



NUST
NATIONAL UNIVERSITY
OF SCIENCES & TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING

Subject: Fundamentals of Programming

Assignment No. 1

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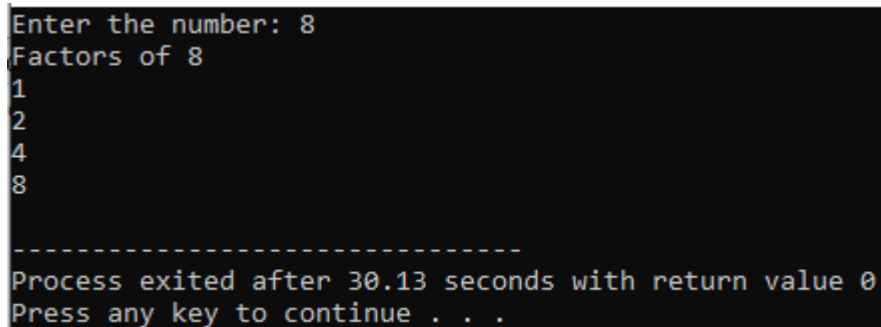
Semester No. 1

Date: November 20, 2023

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

Solution

```
#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;
}
```



```
Enter the number: 8
Factors of 8
1
2
4
8

-----
Process exited after 30.13 seconds with return value 0
Press any key to continue . . .
```

2. Write output to the following code.

```
#include <iostream>
Using namespace std;
int main() {
    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;
    return 0;
}

```

Solution

x is 5 and y is 10

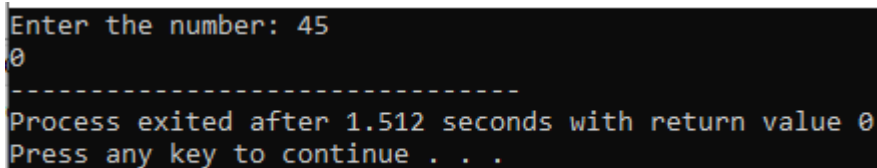
- 3. Write a C++ program, take an integer value from user and check if it's greater than 10 and less than equal to 20. Print 1 if yes and print 0 if no. Use appropriate datatype for output.**

Solution

```

#include <iostream>
using namespace std;
int main()
{
    int num;
    cout<<"Enter the number: ";
    cin>>num;
    if (num > 10 && num <=20) {
        cout<<"1";
    }
    else {
        cout<<"0";
    }
    return 0;
}

```



```

Enter the number: 45
0
-----
Process exited after 1.512 seconds with return value 0
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

```
#include <iostream>
using namespace std;
int main()
{
    int N, factors, i, j;
    cout<<"Enter value of N: ";
    cin>>N;
    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;
}
```

```
Enter value of N: 97
The highest prime number lower than N is: 97
-----
Process exited after 2.373 seconds with return value 0
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

```
#include <iostream>
#include <string>
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;
}
```

```
Enter 1st String: Gilgit
Enter 2nd String: Gilgit
Strings are equal. Reversed string is: tigliG
-----
Process exited after 8.824 seconds with return value 0
Press any key to continue . . .
```

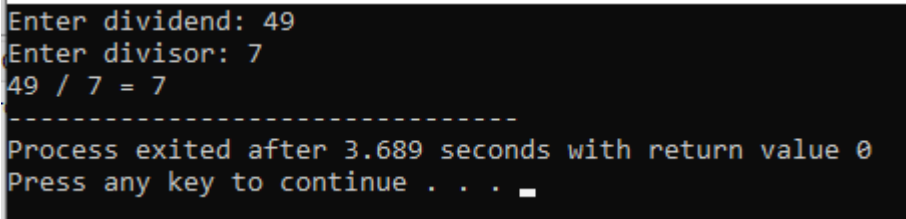
6. Perform division in C++ without / using for loops.

You can use / only to display the final results.

Your dividend must be greater than divisor.

Solution

```
#include <iostream>
using namespace std;
int main()
{
    int dividend, divisor, remainder, quotient;
    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;
}
```



```
Enter dividend: 49
Enter divisor: 7
49 / 7 = 7
-----
Process exited after 3.689 seconds with return value 0
Press any key to continue . . .
```

7. Write a C++program for a string which may contain lowercase and uppercase characters. The

Solution

```
Enter String: zzzzzzzzzzzzzzaaaaaaaaaaaaahhhhhhhhhhhhhoooooooooooooorrrrrrrrrrrr  
Resultant String: zahor  
-----  
Process exited after 8.213 seconds with return value 0  
Press any key to continue . . . _
```

Solution

```

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

```

```

Current array is: {1, 2, 3, 4, 5}
Enter 3 integers which will be added to the array:
42
21
96
Printing elements of array
1 2 3 4 5 42 21 96
-----
Process exited after 11.22 seconds with return value 0
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


```

#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: ";
    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;
}

```

```
Enter 10 integers for array: 21
22
23
24
25
26
27
28
29
30
Enter integer X: 40
Triplets are: No Triplet Found
-----
Process exited after 14.51 seconds with return value 0
Press any key to continue . . .
```

10. Implement Bubble Sort on an array of 6 integers

Solution

```
#include <iostream>
using namespace std;
int main()
{
    int a, s = 6, arr[s];
    cout<<"Enter "<<s<<" integers for array: ";
    for (int i = 0; i<s; i++) {
        cin>>arr[i];
    }
    for (int j = 0; j<(s-1); j++) {
        for (int i = 0; i<(s-1); i++) {
            if (arr[i]>arr[i+1]) {
                a = arr[i];
                arr[i] = arr[i+1];
                arr[i+1] = a;
            }
        }
    }
    cout<<"Final Array: {";
    for (int i = 0; i<s; i++) {
        cout<<arr[i];
        if (i == s-1)
            continue;
    }
}
```

```
cout<<" ";  
}  
cout<<"}";  
return 0;  
}
```

Enter 6 integers for array: 21

20

19

18

17

16

Final Array: {16,17,18,19,20,21}

Process exited after 13.95 seconds with return value 0

Press any key to continue . . . ■