Fundamentals of Programming

Assignment 1

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

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

int main() {
    int x;
    cout << "Enter the number you want factors of" << endl;
    cin >> x;
    for (int i=1;i<=x;i++) {
        if (x%i==0)
        cout << "Factor of " << x << " is "<< i << endl;
    }
    return 0;
}

```

```
Enter the number you want factors of
96
Factor of 96 is 1
Factor of 96 is 2
Factor of 96 is 3
Factor of 96 is 4
Factor of 96 is 6
Factor of 96 is 8
Factor of 96 is 12
Factor of 96 is 16
Factor of 96 is 24
Factor of 96 is 32
Factor of 96 is 48
Factor of 96 is 96

Process returned 0 (0x0)   execution time : 4.915 s
Press any key to continue.
```

Q2. 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;
}
```

```
x is 5 and y is 10

Process returned 0 (0x0)   execution time : 1.907 s
Press any key to continue.
```

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.

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

int main() {
    int x;
    cout << "Enter an integer: ";
    cin >> x;
    if (x>10 && x<=20) {
        cout << "1" << endl;
    }
    else {
        cout << "0" << endl;
    }
    return 0;
}
```

```
Enter an integer: 5
0

Process returned 0 (0x0)   execution time : 0.684 s
Press any key to continue.
```

```
Enter an integer: 13
1

Process returned 0 (0x0)   execution time : 1.450 s
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.

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

int main() {
    int N;
    int pn;
    int i=2;
    bool prime=true;
    cout << "Enter a positive integer: ";
    cin >> N;
    while (i<=N) {
        prime=true;
        for (int j=2;j<=i;j++) {
            if (i%j==0 && i!=j) {
                prime=false;
                break;
            }
        }
        if (prime==true) {
            pn=i;
        }
        i++;
    }
    cout << "The largest prime number less than " << N << " is " << pn;
    return 0;
}
```

```
Enter a positive integer: 100
The largest prime number less than 100 is 97
Process returned 0 (0x0)   execution time : 1.260 s
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 A;
    string B;
    int lA;
    int lB;
    cout << "Enter your first word: ";
    cin >> A;
    cout << "Enter your second word: ";
    cin >> B;
    lA=A.length();
    lB=B.length();
    char arr[lA];
    for (int i=0;i<lB;i++) {
        arr[i]=B[lB-i-1];
    }
    if (A==B) {
        for (int j=0;j<lB;j++) {
            B[j]=arr[j];
        }
        cout << "Your words are equal so the rotated word is: " << B;
    }
    else {
        cout << "Your both words are already unequal";
    }
    return 0;
}
```

```
Enter your first word: ihatec++
Enter your second word: ihatec++
Your words are equal so the rotated word is: ++cetahi
Process returned 0 (0x0)   execution time : 14.485 s
Press any key to continue.
```

```
Enter your first word: ihatec++
Enter your second word: ilovec++
Your both words are already unequal
Process returned 0 (0x0)   execution time : 10.708 s
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.

```cpp
#include <iostream>

using namespace std;

int main() {
    int dividend;
    int divisor;
    int quotient;
    cout << "Enter the dividend: ";
    cin >> dividend;
    cout << "Enter the divisor: ";
    cin >> divisor;
    while (dividend >= divisor) {
        dividend -= divisor;
        quotient++;
    }
    cout << "quotient: " << quotient << endl;
    cout << "remainder: " << dividend<< endl;
    return 0;
}
```

```
Enter the dividend: 47
Enter the divisor: 6
quotient: 7
remainder: 5

Process returned 0 (0x0)   execution time : 3.249 s
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.

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

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

int main() {
    int arr[5]={1,2,3,4,5};
    int num;
    cout << "How many more elements do you want to add in your array?" << endl;
    cin >> num;
    int extarr[num+5];
    for (int i=0;i<5;i++) {
        extarr[i]=arr[i];
    }
    for (int i=5;i<num+5;i++) {
        cout << "Add element to your position no." << i << endl;
        cin >> extarr[i];
    }
    for (int i=0;i<num+5;i++) {
        cout << extarr[i];
    }
    return 0;
}
```

```
How many more elements do you want to add in your array?
5
Add element to your position no.5
6
Add element to your position no.6
7
Add element to your position no.7
8
Add element to your position no.8
9
Add element to your position no.9
10
12345678910
Process returned 0 (0x0)   execution time : 9.428 s
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.

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

int main() {
    int arrsize,num,sum;
    bool flag=false;
    cout << "How big is your array?" << endl;
    cin >> arrsize;
    int arr[arrsize];
    for (int i=0;i<arrsize;i++) {
        cout << "Enter number " << i+1 << endl;
        cin >> arr[i];
    }
    cout << "Enter your integer: ";
    cin >> num;
    for (int i=1;i<arrsize-1;i++) {
        sum=arr[i]+arr[i-1]+arr[i+1];
        if (sum==num) {
            flag=true;
            break;
        }
    }
    if (flag==true) {
        cout << "There is a triplet in your array that sums up to " << num << endl;
    }
    else {
        cout << "There isn't a triplet in your array that sums up to " << num << endl;
    }
    return 0;
}
```

```
How big is your array?
5
Enter number 1
1
Enter number 2
2
Enter number 3
3
Enter number 4
2
Enter number 5
2
Enter your integer: 6
There is a triplet in your array that sums up to 6

Process returned 0 (0x0)   execution time : 9.547 s
Press any key to continue.
```

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

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

int main () {
    int arrsize=6;
    int array[arrsize];
    cout << "Enter 6 numbers to be sorted" << endl;
    for (int i=0;i<arrsize;i++) {
        cin >> array[i];
        }for (int i=0;i<arrsize-1;i++) {
            for (int j=0;j<arrsize-i-1;j++) {
                if (array[j] > array[j+1]) {
                    int temp=array[j];
                    array[j] = array[j+1];
                    array[j+1] = temp;
                }
            }
        }
        cout << "Your sorted array is:" << endl;
        for (int i=0;i<arrsize;i++) {
            cout << array[i] << endl;
        }
    return 0;
}
```

```
Enter 6 numbers to be sorted
5
2
1
3
8
5
Your sorted array is:
1
2
3
5
5
8

Process returned 0 (0x0)   execution time : 10.316 s
Press any key to continue.
```