DOMAIN WINTER WINNING CAMP

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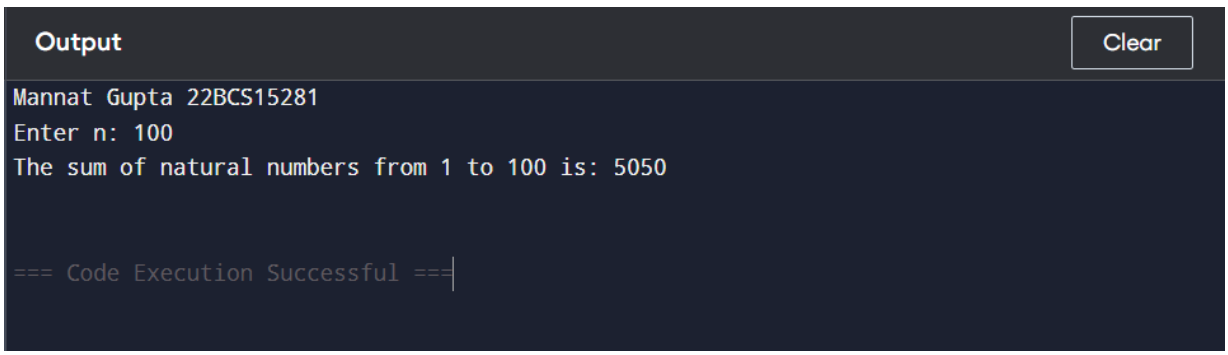
Semester: 5th
Date of Performance: 19/12/24

1) Sum of Natural Numbers up to N

Objective:

Calculate the sum of all natural numbers from 1 to n, where n is a positive integer. Use the formula:
Sum=n×(n+1)/2 .
Take n as input and output the sum of natural numbers from 1 to n.

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

int main() {
    int n;
    cout<<"Mannat Gupta 22BCS15281"<<endl;
    cout << "Enter n: ";
    cin >> n;

    if (n > 0) {
        int sum = n * (n + 1) / 2;
        cout << "The sum of natural numbers from 1 to " << n << " is: " << sum << endl;
    }

    return 0;
}
```

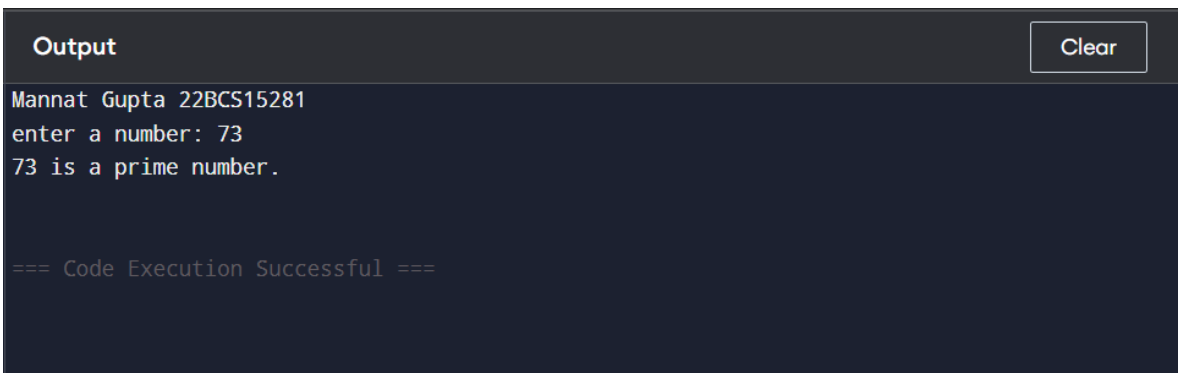


2) Check if a Number is Prime

Objective:

Check if a given number n is a prime number. A prime number is a natural number greater than 1 that has no positive divisors other than 1 and itself.
To determine if a number is prime, iterate from 2 to √n and check if n is divisible by any number in this range. If it is divisible, it is not a prime number; otherwise, it is a prime.

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

int main() {
    cout<<"Mannat Gupta 22BCS15281"<<endl;
    int n;
    cout << "enter a number: ";
    cin >> n;

    if (n <= 1) {
        cout << n << " is not a prime number." << endl;
    }
    else {
        for (int i = 2; i * i <= n; i++) {
            if (n % i == 0) {
                cout << n << " is not a prime number." << endl;
                return 0;
            }
        }
        cout << n << " is a prime number." << endl;
    }

    return 0;
}
```

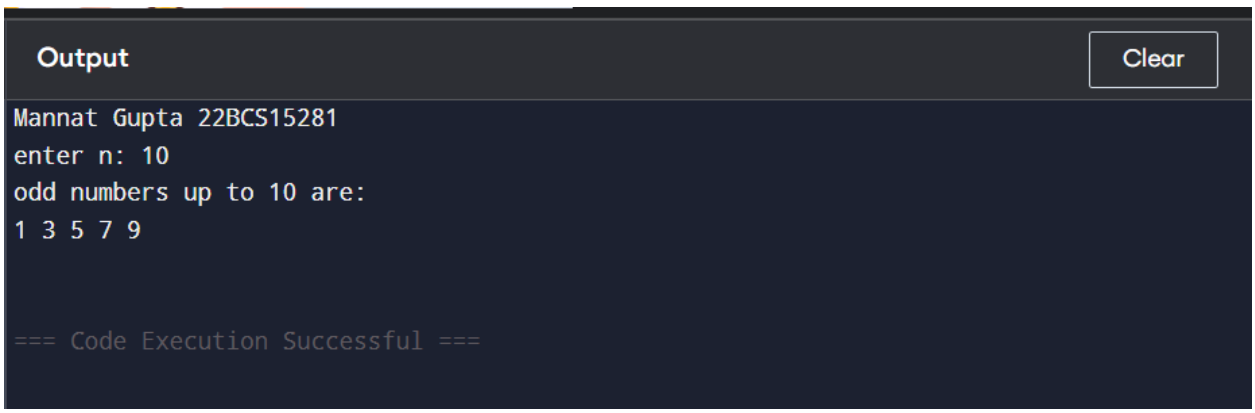


3) Print Odd Numbers up to N

Objective:

Print all odd numbers between 1 and n, inclusive. Odd numbers are integers that are not divisible by 2. These numbers should be printed in ascending order, separated by spaces. This problem is a simple introduction to loops and conditional checks. The goal is to use a loop to iterate over the numbers and check if they are odd using the condition i%2≠0.

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

int main() {
    cout<<"Mannat Gupta 22BCS15281"<<endl;
    int n;
    cout << "enter n: ";
    cin >> n;

    if (n > 0) {
        cout << "odd numbers up to " << n << " are:" << endl;
        for (int i = 1; i <= n; i += 2) {
            cout << i << " ";
        }
        cout << endl;
    }

    return 0;
}
```

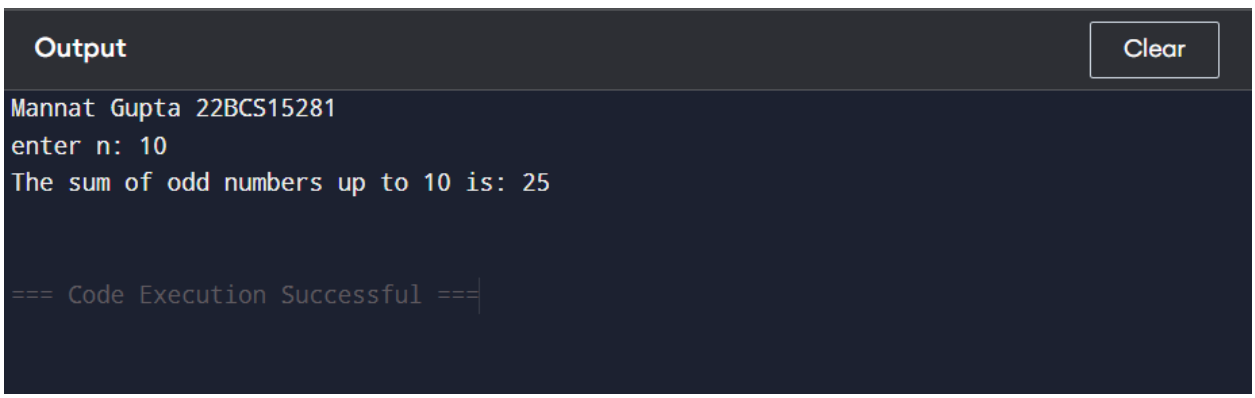


4) Sum of Odd Numbers up to N

Objective:

Calculate the sum of all odd numbers from 1 to n. An odd number is an integer that is not divisible by 2.The sum of odd numbers, iterate through all the numbers from 1 to n, check if each number is odd, and accumulate the sum.

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

int main() {
    cout<<"Mannat Gupta 22BCS15281"<<endl;
   int n;
   cout << "enter n: ";
   cin >> n;

   if (n > 0) {
      int sum = 0;
      for (int i = 1; i <= n; i += 2) {
         sum += i;
      }
      cout << "The sum of odd numbers up to " << n << " is: " << sum << endl;
   }

   return 0;
}
```

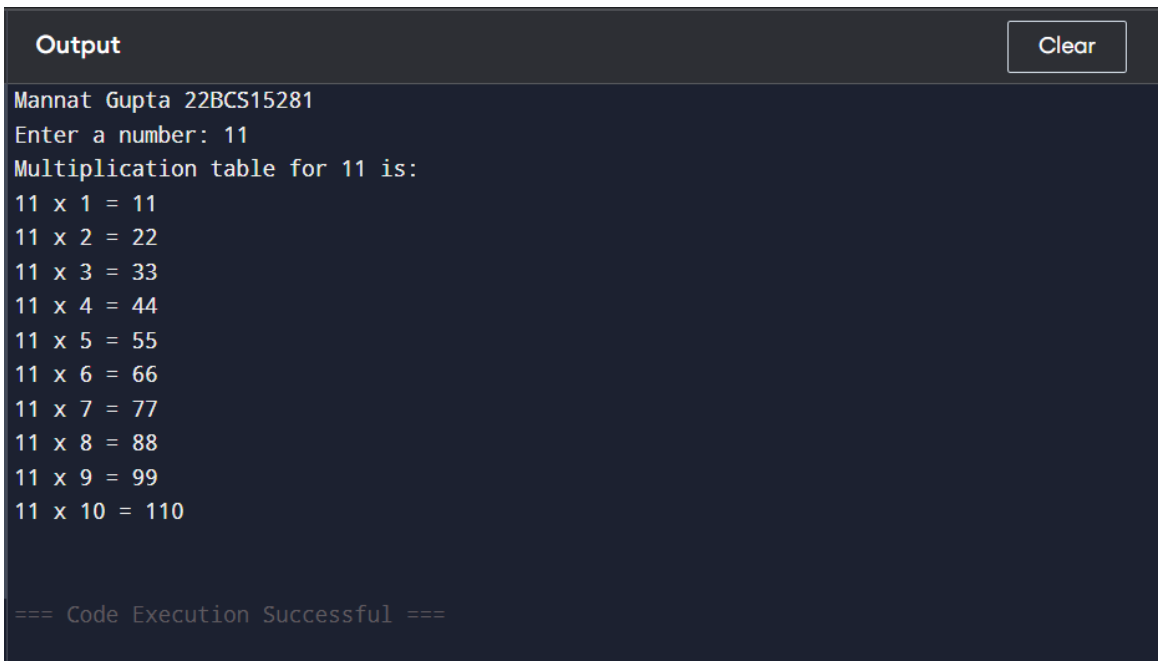


5) Print Multiplication Table of a Number

Objective:

Print the multiplication table of a given number n. A multiplication table for a number n is a list of products of n with integers from 1 to 10. For example, the multiplication table for 3 is: 3×1=3,3×2=6,…,3×10=30.

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

int main() {
   cout<<"Mannat Gupta 22BCS15281"<<endl;
   int n;
   cout << "Enter a number: ";
   cin >> n;

   cout << "Multiplication table for " << n << " is:" << endl;
   for (int i = 1; i <= 10; ++i) {
      cout << n << " x " << i << " = " << n * i << endl;
   }

   return 0;
}
```



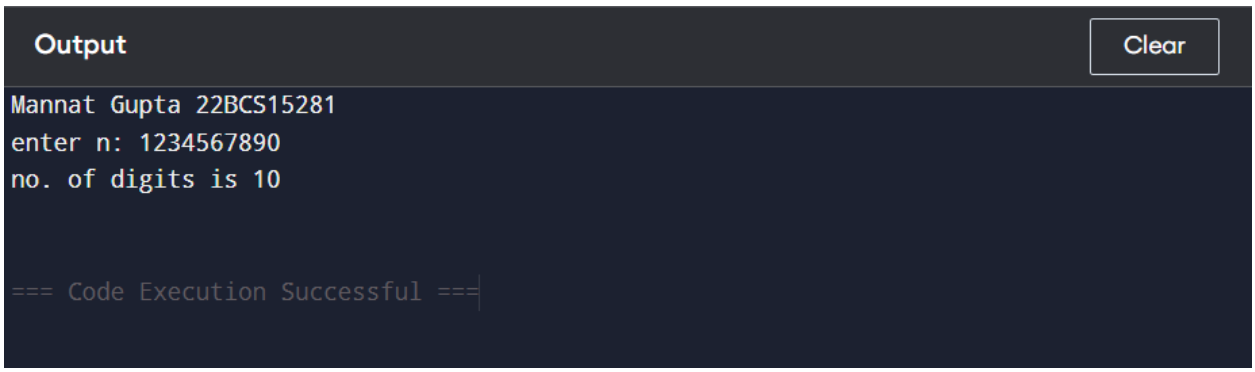
6) Count Digits in a Number

Objective:

Count the total number of digits in a given number n. The number can be a positive integer. For example, for the number 12345, the count of digits is 5. For a number like 900000, the count of digits is 6.

Given an integer n, your task is to determine how many digits are present in n. This task will help you practice working with loops, number manipulation, and conditional logic.

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

int main() {
    int n;
    int m = 0;
    cout<<"Mannat Gupta 22BCS15281"<<endl;
    cout << "enter n: ";
    cin >> n;

    while (n > 0) {
        n = n / 10;
        m++;
    }

    cout << "no. of digits is " << m << endl;

    return 0;
}
```



7) Find the Largest Digit in a Number

Objective:

Find the largest digit in a given number n. For example, for the number 2734, the largest digit is 7. You need to extract each digit from the number and determine the largest one. The task will involve using loops and modulus operations to isolate the digits.

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

int main() {
    cout<<"Mannat Gupta 22BCS15281"<<endl;
    int n, m = 0;
    cout<<"enter n: "<<endl;
    cin >> n;

    while (n > 0) {
        int digit = n % 10;
        if (digit > m) {
            m = digit;
        }
        n = n / 10;
    }

    cout << m << endl;

    return 0;
}
```

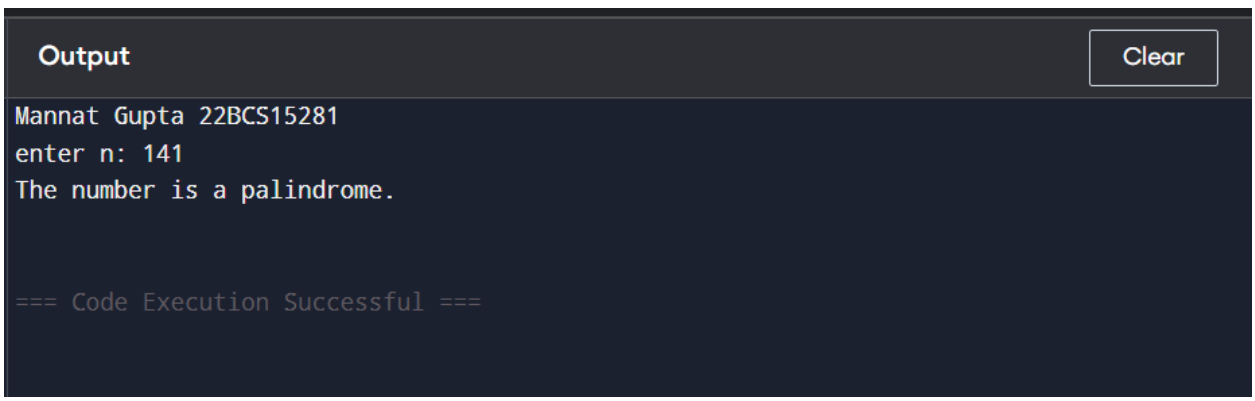
```
Output                                                    Clear
Mannat Gupta 22BCS15281
enter n:
6987
9


=== Code Execution Successful ===
```

8) Check if a Number is a Palindrome

Objective

Check whether a given number is a palindrome or not. A number is called a palindrome if it reads the same backward as forward. For example, 121 is a palindrome because reading it from left to right is the same as reading it from right to left. Similarly, 12321 is also a palindrome, but 12345 is not.

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

int main() {
    cout<<"Mannat Gupta 22BCS15281"<<endl;
    int n, original, reversed = 0;
    cout<<"enter n: ";
    cin >> n;

    original = n;
    while (n > 0) {
        int digit = n % 10;
        reversed = reversed * 10 + digit;
        n = n / 10;
    }

    if (original == reversed) {
        cout << "The number is a palindrome." << endl;
    } else {
        cout << "The number is not a palindrome." << endl;
    }

    return 0;
}
```

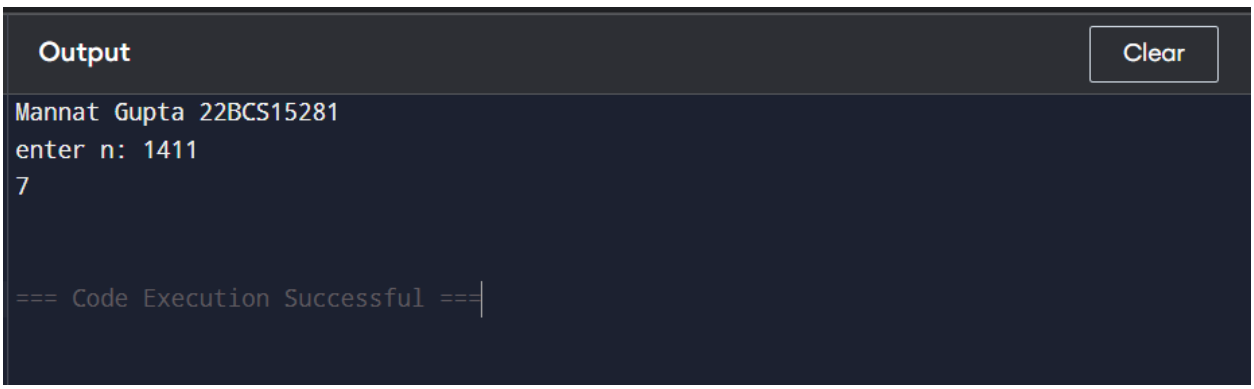


9) Find the Sum of Digits of a Number

Objective:

Calculate the sum of the digits of a given number n. For example, for the number 12345, the sum of the digits is 1+2+3+4+5=15. To solve this, you will need to extract each digit from the number and calculate the total sum.

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

int main() {

    cout<<"Mannat Gupta 22BCS15281"<<endl;

    int n, sum = 0;
    cout<<"enter n: ";
    cin >> n;

    while (n > 0) {
        int digit = n % 10;
        sum += digit;
        n /= 10;
    }

    cout << sum << endl;

    return 0;
}
```



10) Polymorphism with Shape Area Calculation.

Objective:

Create a program that demonstrates polymorphism by calculating the area of different shapes using a base class Shape and derived classes for Circle, Rectangle, and Triangle. Each derived class should override a virtual function to compute the area of the respective shape.

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

class Shape {
public:
    virtual double calculateArea() = 0;
};

class Circle : public Shape {
private:
    double radius;

public:
    Circle(double r) : radius(r) {}
    double calculateArea() {
        return 3.14 * radius * radius;
    }
};

class Rectangle : public Shape {
private:
    double length, width;

public:
    Rectangle(double l, double w) : length(l), width(w) {}
    double calculateArea() {
        return length * width;
    }
};

class Triangle : public Shape {
private:
    double base, height;

public:
    Triangle(double b, double h) : base(b), height(h) {}
    double calculateArea() {
        return 0.5 * base * height;
    }
};
```

```
void displayArea(Shape* shape) {
    cout << "Area: " << shape->calculateArea() << endl;
}

int main() {
    cout<<"Mannat Gupta 22BCS15281"<<endl;
    Circle c(5.0);
    Rectangle r(4.0, 6.0);
    Triangle t(3.0, 4.0);

    displayArea(&c);
    displayArea(&r);
    displayArea(&t);

    return 0;
}
```