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Lecturer Name

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This lecture provides a variety of loop-based programming problems along with their solutions in C++.

## **Example 1: Sum of Numbers from 1 to N**

**Problem:** Write a program to calculate the sum of numbers from 1 to N.

```
#include <iostream>
using namespace std;
int main() {
    int N, sum = 0;
    cout << "Enter a positive integer: ";
    cin >> N;
    for (int i = 1; i <= N; ++i) {
        sum += i;
    }
    cout << "The sum of numbers from 1 to " << N << " is: " << sum << endl;
    return 0;
}
Output:
Enter a positive integer:5
The sum of numbers from 1 to 5 is: 15</pre>
```

### **Output Example:**

For N = 5:

## **Example 2: Factorial of a Number**

**Problem:** Write a program to calculate the factorial of a given number.

## The solution code will be given during the lecture.



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# Example 3: Multiplication Table (جدول الضرب لرقم معين)

**Problem:** Write a program to print the multiplication table of a given number.

### The solution code will be given during the lecture.

### **Output Example:**

For num = 3:

 $3 \times 1 = 3$   $3 \times 2 = 6$   $3 \times 3 = 9$ ...  $3 \times 10 = 30$ 

## **Example 4: Solid Rectangle of Stars**

**Problem:** Write a program to print a solid rectangle of stars with given rows and columns.

Code:

The solution code will be given during the lecture.



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### **Output Example:**

For rows = 3 and cols = 4:

\* \* \* \* \* \* \* \* \* \* \* \*

## **Example 5: Hollow Rectangle of Stars**

**Problem:** Write a program to print a hollow rectangle of stars.

Code:

The solution code will be given during the lecture.

### **Output Example:**

For rows = 4 and cols = 5:

\* \* \* \* \* \* \* · · · \* \* \* \* \* \*

## **Example 6: Right-Angled Triangle of Stars**

**Problem:** Write a program to print a right-angled triangle of stars.

#### Code:

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

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cout << "Enter the number of rows: ";
cin >> rows;
for (int i = 1; i <= rows; ++i) {
 for (int j = 1; j <= i; ++j) {
 cout << "\* ";
 }
 cout << endl;
 }
return 0;
</pre>

#### **Output Example:**

For rows = 4:

\* \* \* \* \* \* \* \* \*

## **Example 7: Inverted Triangle of Stars**

**Problem:** Write a program to print an inverted triangle of stars.

Code:

The solution code will be given during the lecture.

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### **Output Example:**

For rows = 4:

- \* \* \* \* \* \* \*
- \* \*
- \*

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## **Example 8: Hollow Triangle of Stars**

**Problem:** Write a program to print a hollow triangle of stars.

### Code:

```
#include <iostream>
using namespace std;
int main() {
    int rows;
    cout << "Enter the number of rows: ";</pre>
    cin >> rows;
    for (int i = 1; i <= rows; ++i) {</pre>
         for (int j = 1; j <= i; ++j) {</pre>
              if (j == 1 || j == i || i == rows) {
    cout << "* ";</pre>
              } else {
                  cout << " ";
              }
         }
         cout << endl;</pre>
     }
    return 0;
```

### **Output Example:**

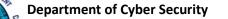
For rows = 5:

## **Example 9: Inverted Pyramid of Stars**

Problem: Write a program to print an inverted pyramid of stars.

### Code:

```
#include <iostream>
using namespace std;
int main() {
    int rows;
    cout << "Enter the number of rows: ";
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```



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```
cin >> rows;
for (int i = rows; i >= 1; --i) {
   for (int j = 1; j <= rows - i; ++j) {
      cout << " ";
   }
   for (int j = 1; j <= 2 * i - 1; ++j) {
      cout << "* ";
   }
   cout << endl;
}
return 0;
```

### **Output Example:**

For rows = 4: