Lab's Scope:

- **Nested If**
- **Switch-Case**
- **Nested loops**

Problem 1:

Movie theaters often give ticket discounts to children (anyone 12 and under) and seniors (anyone 65 and older). The discount is 50%. Write a program where the user enters his age, and the program should output the ticket price based on his age, assuming that the ticket price before the discount is 200 L.E.

Sample run 1:

```
Enter your age: 1010
Child Movie ticket price is 100 L.E.
```

Sample run 2:

```
Enter your age: 67
Senior Movie ticket price is 100 L.E.
```

Sample run 3:

```
Enter your age: 35
Movie ticket price is 200 L.E.
```

Solution:

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

int main() {
    int userAge;
    cout << "Enter your age: ";
    cin >> userAge;

    if (userAge <= 12) {            // Age 12 and under
        cout << "Child Movie ticket price is 100 L.E." << endl;
    }
    else if (userAge >= 65) {       // Age 65 and older
        cout << "Senior Movie ticket price is 100 L.E." << endl;
    }
    else {                          // All other ages
        cout << "Movie ticket price is 200 L.E." << endl;
    }
    return 0;
}
```

Problem 2:

In the National Football League, each player has a T-shirt number in specific ranges according to his position. Below is the table showing the players' positions, and the range of numbers that could be written on their T-shirts. Write a program where the user enters a T-shirt number, and the program outputs the player's position.

Player's position	T-shirt number ranges
Line Backer	40 to 59 or 90 to 99
Tight end	30 to 39 or 80 to 89
Defensive Lineman	20 to 29 or 60 to 79
Quarter Back	From 1 to 19

Sample run:

```
Enter player's t-shirt number: 25
The player's position is Defensive Lineman.
```

Solution:

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

int main() {
    int number;
    cout << "Enter player's t-shirt number:";
    cin >> number;

    if ((number >= 40 && number <= 59) || (number >= 90 && number <= 99))
        cout << "The player's position is Line Backer." << endl;
    else if ((number >= 30 && number <= 39) || (number >= 80 && number <= 89))
        cout << "The player's position is Tight end." << endl;
    else if ((number >= 20 && number <= 29) || (number >= 60 && number <= 79))
        cout << "The player's position is Defensice Lineman." << endl;
    else if (number >= 1 && number <= 19)
        cout << "The player's position is Quarter Back." << endl;
    else
        cout << "Invalid number." << endl;
    return 0;
}
```

Problem 3:

Write a program where the user is asked to enter three numbers. The program then finds out the largest number among the three using nested If statements. Then the program displays the largest number with a proper message.

Solution:

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

int main() {

    int n1, n2, n3;

    cout << "Enter three numbers: ";
    cin >> n1 >> n2 >> n3;

    // check if n1 is the largest number
    if (n1 >= n2 && n1 >= n3)
        cout << "Largest number: " << n1;

    // check if n2 is the largest number
    else if (n2 >= n1 && n2 >= n3)
        cout << "Largest number: " << n2;

    // if neither n1 nor n2 are the largest, n3 is the largest
    else
        cout << "Largest number: " << n3;

    return 0;
}
```

Problem 4 (Lecture exercise):

Write a program using switch-case statements to create a simple calculator. The user should enter a mathematical operator, then two numbers and the program should output the result of the mathematical equation.

Sample run:

```
Enter an operator (+,-,*,/):
+
Enter two numbers:
5
6
5 + 6 = 11
```

Solution:

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

int main() {
    char oper;
    float num1, num2, result;
    cout << "Enter an operator (+, -, *, /): ";
    cin >> oper;
    cout << "Enter two numbers: " << endl;
    cin >> num1 >> num2;

    switch (oper) {
    case '+':
        result = num1 + num2;
        break;
    case '-':
        result = num1 - num2;
        break;
    case '*':
        result = num1 * num2;
        break;
    case '/':
        result = num1 / num2;
        break;
    default:
        result = 0;
    }
    cout << num1 << " " << oper << " " << num2 << " = " << result;

    return 0;
}
```

Problem 5:

In a supermarket, assume a user would buy 5 items in any order from the following products shown in the table below. Write a program where the user enters the 5 items as characters and the program calculates the total bill.

Product	User input	Price per item
Yogurt	'Y' or 'y'	5
Coffee	'C' or 'c'	200
Tea	'T' or 't'	30
Milk	'M' or 'm'	45

Sample run:

```
Enter 5 items:
Y
T
M
M
C
Total Bill = 325
```

Solution:

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

int main() {
    char product;
    int totalPrice = 0;
    cout << "Enter 5 items:" << endl;
    for (int i = 1; i <= 5; i++)
    {
        cin >> product;
        switch (product)
        {
        case 'Y':
        case 'y': totalPrice += 5;
            break;

        case 'C':
        case 'c': totalPrice += 200;
            break;

        case 'T':
        case 't': totalPrice += 30;
            break;

        case 'M':
        case 'm': totalPrice += 45;
            break;

        default: cout << "Invalid product";
            break;
        }//end of switch
    }//end of for loop
    cout << "Total price = " << totalPrice << endl;
    return 0;
}
```

Problem 6 (Lecture exercise):

Write a program that will output the triangle shown below:

Solution:

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

int main() {

    for (int i = 5; i >= 1; i--)
    {
        for (int j = i; j >= 1; j--)
        {
            cout << "* ";
        }
        cout << endl;
    }

    return 0;
}
```

Problem 7:

Update your program from exercise 6 to output alphabet letters instead of *, as shown below:

```
A B C D E
A B C D
A B C
A B
A
```

Solution:

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

int main() {
    int letter = 'A';
    for (int i = 5; i >= 1; i--)
    {
        for (int j = i; j >= 1; j--)
        {
            cout << (char)letter << " ";
            letter++;
        }
        cout << endl;
        letter = 'A';
    }

    return 0;
}
```

Problem 8:

Write a program that will output the triangle shown below:**Solution:**

```
Enter number of rows: 4
1
2 3
4 5 6
7 8 9 10
```

Solution:

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

int main() {

    int rows, number = 1;

    cout << "Enter number of rows: ";
    cin >> rows;

    for (int i = 1; i <= rows; i++) {
        for (int j = 1; j <= i; j++) {
            cout << number << " ";
            number++;
        }

        cout << endl;
    }

    return 0;
}
```