Fop LAB Assignment 1

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Section: B

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

Solution

```cpp
#include <iostream>

using namespace std;

int main()
{

    int num;
    cout << "Enter the number: ";
    cin>>num;

    cout<<"Factors of "<<num<<endl;

    for (int i = 1; i <= num; i++) {
        if (num%i==0) {
            cout<<i<<endl;
        }
    }

    return 0;
}
```

Output

```
Enter the number: 60
Factors of 60
1
2
3
4
5
6
10
12
15
20
30
60

Process returned 0 (0x0)    execution time : 3.789 s
Press any key to continue.
```

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;
}
```

Solution

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 than equal to 20. Print 1 if yes and print 0 if no. Use appropriate datatype for output.

Solution

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

```cpp
int main()
{
    int num;
    cout<<"Enter the number: ";
    cin>>num;
    if (num > 10 && num <=20) {
        cout<<"1";
    }
    else {
        cout<<"0";
    }
    return 0;
}
```

Output

```
Enter the number: 15
1
Process returned 0 (0x0)   execution time : 2.857 s
Press any key to continue.
```

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

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

int main()
{
    int N, factors, i, j;
    cout<<"Enter value of N: ";
    cin>>N;
```

```cpp
    i = N;
    while (i >= 2) {
        factors = 0;

        j = 1;
        while (j <= i) {
            if (i%j==0) {
                factors++;
            }
            j++;
        }

        if (factors==2) {
            cout<<"The highest prime number lower than N is: "<<i;
            break;
        }

        i--;
    }
    return 0;
}
```
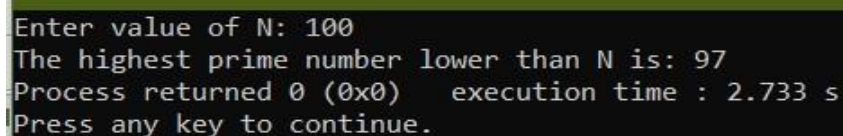
Output

```
Enter value of N: 100
The highest prime number lower than N is: 97
Process returned 0 (0x0)    execution time : 2.733 s
Press any key to continue.
```

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

```cpp
#include <iostream>
#include <string>
```

```cpp
using namespace std;

int main()
{
    string str1, str2, reversed;
    reversed = "";
    cout<<"Enter 1st String: ";
    cin>>str1;
    cout<<"Enter 2nd String: ";
    cin>>str2;

    if (str1 == str2) {
        for (int i = 0; i < str1.length(); i++) {
            reversed = str1[i] + reversed;
        }
        cout<<"Strings are equal. Reversed string is: ";
        cout<<reversed;
    }
    else {
        cout<<"Strings are unequal";
    }
    return 0;
}
```
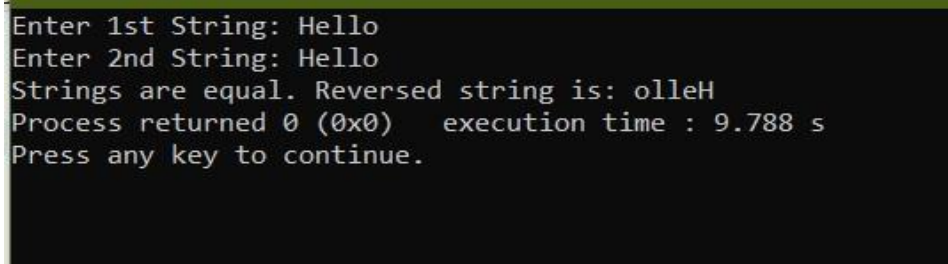
Output

```
Enter 1st String: Hello
Enter 2nd String: Hello
Strings are equal. Reversed string is: olleH
Process returned 0 (0x0)   execution time : 9.788 s
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.

Solution

```cpp
#include <iostream>
```

```cpp
using namespace std;

int main()
{
    int dividend, divisor, remainder, quotient;
    cout<<"NOTE: Dividend must be greater than divisor"<<endl;
    cout<<"Enter dividend: ";
    cin>>dividend;
    cout<<"Enter divisor: ";
    cin>>divisor;

    if (dividend < divisor) {
        cout<<"Please Enter a dividend greater than divisor.";
        return 1;
    }
    remainder = dividend;

    for (int i = 1; i <= dividend; i++) {
        remainder -= divisor;

        if (remainder < divisor) {
            quotient = i;
            break;
        }
    }

    cout<<dividend<<" / "<<divisor<<" = "<<quotient;
    return 0;
}
```

Output

```
NOTE: Dividend must be greater than divisor
Enter dividend: 54
Enter divisor: 4
54 / 4 = 13
Process returned 0 (0x0)   execution time : 4.721 s
Press any key to continue.
```

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

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

int main()
{
    string str, result;
    bool found;

    cout<<"Enter String: ";
    cin>>str;
    result = "";

    for (int i = 0; i < str.length(); i++) {
        found = false;
        for (int j = 0; j < result.length(); j++) {
            if ( str[i] == result[j] ) {
                found = true;
            }
        }

        if (found == false) {
            result += str[i];
        }
    }

    cout<<"Resultant String: "<<result;
    return 0;
}
```

Output

```
Enter String: Dupppllliiiccaaattteeddd
Resultant String: Duplicated
Process returned 0 (0x0)   execution time : 16.566 s
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++.

Solution

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

int main()
{
   int newA[8], a[5] = {1,2,3,4,5};
   cout<<"Current array is: {";
   for (int i = 0; i<5; i++) {
      cout<<a[i];
      if (i==4)
         continue;
      cout<<", ";
   }
   cout<<"}\n";

   for (int i = 0; i<5; i++) {
      newA[i] = a[i];
   }

   cout<<"Enter 3 integers which will be added to the array: "<<endl;
   for (int i = 5; i<8; i++)
      cin>>newA[i];

   cout<<"Printing elements of array"<<endl;
```

```cpp
    for (int i = 0; i<8; i++) {
        cout<<newA[i]<<" ";
    }
    return 0;
}
```

Output

```
Current array is: {1, 2, 3, 4, 5}
Enter 3 integers which will be added to the array:
43
23
48
Printing elements of array
1 2 3 4 5 43 23 48
Process returned 0 (0x0)   execution time : 11.272 s
Press any key to continue.
```

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

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

int main()
{
    int a, b, c, X, sum, arr[10];

    cout<<"Enter 10 integers for array: ";
    for (int i = 0; i<10; i++) {
        cin>>arr[i];
    }

    bool found = false;
    cout<<"Enter integer X: ";
    cin>>X;

    cout<<"Triplets are: ";
```

```cpp
    for (int i = 0; i<10; i++) {
        for (int j = 0; j<10; j++) {
            if (i == j)
                continue;

            for (int z = 0; z<10; z++) {
                if (z == i || z == j)
                    continue;

                sum = arr[i] + arr[j] + arr[z];
                if (sum == X) {
                    cout<<" ("<<arr[i]<<", "<<arr[j]<<", "<<arr[z]<<")";
                    found = true;
                }
            }
        }
    }
    if (found == false) {
        cout<<"No Triplet Found";
    }
    return 0;
}
```

Output


```
Enter 10 integers for array: 1
2
3
4
5
6
7
8
9
10
Enter integer X: 20
Triplets are:  (1, 9, 10) (1, 10, 9) (2, 8, 10) (2, 10, 8) (3, 7, 10) (3, 8, 9) (3, 9, 8) (3, 10, 7) (4, 6, 10) (4, 7, 9
) (4, 9, 7) (4, 10, 6) (5, 6, 9) (5, 7, 8) (5, 8, 7) (5, 9, 6) (6, 4, 10) (6, 5, 9) (6, 9, 5) (6, 10, 4) (7, 3, 10) (7,
4, 9) (7, 5, 8) (7, 8, 5) (7, 9, 4) (7, 10, 3) (8, 2, 10) (8, 3, 9) (8, 5, 7) (8, 7, 5) (8, 9, 3) (8, 10, 2) (9, 1, 10)
(9, 3, 8) (9, 4, 7) (9, 5, 6) (9, 6, 5) (9, 7, 4) (9, 8, 3) (9, 10, 1) (10, 1, 9) (10, 2, 8) (10, 3, 7) (10, 4, 6) (10,
6, 4) (10, 7, 3) (10, 8, 2) (10, 9, 1)
Process returned 0 (0x0)   execution time : 9.424 s
Press any key to continue.
```

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

Solution

```cpp
#include <iostream>
```

```cpp
using namespace std;

int main()
{
    int temp, len = 6, arr[len];
    cout<<"Enter "<<len<<" integers for array: ";
    for (int i = 0; i<len; i++) {
        cin>>arr[i];
    }

    for (int j = 0; j<(len-1); j++) {
        for (int i = 0; i<(len-1); i++) {
        if (arr[i]>arr[i+1]) {
            temp = arr[i];
            arr[i] = arr[i+1];
            arr[i+1] = temp;
            }
        }
    }
    cout<<"Final Array: {";
    for (int i = 0; i<len; i++) {
        cout<<arr[i];
        if (i == len-1)
            continue;
        cout<<",";
    }
    cout<<"}";
    return 0;
}
```

Output

```
Enter 6 integers for array: 8
7
6
5
4
3
Final Array: {3,4,5,6,7,8}
Process returned 0 (0x0)    execution time : 8.378 s
Press any key to continue.
```