جامعة المستقبل
AL MUSTAQBAL UNIVERSITY

قسم الامن السيبراني
DEPARTMENT OF CYBER SECURITY

SUBJECT:

PROGRAMMING FUNDAMENTALS

CLASS:

1ST STAGE

LECTURER:

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LECTURE: (8)

PRACTICAL EXAMPLES FOR LOOPS

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
```

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.

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 x 1 = 3
3 x 2 = 6
3 x 3 = 9
...
3 x 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.

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;
```

```
    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;
}
```

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.

Output Example:

For rows = 4:

```
* * * *
* * *
* *
*
```

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: ";
    cin >> rows;

    for (int i = 1; i <= rows; ++i) {
        for (int j = 1; j <= i; ++j) {
            if (j == 1 || j == i || i == rows) {
                cout << "* ";
            } else {
                cout << "  ";
            }
        }
        cout << endl;
    }
    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: ";
```

```
    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:

```
* * * * * * *
  * * * * *
    * * *
      *
```