

✓ Lab 3 — Looping Structures in C++

Objectives

By the end of this lab, you will be able to:

- Use **for**, **while**, and **do...while** loops.
 - Implement **counter-controlled**, **sentinel-controlled**, and **flag-controlled** loops.
 - Apply loops to real computational problems.
 - Use **break** and **continue** to control loop execution.
 - Practice debugging loop errors.
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Part 1 — for Loops

Question 1

Write a program that prints numbers from **1 to 10** using a for loop.

Answer:

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

int main() {
    for (int i = 1; i <= 10; i++)
        cout << i << " ";
    return 0;
}
```

Question 2

Print the **sum of integers from 1 to 100** using a for loop.

Answer:

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

int main() {
    int sum = 0;
    for (int i = 1; i <= 100; i++)
        sum += i;

    cout << "Sum = " << sum;
    return 0;
}
```

Part 2 — while Loops

Question 3

Write a program that asks the user to enter positive numbers.

Stop when the user enters **0**, then print the **total sum**.

(This is a *sentinel-controlled loop*.)

Answer:

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

int main() {
    int num, sum = 0;
    cout << "Enter positive numbers (0 to stop): ";
    cin >> num;

    while (num != 0) {
        sum += num;
        cin >> num;
    }

    cout << "Total sum = " << sum;
    return 0;
}
```

Question 4

Write a **counter-controlled** loop that asks the user to input **5 numbers** and prints the **average**.

Answer:

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

int main() {
    int num, sum = 0;
    for (int i = 1; i <= 5; i++) {
        cout << "Enter number " << i << ": ";
        cin >> num;
        sum += num;
    }
    cout << "Average = " << sum / 5.0;
    return 0;
}
```

Part 3 — do...while Loop

Question 5

Write a program that repeatedly asks for a password until the user enters **1234**.
Print **“Access Granted.”**

Answer:

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

int main() {
    int pass;
    do {
        cout << "Enter password: ";
        cin >> pass;
    } while (pass != 1234);

    cout << "Access Granted\n";
    return 0;
}
```

Part 4 — Debugging Loops

Question 6

What is wrong with this loop?

```
for (int i = 1; i <= 10; i--)  
    cout << i << endl;
```

Answer (Explanation):

- The loop uses `i--` which moves away from the stopping condition.
- It produces an **infinite loop**.
- It should be:

```
for (int i = 1; i <= 10; i++)
```

Part 5 — Using break and continue

Question 7 — Using break

Write a program that asks the user to enter numbers.

Stop immediately when the user enters a **negative number**, then print “**Loop stopped.**”

Answer:

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

int main() {
    int num;

    while (true) {
        cout << "Enter a number (negative to stop): ";
        cin >> num;

        if (num < 0)
            break; // exits the loop
    }

    cout << "Loop stopped.\n";
    return 0;
}
```

Question 8 — Using continue

Write a program that prints numbers from **1 to 10**, but **skips** printing the number **5** using the continue statement.

Answer:

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

int main() {
    for (int i = 1; i <= 10; i++) {
        if (i == 5)
            continue;    // skip number 5

        cout << i << " ";
    }
    return 0;
}
```