend; remainder>=divisor; remainder -=divisor)
        {
            quotient++;
        }

        cout<<"the operation "<<dividend<<"/"<<divisor<<" gives us "<<endl;
        cout<<"Remainder = "<<remainder<<endl<<"Quotient = "<<quotient;
    }
    else
    { cout<<"Operation Invalid!";}

return 0;
}
```

Code (Copy)

```cpp
#include<iostream>

using namespace std;

int main()

{

        int dividend, divisor, remainder=0, quotient=0;

        cout<<"Input the dividend : ";

        cin>>dividend;

        cout<<"Input the divisor : ";

        cin>>divisor;


        if(dividend >= divisor && divisor!=0)

        {

                for(remainder=dividend; remainder>=divisor; remainder -=divisor)

                {

                        quotient++;

                }
```

```
                cout<<"the operation "<<dividend<<"/"<<divisor<<" gives us "<<endl;

                cout<<"Remainder = "<<remainder<<endl<<"Quotient = "<<quotient;

        }

        else

        { cout<<"Operation Invalid!";}


return 0;

}
```

Execution

```
Input the dividend : 77
Input the divisor : 5
the operation 77/5 gives us
Remainder = 2
Quotient = 15
---------------------------------
Process exited after 2.423 seconds with return value 0
Press any key to continue . . .
```

```
Input the dividend : 55
Input the divisor : 11
the operation 55/11 gives us
Remainder = 0
Quotient = 5
---------------------------------
Process exited after 1.406 seconds with return value 0
Press any key to continue . . .
```

Q-No # 7

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 (Screenshot)

```cpp
#include<iostream>
using namespace std;
int main()
{
    int n;
    cout<<"Input the size of your string: ";
    cin>>n;
    char array[n]={};
    cout<<"Input the string : ";

    for(int i=0; i<n; i++)
    {
        cin>>array[i];
    }
```

```
int newsize=n;
    for(int i=0; i<n; i++)
    {
        for(int j=i+1; j<newsize; j++)
        {
            if(array[j]==array[i])
            {
            for(int k=j; k<newsize; k++)
            {
                array[k]=array[k+1];
            }
            newsize--;
            j--;
            }
        }
    }

    cout<<"The resulting string is : ";
    for(int i=0; i<newsize; i++)
    {
        cout<<array[i];
    }

return 0;
}
```

Code (Copy)

```cpp
#include<iostream>
using namespace std;
int main()
{
        int n;
        cout<<"Input the size of your string: ";
        cin>>n;
        char array[n]={};
        cout<<"Input the string : ";


        for(int i=0; i<n; i++)
        {
                cin>>array[i];
        }


int newsize=n;
        for(int i=0; i<n; i++)
        {
                for(int j=i+1; j<newsize; j++)
                {
                        if(array[j]==array[i])
                        {
                        for(int k=j; k<newsize; k++)
```

```cpp
            {

                    array[k]=array[k+1];

            }

            newsize--;

            j--;

            }

        }

    }


    cout<<"The resulting string is : ";

    for(int i=0; i<newsize; i++)

    {

            cout<<array[i];

    }


return 0;}
```

Execution

```
Input the size of your string: 6
Input the string : cheese
The resulting string is : ches
--------------------------------
Process exited after 1.951 seconds with return value 0
Press any key to continue . . .
```

```
Input the size of your string: 10
Input the string : aaabbbcccd
The resulting string is : abcd
--------------------------------
Process exited after 4.243 seconds with return value 0
Press any key to continue . . .
```

Q-No # 8

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

Code (Screenshot)

```cpp
#include<iostream>
using namespace std;
int main()
{
    int elements=5, new_elements;
    int array[elements]={1,2,3,4,5};

    cout<<"The already present array before addition of new elements is : ";
    for(int i=0; i<elements; i++)
    {
        cout<<array[i]<<" ";
    }
    cout<<endl;

    cout<<"Enter the number of new elements you want to add : ";
    cin>>new_elements;

    elements = elements + new_elements;

    cout<<"Input the new elements one by one : "<<endl;
    for(int i=5; i<elements; i++)
    {
        cin>>array[i];
    }

    cout<<"The complete array after addition of new elements is : ";
    for(int i=0; i<elements; i++)
    {
        cout<<array[i]<<" ";
    }

return 0;
}
```

Code (Copy)

```cpp
#include<iostream>

using namespace std;

int main()

{

        int elements=5, new_elements;

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


        cout<<"The already present array before addition of new elements is : ";

        for(int i=0; i<elements; i++)

        {

                cout<<array[i]<<" ";

        }

        cout<<endl;
```

```
        cout<<"Enter the number of new elements you want to add : ";

        cin>>new_elements;


        elements = elements + new_elements;


        cout<<"Input the new elements one by one : "<<endl;

        for(int i=5; i<elements; i++)

        {

                cin>>array[i];

        }


        cout<<"The complete array after addition of new elements is : ";

        for(int i=0; i<elements; i++)

        {

                cout<<array[i]<<" ";

        }


return 0;

}
```

Execution

```
The already present array before addition of new elements is : 1 2 3 4 5
Enter the number of new elements you want to add : 7
Input the new elements one by one :
44
2
3
7
21
9
5
The complete array after addition of new elements is : 1 2 3 4 5 44 2 3 7 21 9 5
--------------------------------
Process exited after 10.53 seconds with return value 0
Press any key to continue . . .
```

Q-No # 9

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 (Screenshot)

```cpp
#include<iostream>
using namespace std;
int main()
{
    bool triplet_found=false;

    int X;
    cout<<"Input the Integer : ";
    cin>>X;

    int size;
    cout<<"Input the size of your array : ";
    cin>>size;

    int array[size]={};
    cout<<"Input the array : "<<endl;
    for(int i=0; i<size; i++)
    {
        cin>>array[i];
    }

    for(int i=0; i<size-2; i++)
    {
        for(int j=i+1; j<size-1; j++)
        {
            for(int k=j+1; k<size; k++)
            {
                if(array[i]+array[j]+array[k]==X)
                {
                    cout<<array[i]<<" + "<<array[j]<<" + "<<array[k]<<" = "<<X<<endl;
                    triplet_found=true;
                }
            }
        }
    }

    if(triplet_found!=true)
    {
        cout<<"No Triplet found";
    }

return 0;
}
```

Code (Copy)

```
#include<iostream>

using namespace std;

int main()

{

        bool triplet_found=false;


        int X;

        cout<<"Input the Integer : ";
```

```
        cin>>X;


        int size;

        cout<<"Input the size of your array : ";

        cin>>size;


        int array[size]={};

        cout<<"Input the array : "<<endl;

        for(int i=0; i<size; i++)

        {

                cin>>array[i];

        }


        for(int i=0; i<size-2; i++)

        {

                for(int j=i+1; j<size-1; j++)

                {

                        for(int k=j+1; k<size; k++)

                        {

                                if(array[i]+array[j]+array[k]==X)

                                {

                                        cout<<array[i]<<" + "<<array[j]<<" + "<<array[k]<<" = "<<X<<endl;

                                        triplet_found=true;

                                }

                        }

                }

        }


        if(triplet_found!=true)

        {

                cout<<"No Triplet found";

        }


return 0;}
```

Execution


```
Input the Integer : 15
Input the size of your array : 7
Input the array :
2
3
5
6
1
7
3
2 + 6 + 7 = 15
3 + 5 + 7 = 15
5 + 7 + 3 = 15

------------------------------
Process exited after 9.945 seconds with return value 0
Press any key to continue . . .
```

```
Input the Integer : 10
Input the size of your array : 4
Input the array :
1
4
2
3
No Triplet found
------------------------------
Process exited after 3.222 seconds with return value 0
Press any key to continue . . .
```

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

Code (Screenshot)

```cpp
#include<iostream>
using namespace std;
int main()
{
    int array[6]={};
    cout<<"Input the array : "<<endl;
    for(int i=0; i<6; i++)
    {
        cin>>array[i];
    }

    int iteration=0;
    while(iteration<6-1)
    {
        for(int i=0; i<6-iteration; i++)
        {
            if (array[i]>array[i+1])
            {
                int saver = array[i];
                array[i]=array[i+1];
                array[i+1]=saver;
            }
        }

        iteration++;
    }

    cout<<"The sorted array is : ";
    for(int i=0; i<5; i++)
    {
        cout<<array[i]<<" , ";
    }
    cout<<array[5];

return 0;
}
```

Code (Copy)

```cpp
#include<iostream>

using namespace std;

int main()

{

    int array[6]={};

    cout<<"Input the array : "<<endl;

    for(int i=0; i<6; i++)
```

```cpp
        {
                cin>>array[i];

        }


        int iteration=0;
        while(iteration<6-1)

        {
                for(int i=0; i<6-iteration; i++)

                {
                        if (array[i]>array[i+1])

                        {
                                int saver = array[i];

                                array[i]=array[i+1];

                                array[i+1]=saver;

                        }

                }


                iteration++;

        }


        cout<<"The sorted array is : ";
        for(int i=0; i<5; i++)

        {
                cout<<array[i]<<" , ";

        }
        cout<<array[5];


return 0;

}
```

Execution

```
Input the array :
3
1
8
2
7
4
The sorted array is : 1 , 2 , 3 , 4 , 7 , 8
-------------------------------
Process exited after 5.596 seconds with return value 0
Press any key to continue . . .
```

```
Input the array :
73
5
62
23
55
1
The sorted array is : 1 , 5 , 23 , 55 , 62 , 73
-------------------------------
Process exited after 10.34 seconds with return value 0
Press any key to continue . . .
```