**C++ 101 – Session 4**

**✅ 1. Introduction to the for Loop**

When you know exactly how many times you want to repeat a block of code, the for loop is the best tool to use. It is commonly used for counting and iterating through ranges or collections.

**📌 Syntax of a for Loop:**

for (statement 1; statement 2; statement 3) {

// code block to be executed

}

| **Part** | **Description** |
| --- | --- |
| Statement 1 | Runs **once** before the loop starts. Usually used to initialize a counter. |
| Statement 2 | The **condition** that must be true for the loop to continue. |
| Statement 3 | Executes **after each loop iteration**. Typically used to update the counter. |

**✅ 2. Example: Print Numbers 0 to 4**

for (int i = 0; i < 5; i++) {

cout << i << "\n";

}

**🔍 Explanation:**

* int i = 0; → Start counting from 0.
* i < 5; → Continue as long as i is less than 5.
* i++ → Increase i by 1 each loop.
* Output:

0

1

2

3

4

**✅ 3. Example: Print Even Numbers (0 to 10)**

for (int i = 0; i <= 10; i = i + 2) {

cout << i << "\n";

}

**🔍 Explanation:**

* The loop starts from 0 and increments by 2 each time.
* It only prints even numbers.
* Output:

0

2

4

6

8

10

**✅ 4. Common for Loop Pattern with if Statement**

cpp

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for (int i = 0; i < 10; i++) {

if (i % 2 != 0) {

continue; // skip odd numbers

}

cout << i << endl;

}

**💡 Purpose:**

* Skips odd numbers using continue.
* Only prints even numbers.

## 🛠️ 5. Task (In-Class Practice)

### ✅ ****Your Task:****

Write a C++ program using a for loop that does the following:

1. **Print a number grid** using **nested loops**
   * Outer loop = rows
   * Inner loop = columns
   * Example Output (3x3 grid):

1 2 3

1 2 3

1 2 3

1. **Explore and implement a for-each loop (range-based loop)**
   * Create an array of 5 numbers
   * Use a for-each loop to print each number
   * Example:

int numbers[] = {10, 20, 30, 40, 50};

for (int num : numbers) {

cout << num << endl;

}

### 💬 Notes:

* Use \t for spacing in the number grid if needed.
* Nested loops are useful for working with patterns, grids, and matrices.
* for-each loops are used for cleaner, simpler access to array elements.