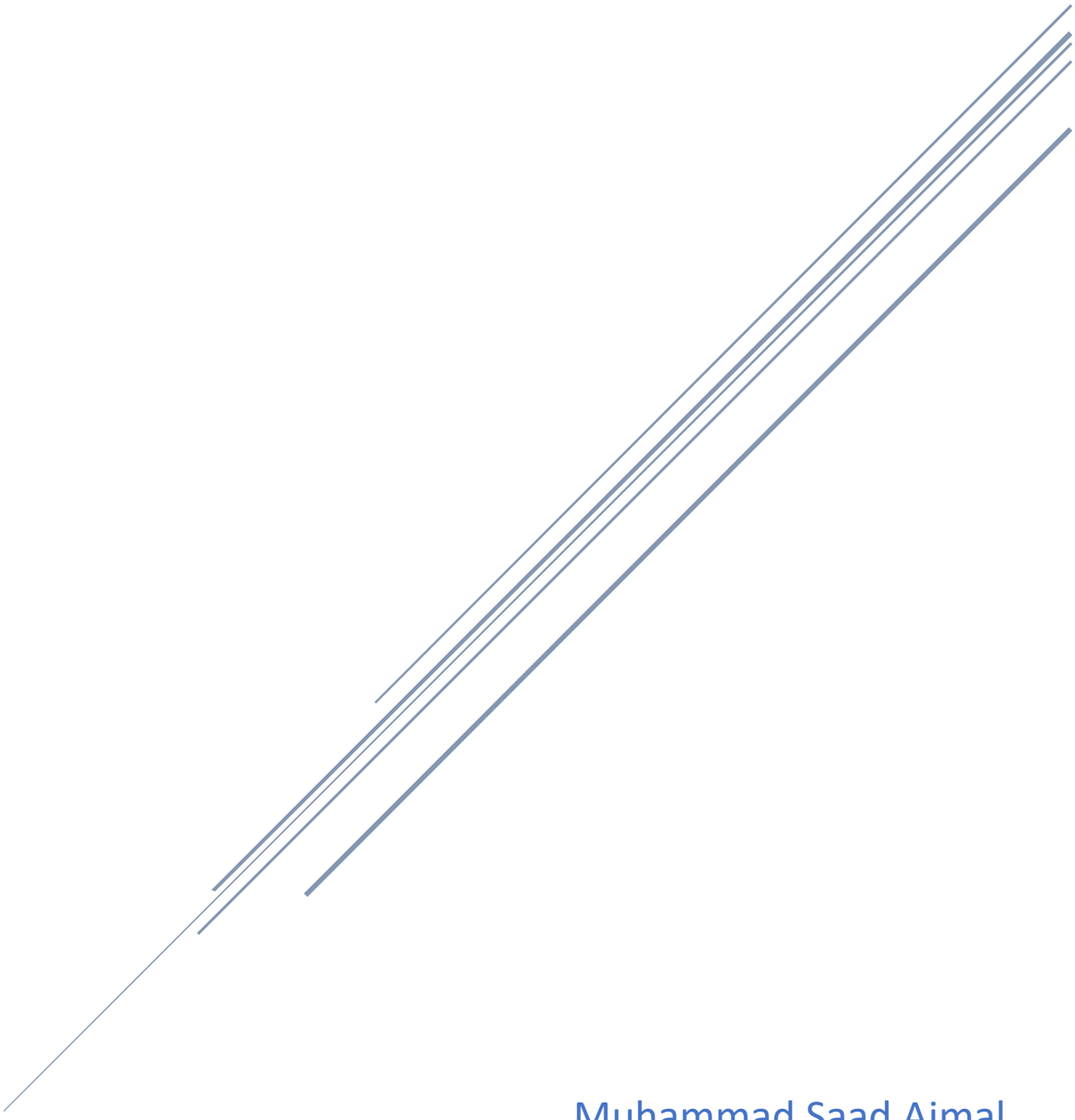
FUNDAMENTALS OF PROGRAMMING

Assignment #1



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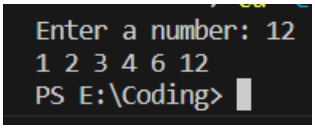
QUESTION #1: Write a C++ program to display factors of a number using for loops.

CODE:

```cpp
#include <iostream>
using namespace std;
int main()
{
    int x, y, z;
    cout << "Enter a number: ";
    cin >> x;
    for (int a = 1; a <= x; a++)
    {
        if (x % a == 0)
        {
            cout << a << " ";
        }
    }
    cout << endl;
}
```

RESULTS:



QUESTION #2: WRITE an output to the given code:

RESULTS:

x is 5 and y is 10

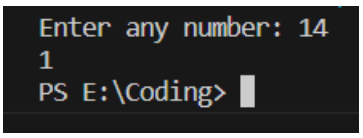
QUESTION #3: Write a C++ program, take an integer value from user and check if it's greater than 10 and less than equal to 20. Print 1 if yes and print 0 if no. Use appropriate datatype for output

CODE:

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

```cpp
using namespace std;
int main()
{
    int x, y;
    cout << "Enter any number: ";
    cin >> x;
    if (x > 10 && x <= 20)
    {
        cout << "1" << endl;
    }
    else
    {
        cout << "0";
    }
}
```

RESULTS:



QUESTION #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:

```cpp
#include <iostream>
using namespace std;
int main()
{
    int n;
    cout << "Enter any positive integer: ";
    cin >> n;
    if (n <= 1)
    {
        cout << "Please enter a positive integer greater than 1." << endl;
        return 1;
```

```
    }
    int x = n - 1;
    while (x > 1)
    {
        bool isPrime = true;
        for (int a = 2; a * a <= x; ++a)
        {
            if (x % a == 0)
            {
                isPrime = false;
                break;
            }
        }
        if (isPrime)
        {
            cout << "Largest prime number less than or equal to " << n << " is "
<< x << endl;
            break;
        }
        --x;
    }
    return 0;
}
```

RESULTS:

```
Enter any positive integer: 99
Largest prime number less than or equal to 99 is 97
PS E:\Coding>
```

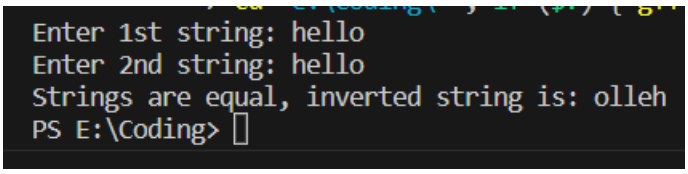
QUESTION #5: Write a C++ program, take two string as input from user and check if both strings are equal or not. If they are equal make them unequal by rotating string. e.g., Hello is turned into olleH etc.

CODE:

```
#include <string>
#include <iostream>
using namespace std;
int main()
{
    string str1, str2;
```

```
    cout << "Enter 1st string: ";
    cin >> str1;
    cout << "Enter 2nd string: ";
    cin >> str2;
    char change;
    if (str1 == str2)
    {
        cout << "Strings are equal, inverted string is: ";
        for (int i = 0; i < str2.length() / 2; i++)
        {
            change = str2[i];
            str2[i] = str2[str2.length() - 1 - i];
            str2[str2.length() - 1 - i] = change;
        }
        cout << str2;
    }
    else
        cout << "Strings are not equal";
    return 0;
}
```

RESULTS:



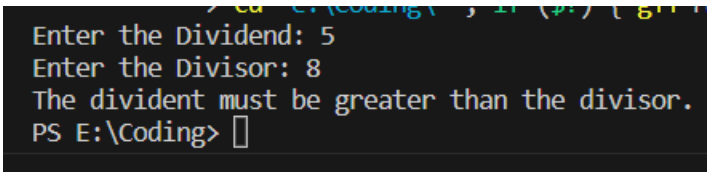
QUESTION #6: Perform division in C++ without / using for loops. You can use / only to display the final results. Your dividend must be greater than divisor.

CODE:

```
#include <iostream>
using namespace std;
int main()
{
    int x, y, z = 0;
    cout << "Enter the Dividend: ";
    cin >> x;
    cout << "Enter the Divisor: ";
    cin >> y;
```

```
    if (x > y)
    {
        for (int i = 1; x >= y; i++)
        {
            x = x - y;
            z++;
        }
        cout << z;
    }
    else
    {
        cout << "The divident must be greater than the divisor.";
    }
    return 0;
}
```

RESULT:



QUESTION #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:

```
#include <iostream>
using namespace std;
int main()
{
    string str1, str2;
    cout << "Enter a word: ";
    cin >> str1;
    int a = 0, b = 0;
    for (a = 0; a < str1.length(); a++)
    {
        for (b = 0; b < str1.length(); b++)
        {
            if (str1[a] == str1[b])
            {
```

```
                break;
            }
        }
        if (a == b)
        {
            str2 += str1[a];
        }
    }
    cout << "Your word without repetition is: ";
    cout << str2;
    return 0;
}
```

RESULT:

```
Enter a word: Hello
Your word without repetition is: Helo
PS E:\Coding>
```

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

CODE:

```
#include <iostream>
using namespace std;
int main()
{
    int size = 5;
    int arr[size] = {1, 2, 3, 4, 5};
    cout << "How many elements you want to add in array: ";
    int x, y;
    cin >> x;
    for (int i = 0; i < x; i++)
    {
        cout << "Enter the number you want to add: ";
        cin >> y;
        arr[size + i] = {y};
    }
    cout << "After adding numbers the loop is: ";
    for (int j = 0; j < 5 + x; j++)
    {
        cout << arr[j] << " ";
    }
    return 0;
```

```
}
```

RESULT:

```
How many elements you want to add in array: 2
Enter the number you want to add: 6
Enter the number you want to add: 7
After adding numbers the loop is: 1 2 3 4 5 6 7
PS E:\Coding>
```

QUESTION #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:

```
#include <iostream>
using namespace std;
int main()
{
    int num, ele, tochk, sum;
    cout << "Enter the number of elements in array: ";
    cin >> num;
    int arr[num] = {};
    for (int i = 0; i < num; i++)
    {
        cout << "Enter a number: ";
        cin >> arr[i];
    }
    cout << "The array is: ";
    for (int j = 0; j < num; j++)
    {
        cout << arr[j] << " ";
    }
    cout << endl;
    cout << " Enter the number to check the sum ";
    cin >>
        tochk;
    cout << "The triplets are: \n";
    for (int i = 0; i < num; i++)
    {
        for (int j = i + 1; j < num; j++)
        {
            sum = arr[i] + arr[j];
            for (int k = j + 1; j < num; j++)
```

```
            {
                sum += arr[k];
                if (sum == tochk)
                {
                    cout << "( " << arr[i] << " , " << arr[j] << " , " << arr[k]
<< ") \n";
                }
            }
        }
    }
    return 0;
}
```

RESULT:

```
Enter a number: 6
The array is: 1 2 3 4 5 6
 Enter the number to check the sum 6
The triplets are:
( 1 , 2 , 3)
PS E:\Coding>
```

QUESTION #10: Implement Bubble Sort on an array of 6 integers

CODE:

```
#include <iostream>
using namespace std;
int main()
{

    int ele = 5;
    int arr[ele] = {};
    for (int i = 0; i < ele; i++)
    {
        cout << "Enter a number: ";
        cin >> arr[i];
    }
    cout << "The sorted array in ascending order is: ";
    for (int j = 0; j < ele; j++)
    {
        for (int k = j + 1; k < ele; k++)
        {
            int toswap;
            if (arr[j] > arr[k])
```

```
            {
                toswap = arr[j];
                arr[j] = arr[k];
                arr[k] = toswap;
            }
        }
        cout << arr[j] << " ";
    }
    cout << endl;
    cout << "The sorted array in descending order is: ";
    for (int j = 0; j < ele; j++)
    {
        for (int k = j + 1; k < ele; k++)
        {
            int toswap;
            if (arr[j] < arr[k])
            {
                toswap = arr[j];
                arr[j] = arr[k];
                arr[k] = toswap;
            }
        }
        cout << arr[j] << " ";
    }
    return 0;
}
```

RESULT:

```
Enter a number: 23
Enter a number: 65
Enter a number: 76
Enter a number: 12
Enter a number: 45
The sorted array in ascending order is: 12 23 45 65 76
The sorted array in descending order is: 76 65 45 23 12
PS E:\Coding>
```